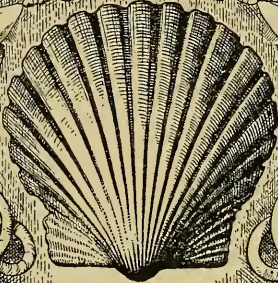


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OF
CONCHOLOGY.

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JOHN W. TAYLOR, F.L.S.,
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PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY
OF GREAT BRITAIN AND IRELAND,
PUBLISHED UNDER THE DIRECTION OF THE COUNCIL.

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The Authors of the several papers contained in this volume are themselves accountable for all the statements and reasonings which they have offered. In these particulars the Editors or the Society must not be considered as in any way responsible.

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THE
JOURNAL
OF
CONCHOLOGY.

THE LAND AND FRESHWATER SHELLS OF THE
NEIGHBOURHOOD OF NORTH BERWICK,
HADDINGTONSHIRE.

By REV. JOHN McMURTRIE, M.A., EDINBURGH.

Read before the Conchological Society, Dec. 15th, 1888, and recommended for publication
by the referees, W. Nelson, W. Denison Roebuck, and J. W. Taylor).

ALL the names are authenticated by specimens, which are here-
with presented to the Museum of the Conchological Society,
at Leeds.

North Berwick is not to be confounded with Berwick-upon-
Tweed. It is near the centre of the coast line of East Lothian.
The rocks are chiefly igneous, with red sandstone, and lime-
stones of the carboniferous series. North Berwick Law rises to
the height of 640 feet. The Bass Rock, formerly a state prison,
now uninhabited except by sheep, rabbits, and countless solan
geese and other sea-fowl, is of columnar basalt, 400 feet high.
It rises precipitously from the sea, about a mile and a half from
the shore. Traprain Law is about nine miles inland. Rhodes
Farm is a mile eastward along the shore from North Berwick.
Binning Wood is between North Berwick and Dunbar. Dunbar
is about ten miles east from North Berwick. Going westwards
from North Berwick by the Golfing Links, there are some miles

of rough ground, sandhills with sea-side grasses, &c. Gullane Links are fully five miles off, and Luffness Links are a mile further. On Luffness Links there is a line of connected fresh-water marshes, never dried up, and several ponds which are sometimes nearly dry in summer. One pond, called the ice-pond, is on the Links at the foot of Peffer Burn, so near the sea that the spray comes over. It was artificially squared many years ago, for the purpose (it is said) of furnishing Luffness ice-house with ice. It is never quite dry. At the west end of Luffness Links the Peffer Burn is crossed, and a little further on is the village of Aberlady. The rainfall at Drem, five miles from North Berwick, is said to be the least in Scotland.

Sphærium corneum L.—Marsh on Luffness Links.

Pisidium fontinale Drap.—Small pond on Rhodes Farm.

[This large form has been named *fossarinum* by Herr Clessin].

P. pusillum Gmelin.—Shallow marsh on Luffness Links, and Luffness Ice-pond.

P. pusillum var. *obtusalis* Lam.—With *P. pusillum*.

P. roseum Scholtz.—With *P. pusillum*.

Planorbis nitidus Müll.—Marsh on Luffness Links, rare.

P. albus Müll.—A dead shell in shell-sand cast up on beach, North Berwick.

P. complanatus L.—Marsh on Luffness Links. This mollusk is rare in Scotland.

P. contortus L.—Marsh on Luffness Links.

P. contortus var. *minor* Taylor.—With type.

Physa fontinalis L.—Marsh on Luffness Links.

P. fontinalis var. *oblonga* Jeff.—With type.

Limnæa peregra var. *acuminata* Jeff.—Small pond on Rhodes Farm.

L. peregra Müll. var. *maritima* Jeff.—Pond, sometimes nearly dry, at east end of Luffness Links.

L. stagnalis L. var. *variegata* Hazay.—A pale, small, solid form, with white varices—abundant in Luffness ice-pond close to the sea.

- L. palustris* Müll.—Luffness Links. Some with dark-brown rib, others with varices.
- L. palustris* var. *tincta* Jeff.—With type.
- L. truncatula* var. *minor* Moq.—North Berwick.
- Ancylus fluviatilis* Müll.—Glen Burn, North Berwick.
- A. fluviatilis* var. *albida* Jeff.—A dead shell cast up on shore.
- Arion ater* L.—Moderately common. No specimen preserved.
- A. hortensis* Fér.—Common. No specimen preserved.
- Limax agrestis* L.—Very common. No specimen preserved.
- L. arborum* B.-Ch.—Bass Rock.
- L. maximus* L.—North Berwick, occasionally. Finely marked.
- Succinea elegans* var. *ochracea* Betta.—At west and east ends of Luffness Links.
- Vitrina pellucida* Müll.—North Berwick and Dunbar.
- Zonites cellarius* Müll.—North Berwick.
- Z. cellarius* var. *complanata* Jeff.—North Berwick.
- Z. alliarius* Mill.—North Berwick.
- Z. alliarius* var. *viridula* Jeff.—Bass Rock.
- Z. nitidulus* var. *nitens* Mich.—Dunbar.
- Z. contractus* Westl.—Binning Wood. [This small form has been differentiated by Westerlund from *crystallinus* under the foregoing name].
- Z. purus* var. *margaritacea* Jeff.—Binning Wood.
- Z. fulvus* Müll.—Binning Wood, and Luffness.
- Helix aspersa* Müll.—Abundant at North Berwick and on the Bass Rock.
- H. aspersa* var. *zonata* Moq.—North Berwick, somewhat common.
- H. aspersa* var. *undulata* Moq.—This type is common, but well-marked specimens are rare.
- H. aspersa* var. *flammea* Picard.—With gradations to the species.
- Varieties approaching *nigrescens* and *obscurata* are occasionally found.
- Helix nemoralis* L.—Common. A specimen with the bands

- pale, North Berwick. Specimens with the banding (12345) and (123)(45) are common on Rhodes farm.
- H. nemoralis** var. *libellula* Risso.—Specimens with the banding 00000, very common, and 00300 somewhat common.
- H. nemoralis** var. *rubella* Moq.—Specimens with the banding 00000, common, and 00300 not uncommon.
- H. nemoralis** var. *libellula-bimarginata*.—Not uncommon.
- H. nemoralis** var. *rubella-bimarginata*.—Not uncommon.
- H. nemoralis** var. *minor* Moq.—Occasionally.
- H. nemoralis** var. *roseo-labiata* Taylor.—Rare, near sea four miles west from North Berwick. I have taken four specimens.
- H. nemoralis** var. *castanea* Moq.—Not abundant.
- H. hortensis** Müll.—Rare here. In a limited locality near sea two miles east from North Berwick. Also two miles inland very rare, where *H. nemoralis* is plentiful.
- H. hortensis** var. *arenicola* Macgill.—Very rare, two miles inland.
- H. arbustorum** L.—Only on the east shore, where it is plentiful. Road-side at foot of Traprain Law.
- H. arbustorum** var. *major* Pfr.—East shore, rare.
- H. aculeata** Müll.—Luffness.
- H. arbustorum** var. *minima* Pfr.—East shore, occasionally.
- H. arbustorum** var. *flavescens* Moq.—East shore, rare.
- H. arbustorum** var. *cincta* Taylor.—East shore, rare.
- H. hispida** L.—North Berwick.
- H. hispida** var. *subrufa* Moq.—Dunbar.
- H. hispida** var. *nana* Jeff.—North Berwick.
- H. caperata** Mont.—North Berwick, common near the sea.
- H. caperata** var. *major* Jeff.—Abundant in a cornfield near the sea a mile east from North Berwick in those autumns in which the crop has been corn.
- H. rotundata** Müll.—North Berwick, Dunbar, and Bass Rock, common. Also a variety approaching var. *turtoni* Flem., not uncommon at North Berwick.

- H. rotundata** var. **alba** Moq.—Bass Rock, as common as the species.
- H. pygmæa** Drap.—Luffness, and Binning Wood, among beech leaves.
- H. pulchella** Müll.—Luffness, among stones, common.
- Bulimus obscurus** Müll.—North Berwick, among stones at water-works, and at roots of herbage close to the sea.
- Pupa umbilicata** Drap.—North Berwick and Bass Rock, plentiful.
- P. umbilicata** var. **edentula** Moq.—North Berwick and Bass Rock, occasionally. Also specimen, approaching variety *albina* Moq., Luffness, rare.
- P. marginata** Drap.—North Berwick and Luffness, not so common as the edentulous form.
- P. marginata** var. **edentula** Moq.—North Berwick and Luffness, somewhat abundant among stones.
- Vertigo antivertigo** Drap.—Luffness, among stones, not common.
- V. pygmæa** Drap.—Luffness and North Berwick Law, among stones.
- V. edentula** Drap.—Luffness, not common.
- V. minutissima** Hartm.—One specimen on North Berwick Law, living with *H. pygmæa*; one specimen cast up on beach in shell-sand.
- Cochlicopa lubrica** Müll.—Luffness, plentiful among stones.
- C. lubrica** var. **lubricoides** Fér.—With type.
- Carychium minimum** Müll.—Luffness and Binning Wood, among beech leaves.

NOTE.—I have not found *Clausilia rugosa* Drap., though it probably occurs. A few years ago I turned loose in the glen at North Berwick a number of *Clausilia laminata* Mont., and *C. rolphii* Gray (from Buriton, Hants.). It is not likely they have withstood the climate. I have not introduced any other mollusks.

SOME FURTHER NOTES ON MARINE
SHELLS COLLECTED AT PORT ELIZABETH,
SOUTH AFRICA, WITH
DESCRIPTIONS OF SOME NEW SPECIES.

BY G. B. SOWERBY, F.L.S., F.Z.S.

(Read before the Conchological Society, May 2nd, 1888, and recommended for publication
by the referees, J. C. Melvill and E. A. Smith).

SINCE the publication in the *Journal of Conchology*, January, 1886, of a list of shells collected in the above locality, with descriptions of some new species, my friends, and particularly S. D. Bairstow, Esq., F.L.S., have been diligent in the search for fresh material, with the result that I am able to add considerably to the list, and to describe a few species hitherto unknown to science.

Argonauta Böttgeri (*Maltzan*).—Erroneously quoted by me as *A. kochiana* (Dunker) a perfectly distinct species, which as far as I know has never been found at the Cape. I have had specimens of *A. Böttgeri* from Mauritius and from Hong-Kong, as well as from South Africa. They vary considerably in the prominence of the tubercles and closeness of the ribs.*

Recluzia Montrouzieri *Souverbie*.—The type described in the *Journal de Conchyliologie*, 1872, was found at Art Island, New Caledonia. The specimen Mr. Ponsonby has submitted to me, which was found at Port Elizabeth, is somewhat larger, about an inch in length.

Bullia callosa var. *sulcata*.—Mr. Bairstow has sent me a variety of this species spirally grooved throughout. I at

* *Vide* Smith, *Ann. Mag. Nat. Hist.*, 1887, vol. xx., p. 409, pl. xviii., figs. 1—6.

first thought it might be specifically distinct, but there seems to be no character besides the grooves by which to distinguish it, so I propose to call it variety *sulcata*.

Pleurotoma Fultoni Sowerby, Proc. Zool. Socy., 1888.—

This species, described and figured for the first time this year, has long been known to me, but the specimens were so defective that I thought it best to wait for a more nearly perfect one before attempting to describe the species. It is about an inch long.

Pleurotoma Wilkiæ Sowerby, n. sp.—*Testa elongato-turrita,*

fusca; spira per-elongata, apice obtusiusculo, papillari; anfractus 8, spiraliter irregulariter sulcati, longitudinaliter oblique vix conspicue striati; primi 2-3, convexi, rotundati; cæteri angulati, ad angulum tuberculis minutis, pallidis, fusco interpunctatis ornati; supra angulum concavi, infra suturam lira sub-nodulosa, fusco articulata iustructi; infra angulum leviter convexi; anfractus ultimus breviusculus; apertura latiuscula, intus fusca; labrum crenulatum, superne sinu latiusculo et profundiusculo emarginatum; inferne haud productum; columella leviter contorta, curta, haud producta.

Long. 15., maj. diam. 5 mill., apert. 4½ longa, 2 lata.

Purpura (Vexilla) vexillum Chemnitz.—This species, the

type of the little group for which Swainson proposed the generic name of *Vexilla*, is very rare at Port Elizabeth, but not uncommon on the Mauritian coast; it is also said to be found among the Pacific Islands.

Triton (Epidromus) nitidulus var. Sowerby.—A single

specimen of this species has been sent to me by Mr. Bairstow, from Port Elizabeth. It differs from the typical form found on the Mauritian coast in being more distinctly granulated. I was at first inclined to consider it distinct, but find the species liable to considerable variation.

Ranella granifera Lamarck.—One small specimen.

Voluta Africana *Reeve*.—Only worn and broken specimens of this very rare species have hitherto been found.

Marginella piperata *Hinds*.—Several distinct varieties besides the var. *albocincta* already mentioned, which we may call as follows:—var. *strigata*, longitudinally streaked, mostly smaller than the type; var. *lutea*, yellowish, with brown spots and short linear markings, usually larger than the type; var. *lineata*, with fine transverse dotted lines.

Mitra merula n. sp.—*Testa elongata, snbfusiformi, nigro-fusca, nitida, longitudinaliter costata, spiraliter sub-obsolete sulcata; spira elata, apice obtusiusculo; anfractus 7, leviter convexi; sutura impressa; anfr. ultimus, ad basin leviter attenuatus; apertura elongata; fauce fusco-nigra, columella albida, quadriplicata, labrum mediocriter arcuatum, haud sinuatum.*

Long. 17, maj. diam. 6, apertura longa 7, lat. 2 mill.

A small, nearly black species allied to *M. ebenus*.

Marginella floccata n. sp.—*Testa sub-ovata, grisea, maculis albidis floccatis aspersa, maculis minutis sparsis nigro-fuscis notata; spira conica, albida, maculis grandibus fusco-griseis picta, mediocriter elata, apice obtuso; anfractus 5, planato declives, sutura leviter impressa, ultimus obtuse angulatus, infra angulum levissime convexus, lateribus rectiusculis; apertura mediocriter lata, columella rectiuscula, quadriplicata, labrum incrassatum, reflexum, album, margine externo nigro-fusco notato.*

Long. 29, maj. lat. 15 mill.

A beautiful specimen of this species in perfect condition has been submitted to me by Mr. Bairstow. It is the only one I have seen excepting a couple of much worn and almost colourless shells, which I take to belong to the same species. The shell may be regarded as intermediate between *M. piperata* and *M. mosaica*.

Marginella Metcalfei *Angas*.—A small white species of the form of an *-Erato*. The specimens from Port Elizabeth scarcely differ from the Australian.

Marginella inconspicua *Sowerby*.—A small white subpellucid species, somewhat like *M. alabaster*, but much smaller.

Columbella sagena *Reeve*.—A species of very wide distribution, but seldom found on the South African coast.

Natica imperforata *Sowerby*.—Reeve's *N. genuana* belongs to this species.

Natica (Ruma) Simicæ *Chemnitz*.—Not uncommon in the Indian Ocean, but rare at the Cape.

Narica Souleyetiana *Recluz*.—One dead shell.

Solarium (Torinia) variegatum *Gmelin*.—Common in the Indian and Pacific Oceans.

Terebra cingulifera *Lamarck*.—One small worn specimen. Common on the Mauritian coast and in various other localities.

Conus Natalensis *Sowerby*.—Mr. Bairstow has a specimen of each of the two striking varieties of this rare and interesting species.

Conus Bairstowi n. sp.—*Testa turbinata, ponderosa, albida, maculis fuscis sub-distantibus, plerumque quadratis picta, ad basim fusco tincta; spira breviscula; anfractus 8, levisime convexi, haud striati; sutura irregulariter impressa; anfractus ultimus superne rotunde angulatus, infra angulum convexiusculus, infra medium sulcis angustis confertis undulatis oblique sculptus; apertura mediocriter lata, basim versus aliquanto latior, fauce dilute fusco tincta.*

Long. 50, maj. diam. 27 mill.

A characteristic species, spotted something like *C. eburneus*, and presenting some similarity to the West Indian *C. leoninus* and *spurius*. It is closely wave-striated towards the base, which is conspicuously tinged with brown. I have as yet seen only a single specimen of this species.

Conus fulvus, n. sp.—*C. testa subcylindrica, fulva, zona fusca obscurissima paulo inframedium cincta; spira breviter conica, ad apicem rufo-fusca; anfractus 6, levissime convexi, obcurissime spiraliter striati; anfractus ultimus superne rotunde angulatus, infra angulum convexus, basim versus paulo attenuatus, oblique sulcatus; apertura latiuscula, antice paulo latior, fauce dilute rosaceo-fusca.*

Long. 21, maj. diam. 11 mill.

The specimen is somewhat worn, but seems sufficiently distinct from *C. rosaceus*, to which it is allied.

Cypræa citrina Gray.—This rare species undoubtedly belongs to the Cape fauna; it has also been found on the coast of Madagascar.

Cypræa vitellus Linn.—This common Indian Ocean species has been taken living at Port Elizabeth in various stages of growth.

Cypræa helvola Linn.—Very common in the Indian Ocean.

Cypræa (Cypræovula) amphithales Melvill, "Mem. Manch. Lit. and Phil. Soc., 1888."—A remarkable shell, the smooth back of which is like *C. algoensis*. It has a spotted margin, and the base is ridged like *C. capensis*, but rather more finely. Mr. Bairstow has a specimen in perfect condition.

Cypræa (Trivia) vesicularis Gaskoin.—Rarely found in good condition.

The following **Cyprææ** common in the Indian and Pacific Oceans have been found dead at Port Elizabeth, but it is doubtful whether many of them properly belong to the South African fauna :—*C. arabica* (Linn.), *C. annulus* (Linn.), *C. caput-serpentis* (Linn.), *C. fimbriata* (Gmel.), *C. felina* (Gmel.), *C. helvola* (Linn.), *C. erosa* (Linn.), *C. carneola*, *C. caurica* (Linn.), *C. mauritiana* (Linn.), *C. Lamarckii* (Gray), *C. Isabella* (Linn.), *C. ocellata* (Linn.), *C. moneta* (Linn.), *C. tabescens* (Soland), *C. zigzac* (Linn.), *C. staphylea* (Linn.).

Ovulum (Birostra) aurantium, n. sp.—*Testa elongata, leviter inflata, polita, sub-pellucida, aurantia, utrinque acuminata; postice leviter producta, acuta; antice leviter contracta; apertura postice augusta, sinuata, antice multo latior; labrum incrassatum, utrinque leviter sinuatum.*

Long. 23, maj. lat. 7 mill.

A single specimen in perfect condition has been sent me by Mr. Bairstow; it is allied to *O. spelta*, but more elongated and of a deep orange colour.

Turritella Knysnaensis *Krauss.*—A specimen from Port Elizabeth has been submitted to me by Mr. Ponsonby.

Littorina Knysnaensis *Krauss.*

Nerita plicata *Linn.*

Nerita polita *Linn.*

Nerita albicilla *Linn.*

Nerita plexa *Chemnitz.*

Cerithium vulgatum *Linn.*—A small pale variety.

Cerithium contractum *Sowerby.*

Turbo coronatus *Gmelin.*—A small specimen.

Trochus (Oxysteles) zonatus *Wood.*

Trochus (Oxysteles) niger *A. Adams.*

Trochus (Gibbula) Benzi *Krauss.*

Trochus (Gibbula?) Ponsonbyi Sowerby, "Proc., Zool. Soc., 1888."—A shell of very distinct form. It is impossible to say in the absence of the operculum whether it is a Trochus or a Turbo, but it seems most likely to belong to the *Gibbula* section of *Trochus*.

Clanculus Laceyi n. sp.—*Testa conica, griseo-fusca, ubique minute seriatim granulata; anfractus 6, conspicue biangulati; anfractus ultimus ad basin leviter convexus; umbilicus albus, profunde excavatus; apertura obliqua, fauce iridescens, obsolete sulcati; columella superne obscure plicata, ad basin conspicue uniplicata.*

Alt. 14, maj. lat. 13 mill.

An interesting bi-angulated species, more conical than *C. carinatus*.

Monodonta Australis *Lamarck*.—Two specimens with the spire less elevated than in the prevailing Australian form.

Trochita chinensis *Linn.*, var.—The Port Elizabeth specimens are mostly purple-tinted.

Fissurella mutabilis *Sowerby*.

Fissurella neglecta *Desh.*—Scarcely distinguishable from Mediterranean specimens.

Fissurella robusta n. sp.—*Testa elevata, solida, fusca, lævigata, vel concentricè obsolete corrugata; antice curta, postice turgida; foramine mediocri, ovali, ad $\frac{1}{4}$ longitudinis sito.*

Long. 40, maj. lat. 34, alt. 25 mill.

The shell lent me by Mr. Ponsonby is in a very worn condition, so that it is impossible from it to give a full description of the species; but it is of a peculiar robust and elevated form, and its surface appears to be nearly smooth without any signs of radiating ridges.

Fissurella parvi-forata n. sp.—*Testa oblongo-elliptica, convexo elevata, alba, costis numerosis confertis complanatis rugosis (interstitiis puncturatis) sculpta; margine crenulato; foramine minutissimo, sub-circulari, $\frac{1}{4}$ long. sito.*

Long. 17, lat. 11, alt. 8 mill.

A white species with a very small orifice, from St. Simon's Bay, kindly given me by the Rev. Dr. Churchill Babington.

Macrochisma producta *A Adams*.—A dead specimen of this Australian species found at Port Elizabeth by Mr. Bairstow.

Patella conspicua *Philippi*.

Diala capensis n. sp.—*Testa elongata, angusta, albida, spira turrata; anfractus 10, lente accrescentes, convexi, costis longitudinalibus angulatis, superne et inferne evanidis, armati; sutura impressa; anfr. ultimus infra medium obscurissime liratus; apertura ovata.*

Long. 9 $\frac{1}{2}$, maj. diam. 3, apert. long. 2, lat. 1 $\frac{1}{2}$ mill.

A dead white shell, ribbed like *Rissoa similis*, with a very long turreted spire. A single specimen submitted to me by Mr. Ponsonby.

Tornatina soluta Quoy and Gaimard.

Philine aperta Linn.—Scarcely distinguishable from British specimens.

Haminea Natalensis Sowerby.

Hydatina physis Linn.

Aplysia punctata Cuvier.

Siphonaria aspera Krauss.

Siphonaria capensis Krauss.

Siphonaria Natalensis Krauss.

Siphonaria variabilis Krauss.

Mactra decora Deshayes.—The specimen submitted to me by Mr. Ponsonby from Port Elizabeth differs somewhat from the Red Sea and Indian Ocean specimens; but the difference is scarcely sufficient to found a species.

Tellina cumana Hanley.—Scarcely differing from Mediterranean specimens.

Tellina rosea Spengler.—A fine characteristic species, apparently belonging exclusively to the South African fauna.

Tellina orbicularis n. sp.—*Testa sub-orbicularis, solidiuscula, æquivalvis, sub-æquilatera, leviter inflata, albida, prope umbones luteo tincta, concentricè irregulariter striata; margine antico semicirculari, margine postico truncato; valva sinistra postice sinuatim depressa, dextra sinuatim elevata; umbones leviter prominentes, approximati.*

Diam. antero-post. 50, umbono marg. 45 mill.

A species of nearly circular form, posteriorly sinuated. A single specimen in perfect condition from Port Elizabeth.

Psammotellina capensis n. sp.—*Testa oblonga compressa utrinque rotundata, tenuissima, pellucida, fusco cornea, purpurea-fusco tincta et radiata; umbonibus minutis, acutis approximatis; margo dorsalis anticus brevis, declivis,*

arcuatus; *posticus elongatus*, *declivis*; *margo ventralis leviter arcuatus*; *ligamentum externum parvum*; *cardo normalis*.

Diam. antero-post. 13, *umbo-marg.* 8, *crass* 3 mill.

A small species of a thin horny substance, rayed with dark purplish brown.

Lucina columbella *Lamarck*.

Donax serra *Gmelin*.—A large species, common on the South African coast, which seems to be its principal, if not exclusive, habitat.

Donax sordida *Reeve*.—A very distinct species which I have not seen from any other locality.

Donax exarata *Krauss*.—A remarkable species with oblique ridges; allied to *D. Madagascariensis*, but distinct, and I believe confined to the South African coast.

Gastrana Guinaica *Chemnitz*.—More angular than the British species.

Dosinia consobrina *Deshayes*.

Dosinia hepatica *Lamarck*.

Venus verrucosa var. *capensis*.—Transversely oblong as compared with the British and Mediterranean specimens.

Tapes corrugata *Deshayes*.—A curiously sculptured species, common at the Cape.

Tapes paupercula *Chemnitz*.

Gardita (Thecalia) concamerata *Brug*.—A very remarkable sub-genus, represented by only one species which seems to inhabit exclusively South African and Australian waters. It has been quoted (I believe erroneously) as West Indian.

Cardium Natalense *Krauss*.

Modiola capensis *Krauss*.

Modiola auriculata *Krauss*.

Arca lactea *Linn*.—Differing but little from British specimens.

Arca obliquata *Gray*.

Arca Kraussi *Phil*.

Pecten pusio var. *alba*.—A white variety of the Mediterranean species.

Lima rotundata *Sowerby*.—Resembling the Mediterranean *L. inflata*, but rounder.

Terebratulina radiata *Sowerby*.—Of the form of *T. caput-serpentis*, but purple rayed. The shells are found in groups attached to sea-weed, and the species seems peculiar to the South African coast.

Kraussia rubra *Pallas* (= *Terebratula capensis* *Krauss*).

EXPLANATION OF PLATE I.

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| 1. <i>Conus fulvus</i> , n. sp. | 12. <i>Conus Bairstowi</i> , n. sp. |
| 2. <i>Marginella lineolata</i> , J.C., 1886. | 13. <i>Latirus Rousi</i> , J.C., 1886. |
| 3. " <i>Bairstowi</i> , " | 14. " <i>Bairstowi</i> , J.C., 1886. |
| 4. " <i>floccata</i> , n. sp. | 15. <i>Ovulum aurantium</i> , n. sp. |
| 5. <i>Fissurella robusta</i> , n. sp. | 16. <i>Clanculus Laceyi</i> , n. sp. |
| 6. " " | 17. <i>Diala capensis</i> , n. sp. |
| 7. " <i>parvi-forata</i> , n. sp. | 18. <i>Euthria fusco-tincta</i> , J.C., 1886. |
| 8. <i>Cominella angusta</i> , J.C., 1886. | 19. <i>Psammotellina capensis</i> , n. sp. |
| 9. " <i>puncturata</i> , " | 20. <i>Tellina orbicularis</i> , n. sp. |
| 10. " <i>unifasciata</i> , " | 21. <i>Pleurotoma Wilkieæ</i> , n. sp. |
| 11. <i>Mitra merula</i> , n. sp. | 22. " <i>Rousi</i> , J.C., 1886. |

Colonizing Land and Freshwater Shells at Brora, East Sutherland.—Of the shells mentioned in my last communication on this subject (*Jour. Conch.*, v., p. 192), of both *Helix Cantiana* and *H. rufescens*, I found the young in my garden this season. *H. virgata* is abundant near the sea, E. Brora. *H. pisana* is more tender—a few survive as yet. *Bulimus acutus* not as numerous this season, E. Brora. *Clausilia biplacata*—New Clyne waterfall, Brora bridge, and garden seems likely to hold its ground. *C. parvula* (Normandy), breeding last summer in my garden, but cannot trace those laid down near the sea, E. Brora. Of *Cyclostoma elegans*, *Testacella halioidea*, and *Analia marginata* I have lost all trace in my garden, but they may still survive.—W. BAILLIE.

ON THE CIRCUMSTANCES ATTENDING DEATH,
BY DROWNING, OF *HELIX ASPERSA*.

BY DR. J. W. WILLIAMS, M.A.

(Read before the Conchological Society, May 2nd, 1888, and recommended for publication
by the referee, Rev. A. H. Cooke).

WHEN one of the Mollusca is required in an expanded condition for anatomical purposes, it is usual to kill it by drowning in water. This process occupies generally about two days, and as the Mollusca are known to be extremely tenacious of life, even when deprived of oxygen, it occurred to me that a note containing observations of the phenomena attending drowning, and observations of an autopsy made immediately succeeding death, would not be uninteresting to those conchologists who are interested, as I am, in their physiology. Consequently, requiring dead expanded specimens of *Helix aspersa* for anatomical work, I placed several in a cylindrical glass, filled completely with water and tightly sealed so as not to admit air, on the morning of April 28th, and noted the following results. At first the ommatophores are not fully extended—the retractor muscles, which were plainly visible, keeping, probably under the influence of reflex actions, the apices of the tentacles invaginated to a slight extent, on account of, no doubt, the extreme sensitiveness of the cornea to water; the pulmonary aperture opens and closes normally, but, after the lapse of two or three hours, the action becomes slower and slower, and finally ceases in an expiration; the penis, if everted, is seldom returned back again to its general position in the cavity of the prostoma; the whole of the prostoma on its upper surface becomes of a lighter cinereous colour, the purplishness of the proximal extremity gradually disappears, the whole swells up with fluid absorbed from the water, the reticulation with the tuberculæ in the areolæ of the meshes be-

come more pronounced, the mantle-collar becomes swollen and reflected over the peritreme of the shell, the under surface of the foot becomes of an opalescent white colour, the foot is expanded or complicated, and, at last, the retractor muscles of the tentacles lose their contractility and become elongated to their normal length, the ommatophores become completely everted, the sensitiveness of the cornea is lost, and the animal dies. The autopsy made immediately after death (April 30th) revealed the following :—The buccal mass was swollen, the mantle-cavity was tensely distended with fluid, the cœlum was distended with fluid, the whole enteric tract was swollen, the heart and venous sinuses were tense and swollen with diluted blood, the digestive gland [gland of mid-intestine (“Mitteldarmdrüse”) of Frenzel] was enlarged, the dart-sac was enlarged and more clavate than pyriform in shape, the follicles of the hermaphrodite gland were swollen, and the male portion of the common duct was distended, but the adherent female portion quite normal. All the other organs were normal in size and shape.

From a full consideration of the above observations it is evident that the ultimate cause of death is not asphyxia, since all respiratory movements totally cease for many hours before death ; but that, although asphyxia no doubt is a great factor, it is rather the absorption of water by the various tissues of the body and the consequent hindrance, and, at last, cessation of all vital functions.



Note on *Patula cooperi* Binney. — The young of this species are keeled, and it is an interesting fact, apparently unrecorded, that the epidermis is raised into a number of spiral ridges, which are sometimes even ciliate, especially that on the keel. I found this condition best developed in examples from near Brush Creek, Custer Co., Colorado, at 10,000 ft. alt.—T. D. A. COCKERELL, West Cliff, Colorado, Oct. 28th, 1888.

THE LAND AND FRESHWATER MOLLUSCA OF
HARROGATE AND DISTRICT (YORKS.).

BY FRANCIS R. FITZGERALD,
Honorary Secretary of the Harrogate Naturalists' Society.

(Read before the Conchological Society, Nov. 1st, 1888, and recommended for publication
by the referees, W. Nelson and J. W. Taylor).

A very brief description of the district will suffice, by far the greater portion of the seven miles radius round Harrogate is contained within what is known as "The Forest of Knaresborough." In the north it extends to Wormald Green, on the south it reaches as far as Harewood, while in the east and west its respective limits are Walshford and Fewston.

The physical aspects of this district is generally that of a series of undulations, a series of hills and valleys, none of them remarkably high or deep, but both to a certain extent rounded and smoothed by the action of water.

The principal geological formation is the Millstone Grit, which is said to be about 800 to 1000 feet thick, it is prominently developed at Plumpton and Brame Hall. The impure and magnesian limestone appears in several places and its effect upon the land mollusca is very noticeable.

The district is well watered by the rivers Nidd, Wharfe and Tutt. The river Nidd which has its origin in the mountain limestone district—Greenhow Hill—first touches this district at Darley. On reaching Ripley it receives the waters of Oakbeck, and after meandering slowly along through beautiful scenery it unites with the Crimpe beck near Walshford bridge. The Wharfe only touches this district at Castley and forms the southern boundary of the forest down to Harewood bridge. The river Tutt touches the north-eastern boundary of the district at Staveley.

In addition to the rivers and becks aforementioned there are two or three lakes and several smaller streams of water which all have an effect upon the distribution of aquatic mollusca.

The present list comprises seventy-five species and thirty-two varieties. There are yet many species which may be expected to be found, as for instance *Neritina fluviatilis*, *Valvata piscinalis* and *cristata*, *Planorbis nitidus* and *nautileus*, *Helix rupestris* *Pupa ringens* and two or more of the *Vertigoes*, and very probably *Achatina acicula*, it occurs just outside the boundary of this district, namely at Boston Spa, from whence Mr. John Emmet, F.L.S., has kindly sent me a few.

To Mr. Wm. Nelson, Curator, and Mr. J. W. Taylor, F.L.S. Ex-President of the Conchological Society, and to Mr. George Roberts, of Lofthouse, my thanks are due for having named the shells submitted to them. To Mr. F. T. Walker, of Birstwith I am under a very great obligation for having placed his notes on the Mollusca of Birstwith and District at my disposal. In each case where he has met with any species within this district I have appended his initials, and in every other instance, unless otherwise stated, I have collected the specimens myself.

Sphærium corneum (L.).—Fairly common and generally distributed in the mud of ponds and ditches. Fullwith Stream; Plumpton Lake; Ripley Park Lake; River Nidd near Ripley; Stagnant water, Sewage Farm; Stone Rings Quarry; Staveley Pond, and Knaresborough. It occurs in a sub-fossil state along the banks of the river Tutt at Staveley.

S. corneum var. **nucleus** (Stud.).—I obtained specimens of this variety at Plumpton Lake, and at Ripley I obtained some which very closely approach the var. *flavescens* (Macgill).

S. lacustre (Müll.).—Local but fairly abundant where it occurs. Ripley, Burnt Gates (Brickponds) (F.T.W.).

Pisidium amnicum (Müll.).—Sparsely distributed and by no means common. Fish Pond Wood, Ripley Park; Rilston

- Park and Fullwith Stream ; those in this stream have the upper portion of the valves thickly incrustated with mud.
- P. fontinale** (Drap.).—One of the commonest and most generally distributed of the genus. Fullwith Stream ; Lake, Ripley Park ; Ditch nr. Hampsthwaite ; Pond, Ribston Park ; Pond, between Nidd Bridge and Knaresborough ; Stone Rings Quarry and Staveley Pond. Burnt Gates (F.T.W.) and Hartwith (F.T.W.). This species has been found in a sub-fossil state on the banks of the river Tutt at Staveley, in 1885.
- P. pusillum** (Gmelin).—Generally distributed but not so common as the last named. Pond, Ribston Park ; Staveley Pond ; Lake, Ripley Park ; Crimple Stream ; and Pond, Copgrove Park. Rennie Crags and Birstwith (F.T.W.). Found on the banks of the Tutt similar to the last named.
- P. nitidum** Jenyns.—Extremely local. Plentiful in Beck near Ripley, (F.T.W. and F.R.F.).
- Unio margaritifer** (L.).—This extremely local species occurs sparingly in the river Nidd at Ripley. A specimen which I gave to Mr. Standen, that gentleman said he thought belonged to the var. *roissyi*.
- Anodonta cygnea** (L.).—Fairly common in suitable localities. River Nidd at Ripley ; numerous in the stagnant lake at Plumpton the majority of which are much stunted in growth ; a few in Staveley Pond.
- A. cygnea** var. *incrassata* (Shepp.).—Occurs numerously in the lake at Plumpton.
- A. cygnea** var. *rostrata* Rossm.—Plentiful in Ripley Beck (F.T.W.) and F.R.F.).
- A. anatina** (L.).—Not so numerous as *A. cygnea* but occurs in the same localities ; I have also found shells in the Crimple Beck.
- A. anatina** var. *complanata* Rossm.—This variety occurs sparingly in the lake at Plumpton.
- Dreissena polymorpha** (Pallas).—This species is not to be found in any of the rivers etc., of the district, but they are

often brought to Starbeck adhering to timber that has been used at docks etc. Mr. Blakey gave me some in 1886, but my attempts to introduce it have not as yet proved successful.

Bythinia tentaculata (L.).—Local. Plentiful in Staveley ponds; and in pond at Copgrove Park, where, like all the mollusca in this pond, it grows to a large size; occurs in sub-fossil state on the banks of the river Tutt.

Planorbis nitidus (Müller.).—I obtained three specimens from Staveley Ponds during last August. Asp Ponds, Knaresborough, (W.N.).

P. albus Müller.—Abundant in suitable localities throughout the district. Pond, Ribston Park; Lake, Ripley Park; Starbeck Reservoir; Staveley Pond; Fullwith Stream; wayside Pond, Nidd Bridge. This species grows to a very large size in the Crimple Stream.*

P. spirorbis Müller.—Local but abundant where it occurs. Pond between Nidd Bridge and Knaresborough; Pond near Knaresborough; Ditch near Roecliffe; Ditch near Ferrensby (W.N.).

P. vortex (L.).—Very local. Occurring in a ditch near Weeton (Y.N.U. Trans. part 9).

* During the latter end of August 1887, I sent some of these to Mr. Wm. Nelson, the Curator of the Conchological Society. At a meeting of the Leeds Naturalist's Club and Scientific Association, held on August 29th, Mr. Wm. Nelson the chairman directed the attention of the members to some extra large specimens of *P. albus*, and referred to Dr. J. Gwyn Jeffreys' "British Conchology," in which (Vol. I, p. 84) the author mentions some specimens received from his friend the Rev. A. Merle Norman, as being the finest examples of the species he had seen, and which measured over $\frac{1}{3}$ of an inch across. The locality is stated, but erroneously, to be Kibworth, Durham; it should be Kibworth, Leicestershire. The specimens exhibited by the chairman were collected by Mr. F. R. Fitzgerald near Harrogate, and were full larger than those mentioned by Dr. Jeffreys' being 9 mill. across. Other equally large examples of *P. albus* (var. *draparnaldi*) were shown from Sandal near Wakefield, and compared with specimens of the typical form and normal size, from Mollin Lake near Harewood, vide LEEDS MERCURY. These shells were also exhibited at a meeting of this society by Mr. Wm. Nelson (F.R.F.).

- P. carinatus** Müller.—Very local. A few, Staveley Ponds; also in a sub-fossil state on the banks of the river Tutt at Staveley, two feet below the surface. During Sep. of 1887 I introduced a number of this species and also *P. corneus* into Fullwith Stream.
- P. complanatus** (L.).—Local. Asp Pond, Knaresborough (Y.N.U. Trans. part 9); Ripley Beck (F.T.W. and F.R.F.). Several specimens of this shell were obtained along with the others previously mentioned, as found in 1885 in a sub-fossil state for some miles distance along the banks of the river Tutt at Staveley, in a deposit two feet below the surface, by my friend the Rev. E. Ponsonby Knubley, M.A., M.B.O.U.; about the same time he found it also sub-fossil on the site of an old pond at Staveley.
- P. complanatus** var. *rhombea* (Turt.).—Mentioned in part 9 of the Y.N.U. Trans. as occurring near Harrogate, by Lister Peace, 1880. Probably the Ripley Beck is the locality although not stated. I have not found this variety there.
- P. corneus** (L.).—By no means a common species. I have found it (three dead specimens) in Staveley Ponds during the autumn of last year. I put a few into the Fullwith Stream, from Ripon Canal. It occurs in a sub-fossil state along the banks of the river Tutt at Staveley.
- P. contortus** (L.).—Very local in its distribution. In the Staveley Ponds and the pond in Copgrove Wood it is the most numerous species. Occurs sub-fossil along with the other species previously mentioned. A number of these shells in the Staveley Pond are referable to the var. *albida*.
- Physa hypnorum** (L.).—A rather local species frequenting stagnant ponds and ditches. It occurs at Ripley Lake and Ridding, Ditch, Ferrensby (W.N.).
- P. fontinalis** (L.).—More generally distributed than the former species. It occurs in profusion in the Staveley Ponds. During August of last year my friend Mr. Chaytor, M.C.S.,

informed me that he had taken the var. *curta* at Plumpton.

I have since taken both the type and this variety at the same place. Sub-fossil on banks of the river Tutt at Staveley.

P. fontinalis var. *curta* Jeff.—As mentioned above.

Limnæa peregra (Müll.).—A very abundant species all over the district. Lake, Ripley Park (fine); Starbeck Reservoir; Ditch, railway side near Harrogate; Stagnant pool, Crimple Wood; Ditch, Stone Rings; Pond, Ribston Park; Pond nr. Allerton; Rudding Park; between Nidd Bridge and Knaresborough; Sewage Farm; Plumpton; Staveley Pond; Ripley Beck; Ditch near Pannal, Ditch near Killinghall; near Spofforth. The finest occur in Fullwith Stream. Shaw Mill (F.T.W.) and Hartwith (F.T.W.). Sub-fossil on banks of river Tutt at Staveley.

L. peregra var. *ovata* Drap.—Beautiful specimens of this variety occur in Crimple Beck and Ripley Park.

L. peregra var. *acuminata* Jeff.—Occurs at Markington.

L. peregra var. *ampullacea* Rossm.—Also occurs in Plumpton Lake.

L. auricularia (L.).—Local. Exceedingly fine and numerous in the N. E. Rly. Co.'s Reservoir at Starbeck. I obtained one specimen on July 19th 1887 at Staveley Pond; the Rev. E. Ponsonby Knubley has also obtained it from this pond. It occurs sub-fossil on the banks of the river Tutt. Mr. Walker has taken it in the Swinsty reservoir just inside the boundary.

L. stagnalis (L.).—Local and not numerous. Some of the finest I ever saw I obtained in a small sheet of water in Copgrove Park. The greater portion of this sheet of water is completely overgrown with lilies, rushes, and other water plants, and if steps are not taken to clear away some of the rushes etc., the pond will soon disappear altogether, only leaving a slight inundation to show where it had previously existed. Occurs in a sub-fossil condition on the banks of the Tutt.

- L. palustris** (Müll.).—Occurs locally in one or two parts of the district. Ponds near Ripley Station (F.T.W. & F.R.F.). I also obtained a single specimen at Staveley July 19th 1888, (F.R.F.). Occurs sub-fossil on banks of Tutt at Staveley.
- L. truncatula** (Müll.).—Fairly common and generally distributed. Ponds between Nidd Bridge and Knaresborough. Hartwith Dam (F.T.W.). Found near Staveley by Rev. W. C. Hey, (Nat. 1884, page 280), no particular place is mentioned; I have not found it anywhere near Staveley. It also occurs in a ditch behind Ripley Park Woods but is very small, some of which I think are referable to var. *minor* Moq.
- L. glabra** (Müll.).—Rare and local. Very fine specimens in a ditch between Roecliff and Staveley, (W. Denison Roebuck, F.L.S. in Nat. 1884, page 280); near Shaw Mills (F.T.W. and F.R.F.); Ditch near Ferrensby (W.N.).
- Ancylus fluviatilis** Müll.—Very common and generally distributed in most streams, attached to stones etc. Fullwith Stream; Stone Rings; Killinghall; Pond, Rudding Park; Oak Beck; Ditches at Staveley; River Tutt; River Nidd; Spofforth. Also pond at Birstwith, (F.T.W.).
- A. fluviatilis** var. **albida** Jeff.—Rare. A few in stream near Stone Rings.
- A. lacustris** (L.).—Local. Staveley Ponds; and in a sheet of water in Copgrove Park. Those in this water grow to an extraordinary size.
- A. lacustris** var. **albida** Jeff.—Abundant and very fine on water lilies in Staveley Pond.
- Arion ater** (L.).—Abundant throughout the district. Ripley; Nidd Bridge; Scriven; Knaresborough; Follifoot; Spofforth; Staveley; Copgrove; Pannal; Weeton; Rudding; Ribston; Goldsborough; Allerton; and in gardens in the town. Also at Birstwith (F.T.W.) and Hartwith (F.T.W.).
- A. ater** var. **rufa** (L.).—I have found this variety at Knaresborough.

- A. flavus** (Mull.).—Rare. Several specimens taken at Burt Bridge Sept. 4th 1887, and sent to Geo. Roberts of Loft-house. The description of the specimens are entirely yellow without spots or bands, or bands very obscure. Head and tentacles black or bluish grey. Lower tentacles very short, length twenty to thirty mill. the specimen sent to Mr. Roberts was 22 mill.
- A. bourguignati** Mabile.—Supposed to occur.
- A. hortensis** Fér.—Common and generally distributed throughout the district, especially numerous in cultivated districts; Harrogate; Ripley; Weeton; Pannal; Rudding, Ribston; Knaresborough; Hampsthwaite; and Birstwith, (F.T.W.). Copgrove Woods (Nat. 1885).
- Limax flavus** L.—Common in cellars and drains, under stones, etc. Harrogate; Knaresborough; Rennie Crags near Birstwith (F.T.W.).
- L. agrestis** L.—Abundant everywhere. Harrogate; Knaresborough; Spofforth; Ribston; Pannal; Ripley; Birstwith; (F.T.W.) and Hartwith (F.T.W.).
- L. agrestis** var. **sylvatica** Drap.—Is common everywhere (F.T.W. and F.R.F.).
- L. agrestis** var. **tristis** Moq.—Is common everywhere (F.T.W. and F.R.F.).
- L. lævis** Müll.—Local and rare. Copgrove Woods and Lindley Woods (vide Roebuck in Nat. 1885).
- L. arborum** Bouchard-Chantereaux.—Not common, but noted in several localities; it has a partiality for beech woods. This slug exudes a quantity of watery slime on being captured. Occurs in Ripley woods (F.T.W. and F.R.F.).
- L. maximus** L.—Generally distributed. Ripley; Harrogate; Ribston; and Knaresborough. Very common at Birstwith (F.T.W.).
- L. cinereo-niger** Wolf.—On July 5th 1885, Mr. Wm. Denison Roebuck, F.L.S., along with Mr. Wm. Eagle Clarke, F.L.S. and Mr. R. Rosenstock, while working out the fauna of

Washburndale, came across this very rare slug, which had only been reported nine times previously for Great Britain. On arriving at the point where the Glaston Beck flows into Lindley Wood Reservoir, they found a number of planks lying on the ground, the remains of a dismantled building. Turning these over they found slugs in great abundance, including *L. agrestis* and its varieties *L. lævis*, *Arion ater* var. *rufa*, two or three *L. maximus* var. *cellaria*, and the greatest treasure of all, a single half-grown example of *L. cinereo-niger* (vide Nat. July 10th 1885, W. D. Roebuck). This locality is just within my district.

Succinea putris (L.).—Generally distributed but not common. Spofforth; Sewage Farm; Ripley Lake, near Ripley Station; and Copgrove Woods. Occurs sub-fossil on banks of river Tutt at Staveley.

Vitrina pellucida Müll.—Not common, but generally distributed; dead shells plentiful in several localities. I have found live specimens at Fullwith; Goldsborough; Knaresborough; Ripley; Staveley; Pannal; Follifoot and Sewage Farm. Mr. Walker has found it very numerous in damp woods at Birstwith.

Zonites cellarius (Mull.).—Very common throughout the district. Harrogate; Knaresborough; Ripley; Pannal; Weeton; Ribston; Spofforth; Staveley; Birk Crag; Copgrove; Nidd Bridge. Birstwith (F.T.W.) and Dacre Banks (F.T.W.).

Z. alliarius (Miller).—Rather local in its distribution and by no means as common as *cellarius*. Fullwith; Knaresborough; Burnt Bridge. Ripley and Hartwith (F.T.W.).

Z. glaber (Stud.).—Very local. Obtained several on bank below the Castle Keep, Knaresborough.

Z. nitidulus (Drap.).—Very common and generally distributed. Allerton; Ribston; Ripley; Crimble; Starbeck; Knaresborough; Harrogate; Pannal; and Copgrove. Also Birstwith (F.T.W.).

- Z. nitidulus** var. **nitens** (Mich).—Occurs sparingly at Knaresborough and Birstwith.
- Z. purus** (Alder).—Local and by no means numerous. Birk Crag; Knaresborough; Ripley; and Nidd Bridge. Birstwith in limited numbers (F.T.W.).
- Z. purus** var. **margaritacea** Jeff.—Mr. Walker and I have found this on a bank at Nidd Bridge.
- Z. radiatulus** (Alder).—Very local and not numerous. Were found Ripley (F.R.F. and F.T.W.). Birstwith (F.T.W.) and Hartwith (F.T.W.).
- Z. nitidus** (Mull.).—Very local, occurring in damp situations, such as the banks of streams, etc. Birk Crag and Ripley (F.T.W. and F.R.F.).
- Z. excavatus** (Bean).—Local and very rare. I obtained seven specimens in Ripley Wood amongst dead leaves.
- Z. crystallinus** (Müll.).—Fairly common and generally distributed throughout the district in suitable localities. Birk Crag; Harrogate; Ripley; Knaresborough; and Copgrove Woods; also very common near Birstwith (F.T.W.); and marshy field near Darley (F.T.W.).
- Z. fulvus** (Müll.).—Generally distributed, but not so common as the last named. Found in damp Beech wood under decayed leaves, at Birstwith (F.T.W.). I have found it under similar conditions at Ripley, and also obtained several specimens on garden wall under moss near Burnt Bridge.
- Helix aculeata** (Müll.).—Rare, only found in two localities, Birk Crag and near Ripley (F.R.F. and F.T.W.).
- Helix aspersa** (Mull.).—Local, being confined to the limestone formations. I have found single specimens off the limestone but they are rare. At Knaresborough there is a very large colony of this species along with *H. arbustorum* and *H. hortensis*; this little patch of ground is exceedingly rich in its number of species of Mollusca. I have also obtained it at Ribston; Spofforth; and Allerton. Dead specimens at Nidd Bridge; a few in gardens at Harrogate

and near Pannal. One young specimen found in Copgrove Woods (vide Nat. for 1885).

Helix nemoralis L.—Local and not numerous.

H. nemoralis var. *libellula* Risso.—One dead specimen at Knox, 00340; Ripley; and several at Knaresborough.

H. nemoralis var. *rubella* Moq.—Found at Knaresborough, without bands.

H. nemoralis var. *hybrida* Poiret.—Knaresborough and also Ripley (F.T.W.).

H. hortensis Mull.—Very common especially at Knaresborough, on the limestone, where there is a large colony. It also occurs sparingly all over the district, the var. *lutea* 00000 being the most common.

H. hortensis var. *lutea* Moq.—Knaresborough; Crimple; Pannal; Ripley; Nidd Bridge; Allerton; Ribston; Goldsborough; Burton Leonard; Staveley; Burnt Bridge; and Copgrove. Also Birstwith (F.T.W.).

H. hortensis var. *roseo-labiata* Taylor.—Knaresborough several; Goldsborough one; Harrogate several; Starbeck one; Ripley two.

H. arbustorum L.—Local; confined principally to the limestone. Large colony at Knaresborough; also found at Ribston; Goldsborough; Allerton; and Spofforth. The only Birstwith example was a broken one found by Mr. Walker on a stone heap where it had been dropped by a bird.

H. arbustorum var. *alpestris* Zgl.—Two along with the type at Knaresborough.

H. arbustorum var. *marmorata* Tayl.—A few occur along with the type at Knaresborough.

H. arbustorum var. *flavescens* Moq.—One at Knaresborough.

H. cantiana Mont.—Local and rare. Mr. Walker has found it at Birstwith; I have taken it within the boundary on the Wetherby road. Copgrove Woods (Roebuck, Nat. 1885).

- H. rufescens** Pennant.—A too common species occurring all over the district. Ripley ; Knaresborough ; Plumpton ; Nidd Bridge ; Spofforth ; Rudding ; and Follifoot. Birstwith (F.T.W.) and Hartwith Dam (F.T.W.). Those at Nidd Bridge are very fine. Mr. Nelson writes some approach the variety *albida*. I have since taken this variety on the magnesian limestone at Nidd Bridge.
- H. rufescens** var. *rubens* Moq.—Common along with the type.
- H. rufescens** var. *albida* Moq.—As stated above.
- H. concinna** Jeff.—Local and not numerous. Knaresborough and Ripley. Common at Birstwith (F.T.W.).
- H. hispida** L.—Local, but fairly common where it occurs. Knaresborough (plentiful) ; Nidd Bridge ; Burnt Bridge ; and Fullwith. Also Ripley and Copgrove (F.T.W. & F.R.F.).
- H. hispida** var. *subrufa* Moq.—Ripley (F.T.W. and F.R.F.)
- H. sericea** Mull.—Local and rare. Near Hartwith Dam on ivy and nettles (F.T.W.).
- H. caperata** Montagu.—Common in some localities. Allerton, under old trees ; Knaresborough ; Goldsborough ; Starbeck ; Grimbold Crag ; and two near Plumpton. Also Birstwith (F.T.W.).
- H. ericetorum** Müll.—Local and rare. Near Birstwith, rare (F.T.W.). One dead specimen, Grimbold Crag, June 1888.
- H. ericetorum** var. *instabilis* Zgl.—Near Birstwith (F.T.W.)
- H. rotundata** Müll.—Common throughout the district. Birk Crag ; Plumpton ; Rudding ; Ribston ; Allerton ; Harrogate ; Pannal ; Knaresborough ; Hampsthwaite ; Ripley ; Burnt Bridge ; Spofforth. Also Birstwith (F.T.W.).
- H. rotundata** var. *alba* Moq.—Pannal (J. W. Taylor).
- H. pygmæa** Draparnaud.—Not numerous, but occurs in suitable localities, *i.e.* among dead leaves and at the roots of grass. Knaresborough and Nidd Bridge.
- H. pulchella** Müll.—More numerous than the last named, but still not common. Burnt Bridge ; Spofforth ; Knaresborough ; and also one under a stone in Ripley Park.

H. lapicida L.—Local and confined to the limestone, and I believe decreasing in numbers at Knaresborough, where dead shells are very numerous. Found amongst nettles at Birstwith (F.T.W.) and Hartwith (F.T.W.).

Bulimus obscurus (Müll.).—Local in its distribution. At Knaresborough the same remarks apply to this species as to *lapicida*. Also occurs at Nidd Bridge and Ripley (F.T.W. and F.R.F.).

B. obscurus var. *alba* Jeff.—Grimbald Crag, Mr. Beevers.

Pupa umbilicata Draparnaud.—Common where it occurs. Little Wonder; Burnt Bridge; Knaresborough; and Hartwith (F.T.W.).

P. umbilicata var. *albina* Mop.—Mr. Wm. Nelson.

Clausilia rugosa (Draparnaud).—Common everywhere. Spofforth; Follifoot; Farnham; Burton Leonard; Copgrove; Harrogate; Fullwith; Pannal; Weeton; Ripley; Nidd Bridge; Staveley; Knaresborough; etc., etc. Also Hartwith (F.T.W.).

C. rugosa var. *dubia* Drap.—Knaresborough.

C. laminata.—Rare. Near Asp Pond, W. Nelson.

Cochlicopa tridens (Pult.).—Generally distributed, but not numerous. Nidd Bridge; Burnt Bridge; and near Ripley Station (F.T.W. and F.R.F.).

C. lubrica (Mull.).—Common and more generally distributed. Near Harrogate; Nidd Bridge; Ripley; Burnt Bridge; Birstwith (F.T.W.); Hartwith (F.T.W.) and Copgrove Woods and Ribston.

C. lubrica var. *lubricoides* Fér.—Several specimens found along with the type form, in an old broken-down house at Fullwith.

Carychium minimum Müll.—Common in suitable localities, probably overlooked owing to its minute size; frequents damp situations under stones, etc., and amongst dead leaves.

DESCRIPTIONS OF THREE NEW SPECIES OF
SHELLS.

By JAMES COSMO MELVILL, M.A., F.L.S.

(Read before the Conchological Society, Dec. 15th, 1888, and recommended for publication by the referees, Mr. E. A. Smith and the Rev. R. B. Watson).

Coralliophila Andamana (sp. nov.) Pl. ii, fig. 1.

Testâ ovatâ, muriciformi, ad basem attenuatâ, longitudinaliter plicocostata, costis paucis, rotundatis, transversim eleganter squamuloso-liratis, fauce violaceâ.

Long. 17, lat. 8 mill.

Habitat: *Ad Insulas Andamanenses.*

A pretty and distinct little form, now found in most cabinets, but not hitherto described. I have noticed it recently, without a name, in the National collection and have two specimens, precisely alike to each other, in my own. It is allied to *C. costularis* (Blainville), and its variety *C. planilirata* (Reeve), but mainly differs in the fewer ribs, greater delicacy of the transverse squamulose ridging, finely-frilled outer lip, and other minute differences.

Eulima epeterion (sp. nov.) Pl. ii, fig. 2.

Testâ aculeiformi, albo-vitrâ, politâ, angustâ, gracili, planiusculâ, anfractibus in numero tridecim, deplanatis, ultimo elongato, aperturâ oblongâ, margine recto.

Long. 16, lat. 3 mill.

Hab.: *Mauritius.*

In a genus so extensive and in which the species are so similar as the one now under discussion, it seems a somewhat hazardous task to venture to add yet another form to its list. There are altogether over one hundred and fifty species described, and this does not include *Leiostraca*, which some authors still include as a section of *Eulima*. The *E. epeterion* however seems sufficiently distinct. It differs from its nearest congeners,

viz: *E. attenuata* (Sowb.), a native of Fiji, in its fewer whorls, the latter possessing fifteen at least; from *E. teinostoma* (Ad.), also from Fiji, in its straighter build and slender body-whorl; and from the common form *E. vitrea* (Ad.), native of Fiji and the south seas, in its much greater slenderness, and whorls more elongate—*E. vitrea* being a smaller and stouter shell, with and very numerous narrow whorls.

Not very many species are yet described from Mauritius, from which island, however, the large and conspicuous *E. Martinii* (Adams) comes, the second largest species in the genus. The trivial name is derived from *ηπητηριον* a needle, in allusion to the shape. It is one of the most graceful in a singularly beautiful genus, though to discriminate their beauty of form to the full, a magnifying glass is almost imperatively necessary, owing to the small size of the majority of the known species.

The type, at present the only specimen known, is in my collection.

Zizyphinus haliarchus (sp. nov.) Pl. ii, fig. 3.

Testâ erecto conicâ, pyramidali, anfractu ultimo ad basin acutangulato, anfractibus planis, declivibus, sublævibus, granis parvulis liratis, liris tenuibus circumambientibus, duâbus ad suturas proximis crassioribus, granis majoribus decoratis, flavidâ, flammis purpureo-fuscis apud peripheram ornâtâ, obscuré punctulata, basi liris sublævibus punctato-gemmatâ, plauâ, sub-convexâ, columella callosâ, fauce lævistriata.

Alt. 40, lat. 36 mill.

Hab.: Ad oras Australiæ ?

This very large, conspicuous, and beautiful addition to the genus *Zizyphinus* is at present unique, the specimen being included in the collection now in the Museum, Owen's College, Manchester, and formerly having formed part of that of Reginald Cholmondeley, Esq., of Conover Hall, Salop.

No very close connection is observable with the other Australian species; there is, however, owing to accidental transposition of labels, some little doubt as to the correctness of the

locality now assigned to it; the nearest approach to it would seem to be *Z. jucundus* (Sowb.) *c. f.* "Proc. Zool. Soc.," 1878, p. 798, pl. xlvi., fig. 6, from which, however, it is abundantly distinct in the sculpture of the whorls and other minor particulars.

It will rank about the fourth in size in the genus; *Z. tigris* (Mart.) coming first, with *Z. Cunninghamii* (Gray) and *Z. spectabilis* (Gray) following. The smoothness of the whorls of *Z. haliarchus*, the straight sides and light appearance of the shell, suggest affinities with *Z. Tranquebaricus* (Chem.) from Tranquebar; but this is merely superficial. Again, in its painting, with fuscous purple flames radiating round the basal periphery, it recalls some forms of the *Z. conuloides* (Lam.), a well-known inhabitant of our own shores.

The name selected for this magnificent shell *αλιαεχος*, or "Ruler of the Sea," would seem well deserved.



Helix cantiana monst. *sinistrorsum* in England.—

Through the kindness of Miss F. M. Hele I have become possessed of a reversed specimen of this species, one of several found in Wiltshire by Mr. Rippon, of Norwood. The only other record I am aware of, is that by M. Jules Colbeau, who states that M. Nyst once found a specimen at Antwerp, Belgium.—JNO. W. TAYLOR.



Respiration of *Ancylus fluviatilis*.—I trust your correspondent, Mr. W. A. Gain, will pardon me for taking exception to his explanation of the manner in which *A. fluviatilis* obtains its supply of air. I grant that during the day the vegetation is constantly giving off oxygen, and also that, for purposes of combustion, this gas is five times more effective than atmospheric air. But it is much too effective for purposes of respiration. Animals need oxygen, but they cannot live in an atmosphere of oxygen, and know no reason why the mollusk in question should be regarded as an exception to the rule.—CHAS. A. WHATMORE.

ON THE MEANING OF THE GLYCOGENIC
FUNCTION IN THE MOLLUSCA.

A STUDY IN COMPARATIVE PHYSIOLOGY.

BY DR. J. W. WILLIAMS, M.A.

(Read before the Conchological Society, May 2nd, 1888, and recommended for publication by the Rev. A. H. Cooke, acting as referee).

THE substance which Claud Bernard discovered in the liver-cells of the Vertebrates and the Mollusca in 1857, and which is known to physiologists under the various names of glycogen, hepatine, bernardine and zo-anyline, or animal starch, has during recent years been discovered by several continental and other workers as existing in the tissues (other than the liver) of the Molluscan body, and has, by them, in the majority of instances, been quantitatively estimated. It is our business here to pass over in review these observations, and to try if we cannot from them, and from the analogies present in the animal kingdom generally, build up the superstructure of a somewhat stable hypothesis as to its origin (mother-substance) and its use in the economy of the Mollusca.

Glycogen ($C_6 H_{10} O_5$), as can be seen from its formula, is an isomer of starch and dextrin. It is a white amorphous substance, soluble in water, insoluble in alcohol and ether, and its aqueous solution is opalescent and has a strong dextro-rotatory influence on polarised light. It can be readily converted into dextrin by weak acids or by an amylolytic ferment. Its presence in the tissues may be detected—provided the animal has been recently killed—by testing with ioduretted potassium with which it gives a wine-red colour, disappearing on heating, reappearing on cooling. In the Vertebrates it has been detected in the liver (1.5—4 per cent.), muscles, villi of the chorion, embryonal tissues, placenta, and the leucocytes of the

blood. In the Mollusca, Hammarsten¹ has demonstrated that in the liver of *Helix pomatia* it is present to the extent of 1.75 per cent., and that in hibernating animals of the same species, and in the same organ, it is decreased to the amount of 0.429 per cent. Hoppe-Seyler has stated its existence in the liver and muscles of the oyster; D. Barfurth² has found it in most of the tissues of *Arion*, *Limax*, *Helix* and *Cyclostoma*, while E. R. Blundstone³ has discovered it in the mantle of *Anodon*, and the mesentery of *Helix*.

Whence comes this glycogen, and whither is it bound? To answer these two questions we have to call to our mind what is known of the physiology of the Vertebrates in this connection, and compare it with what have been demonstrated as existing in the Mollusca. There can be little doubt that the mother-substance of glycogen in the Vertebrates, at any rate, is carbohydrate food, while the ingestion of proteid matter seems also to favour its production, but in a far less degree. The former kind of foodstuff (starch) in them, is changed by peculiar diastatic ferments—ptyalin of the saliva and amylopsin of the pancreatic juice—into sugar which is taken up, as such, from the enteric tract by the portal veins, and carried by them to the liver, there to undergo by a process of dehydration its conversion into glycogen. The latter is, in them, converted into peptones by the action of the hydrochloric acid and pepsin of the gastric juice, and the trypsin (in the presence of sodium carbonate) of the pancreatic juice, and afterwards split up in the liver into a non-nitrogenous portion (glycogen) and a nitrogenous portion (probably urea). We have thus a starch diet and an albuminous diet forming in the liver of the Vertebrates a product—glycogen. Where does the analogy

1. Arch. ges. Phys. xxvi. pp. 384-456.

2. "Vergleichend-hestochemische Untersuchungen über das Glycogen." Arch. Mikr. Anat. xxv. pp. 259-404.

3. "On the occurrence of Glycogen as a constituent of the Vesicular Cells of the Connective Tissue of Molluscs." Proc. Roy. Soc. xxxvi. pp. 442-445; Abst. J. R. Micr. Soc. (2) v. p. 986.

exist in the case of the Mollusca? Their food is essentially, in the majority of cases, a vegetable one, and forming the chief chemical constituents of plants are carbohydrates and proteids. The carbohydrates are starch, inulin, dextrin, and sugars including glucose, cane sugar, and various others. Proteids are there as protoplasm, aleurone grains, crystalloids, gliadin, vegetable fibrin, and a native albumen which is soluble in water and coagulable by heat and, in many respects, identical with animal albumen. Free sulphuric acid has been demonstrated in the secretion of the salivary glands of Mollusca by Panceri, Troschel and Quoy⁴ and this according to E. Bourquelot⁵ changes starch into sugar in the Cephalopoda, and the same amyolytic function has been shown by E. Bonardi⁶ to be possessed by the salivary secretion of the Pulmogastropoda; L. Fredericq⁷ has demonstrated a ferment in the enteric canal of *Arion ater* which changes starch into sugar; E. Bourquelot⁸ has found that the secretion of the pancreas of Cephalopods contains a diastatic ferment which is identical, in its action, with the amylopsin of the Vertebrates, and that there is also present trypsin which changes proteids into peptones after the orthodox method described as existing in the Mammalia; while A. B. Griffiths⁹ has also proved a diastatic ferment to be present in

4. "Gli organi e la secrezione dell'acido sulfurico nei Gasteropodi con una appendice relativa ad altra glandole dei medesimi." *Ann. Sci. Nat.* vol. X pp. 89-94; also *Am. J. Sc.* (2). xix. pp. 420-422.

5. *Arch. Z. expér*: x. pp. 384-421.

6 "Intorno all'azione saccarificante della saliva ed alla glicogenesi epatica in alcuni Molluschi terrestri." *Boll. scient.* v. pp. 83-86.

7. *Arch. Z. expér*: vii. pp. 397-399.

8. "Recherches relatives à l'action des sucs digestifs des Céphalopodes sur les matières amylacées" *Compt. Rend.* xciii. pp. 978-980; *Abstr. J. R. Mic. Soc.* (2). ii. p. 30. Also "Recherches sur les phénomènes de la digestion chez les Mollusques Céphalopodes." *Arch. Z. exper* (2). iii. pp. 1-74.

9. "Chemico-Physiological Investigations on the Cephalopod Liver and its Identity as a True Pancreas" *P. R. S. Edinb.* xiii. pp. 120-122; *Chem. News*, xlvi. p. 37., li. p. 241; *J. Chem. Soc.* xlvi. p. 94., 1884; *Abstr. J. R. Mic. Soc.* (2) v. p. 622.

the pancreatic secretion of *Sepia*. And that the glycogen is immediately formed from the ingesta, as in the Vertebrates, has been proved by Barfurth¹⁰ who found that after three hours fasting it had disappeared from the liver of *Helix*, but that it reappeared from nine to ten hours after feeding, and by Hammarsten¹¹ in the decrease in the amount of glycogen showed in the liver of his pomatias which had hibernated in a warm room. Thus there is every reason for us to believe, in the face of no evidence to the contrary, that the mother-substance of glycogen in the Mollusca is the same as that in the Vertebrates—viz: the carbohydrates and proteids of their food-stuffs.

Regarding the ultimate destination of the glycogen in the Mollusca we have very little evidence to guide us to a safe conclusion. In the Vertebrates it is no doubt devoted to the production of heat and muscle-energy. Broken up, in then, by a blood-ferment again into sugar, as the exigencies of the system demand, it is taken by the hepatic veins to undergo metabolic changes in the tissues. And that it is, in them, used up during muscular contractions does not admit of a doubt for it has been experimentally proved that all the glycogen disappears from the muscles during movement. While Barfurth has stated (*loc. cit.*) that the quantity present in the muscles of *Helix* is inversely proportional to their activity, and should Wooldridge's theory that the Vertebrates blood-ferment is lecithin prove to be a fact we have here two things that unite together to show, disregarding the facts we have already mentioned, that glycogeny in the Mollusca and the Vertebrata are far from being dissimilar, since lecithin is present in the Molluscan blood. But, whatever its destination in the Mollusca may be, it is a point well worthy of mention in relation with this, that a large amount of reserve-material must be stored away

10. *loc. cit.*; also "Das Glycogen in der Gasteropodenleber." Zool. Anz. pp. 652-655.

11. *loc. cit.*

in the tissues in some kind, if not in the form of glycogen, for the wants of the system during hibernation, and also to supply energy by oxidation, during prolonged muscle-contraction since Simroth¹² has stated that a small *Helix* can move along when burdened with a weight nine times its own, and Sandford in a note communicated to the tenth volume of "The Zoologist" (p. 491) entitled "Experiments to Test the Strength of Snails" has proved that a *Helix aspersa* weighing one-third of an ounce can draw along an horizontal plane a weight weighing seventeen ounces, and that another of the same species of one-quarter of an ounce in weight can drag a weight of two and a quarter ounces after it when moving along a vertical plane; while according to the researches of F. Plateau¹³ the absolute force—*i. e.* the weight which a muscle stimulated to the utmost is just able to raise—estimated on one square centimetre of the mean transverse section is nearly equal, with their unstriated muscle-cells that differ so slightly from the ordinary type of protoplasm—is nearly equal to that estimated for the Vertebrates with their more differentiated striped muscle-fibres. The largest estimates made by this observer on the adductor muscles were for *Venus verrucosa* (12,431 grammes), *Pectunculus glycymeris* (10,152 grammes), and *Mytilus edulis* (7,984 grammes; the lowest for *Pecten opercularis* (530 grammes). For comparison's sake, the absolute force of a frog's muscle is 2·8 to 3 kilogrammeters; of human muscle, 8 to 9 kilogrammeters. The great drawbacks to our future knowledge of the physiology of the Mollusca are the evident ones of the difficulties attending the performance of minute experiments on account of the small size of their organs and the incapability of keeping them alive for a sufficiently lengthened period under the influence of proper anæsthetic conditions. The consideration occurs to the author that it is

12. "Die Thätigkeit der willkürlichen Muskulatur unserer Landschnecken" Z. wiss. Zool. xxx. suppl. vol. pp. 166-224.

13. "Recherches sur la force absolue des muscles des Invertébrés." I. Partie. Bull. Ac. Belg. (3) vi., pp. 226-259.

only by instituting a comparison, such as this one, that we shall ever arrive at definite conclusions relative to their physiology.

Glycogen, itself, can be obtained from the liver and other tissues of the Mollusca by the following method. The organs suspected to contain it are taken from a recently killed animal, immediately cut up into pieces and plunged into boiling water to destroy any ferment that may be present, then boiled for some time and filtered. The filtrate is allowed to get cold, and then dilute hydrochloric acid and potassio-mercuric iodide are alternately added to precipitate any proteids that may be present in solution, and this is continued until no precipitation any longer obtains. Then it is filtered—if any glycogen be present the filtrate is clear and opalescent—and the glycogen is precipitated from the filtrate by adding 70-80 p.c. alcohol to excess. This precipitate is then washed with alcohol, 60 p.c. and 90 p.c., afterwards with ether, lastly with absolute alcohol, then dried over sulphuric acid and weighed.



Helix rotundata m. sinistrorsum.—Shell reversed.—This monstrosity, which, so far as I am aware, has not been previously noticed or recorded, I found amongst a number of the ordinary form collected by Mr. C. H. T. Lett, in August, 1888, at Aghadery Glebe, Loughbricklands, Down.—JNO. W. TAYLOR.



Vertigo minutissima (Hartmann) in Dorset.—When collecting on Portland in October, 1888, I took about eighty specimens of this rare *Vertigo*. They were all under three stones close together and no others were to be found near. I believe this is a new record for Dorset. I have never found this species on Portland before. It was in company with *Pupa marginata* and *P. umbilicata*, of the latter of which I took three whitish specimens close by.—E. R. SYKES, Weymouth.

LIST OF SHELLS COLLECTED AT INGLETON AND
DISTRICT DURING AUGUST, 1888.

BY EDWARD COLLIER.

(Read before the Conchological Society, Dec. 15th, 1888, and recommended for publication by the referees, W. Denison Roebuck and J. W. Taylor).

My family being at Ingleton during the month of August last, I took the opportunity when I was there each week-end, of collecting what I could of the Land and Freshwater Shells of the district. Fortunately, or unfortunately, the weather was very wet during most of the time I was there and prevented me going out at times, but it certainly brought out the snails, as after very heavy rains *Helix rupestris* and *Clausilia rugosa* abounded on the old walls, and in some places *Balea perversa* was very abundant. Helks Wood proved to be the best hunting-ground, both for numbers and variety of species, but unfortunately I did not collect there much, until the last week-end when I was joined by Mr. Oldham and Mr. Standen. The following are the species collected :—

Limnæa peregra.—Plentiful in an old horse-trough on the Clapham Road, also in the stream that runs through Clapham village.

L. truncatula.—A few on wet rocks near the Pecca Falls, Ingleton.

Ancylus fluviatilis.—Common in the stream running through Clapham village. I never tried for this species at Ingleton as the river was generally flooded, but no doubt it would occur there abundantly.

Succinea elegans.—One specimen only, on herbage in a wet ditch, Bentham Road, Ingleton.

Vitrina pellucida.—Moderately common in Helks Wood, also at Clapham, but only very small and poor specimens.

- Zonites cellarius.**—Common about Ingleton, in Helks Wood, also at Clapham.
- Z. cellarius** var. **albinos.**—Two specimens of this variety were taken in Helks Wood, one by Mr. Standen, the other by Mr. Oldham.
- Z. alliarius.**—Common all about the district.
- Z. alliarius** var. **viridula.**—One immature specimen taken by myself at Clapham.
- Z. glaber.**—A few in Helks Wood, but not common.
- Z. nitidulus.**—Not very common.
- Z. purus.**—Rare. A few in Helks Wood, also at Clapham.
- Z. crystallinus.**—Moderately common in moss, Helks Wood, also near Clapham Common.
- Z. fulvus.**—Very plentiful in Helks Wood, and very fine. This is a species I had never taken previously in any quantity, but now found them very abundant.
- Helix aculeata.**—This species was also plentiful in Helks Wood, under stones and amongst moss.
- H. aspersa.**—Very common and very fine, on old walls behind clumps of nettles, anywhere about Ingleton; some of them are beautifully marked.
- H. aspersa** var. **conoidea.**—Not common. One specimen of this variety is very fine.
- H. aspersa** var. **undulata.**—A few of this variety amongst the type.
- H. nemoralis.**—Not common. A few in the lane near Ingleton Hall, and a var. *rubella* ooooo on the Bentham Road.
- H. hortensis.**—Much commoner than the preceding species, mostly banded, but a few var. *lutea* ooooo.
- H. arbustorum.**—Common all about Ingleton, and very various in form and marking.
- H. arbustorum** var. **alpestris.**—Common in the lane near Ingleton Hall, and beautiful specimens.
- H. arbustorum** var. **trochoidalis.**—A few very fine specimens of this uncommon variety in the lane near Ingleton Hall. One of them Mr. Taylor says is subscalariform.

- H. arbustorum** var. *fusca*.—Two beautiful specimens I found at Kirkby Lonsdale, Westmorland, about seven miles from Ingleton. They are very dark and very thin shells.
- H. arbustorum** var. *marmorata*.—Three or four specimens from the lane near Ingleton Hall.
- H. arbustorum** var. *flavescens*.—A few amongst the type, one of the var. *trochoidalis* in this colour.
- H. rufescens**.—The commonest species of *Helix* about Ingleton. Very plentiful on nettles, finer in Helks Wood than about the village ; also in Farrar's Grounds, Clapham, and at Kirkby Lonsdale.
- H. rufescens** var. *rubens*.—Pretty common amongst the type, both about the village and in Helks Wood. We did not find a single var. *alba*, although it is very often found associated with the type.
- H. hispida**.—A few on Storr's Common, Ingleton, also in Helks Wood, but not plentiful.
- H. hispida** var. *albida*.—One specimen on old wall, Beezley (C.O.).
- H. ericetorum** var. *minor*.—My children found a colony of this species on Stow's Common. They were all on grassy slopes facing west and south-west and confined to a rather small area.
- H. rotundata**.—Common in Helks Wood, also at Clapham.
- H. rupestris**.—Very common on old walls after rain, also on the limestone scars.
- H. pygmæa**.—I found two specimens of this small shell amongst the moss I brought home from Helks Wood. Mr. Standen also got a few.
- H. pulchella** var. *costata*.—Moderately plentiful in Helks Wood amongst moss and under stones.
- Bulimus obscurus**.—A few in Helks Wood, but not common.
- Pupa secale**.—A few dead specimens in Helks Wood. We did not find a single living specimen.

- Pupa umbilicata.**—Common all about the district, especially in Helks Wood, some of them had a flesh-colored mouth.
- P. umbilicata** var. *curta.*—I noticed some of my *Pupa umbilicata* seemed to be very short and dumpy, though fully grown; some of them I sent to Mr. Taylor and he says they are this variety.
- Vertigo pygmæa.**—Mr. Standen found some of this species amongst the moss he brought home and kindly gave me a few.
- V. pusilla.**—Plentiful in Helks Wood. Mr. Oldham must have the credit for first finding this rare species as he found five of it on one stone he turned over, We found a good many of them in the moss we brought home, and I may say this is a very good plan for getting the smaller species, though they take very careful looking for after the moss is dried.
- V. edentula.**—A few in Helk's Wood, but not common.
- Balea perversa.**—Plentiful on old walls after rain, but very local. It seems to occur most plentifully on walls that are shaded by trees and are covered with moss and lichens.
- Clausilia rugosa.**—Very common everywhere about Ingleton and Clapham. I could have got thousands of them. They were very variable in size, some were very short, but not tumid enough for the var. *tumidula.*
- C. rugosa** var. *dubia.*—This variety was also very common about Ingleton, but local. A colony on an old wall near Beezley Grange, also at Twistleton Scar End. A few at Chapel-le-Dale. Where I found this variety I did not find the type, except a few on an old tree trunk at Twistleton Scar End. I am inclined to think this is a different species from *C. rugosa.*
- C. laminata.**—Plentiful in Helks Wood on the trunks of trees, in some places as high as you could reach, but a good many of them very much weathered.

- Cochlicopa tridens*.—Very common both at Clapham and in Helks Wood.
- C. tridens* var. *crystallina*.—Two specimens in Helks Wood (R.S.).
- C. lubrica*.—This species was also plentiful, especially in Helks Wood.
- C. lubrica* var. *lubricoides*.—A few with the type.
- C. lubrica* var. *ovata*.—A few with the type (R.S.).
- Carychium minimum*.—Common in Helks Wood, also a few in Farrar's Grounds, Clapham.
- Acme lineata*.—Mr. Standen found one dead shell in the moss he brought home from Helks Wood.

The above list includes thirty-seven species and sixteen named varieties, and comparing this with a list of the shells of Clapham and District by Hugh Richardson, published in vol. v. of the Journal of Conchology, page 60, and a supplemental list by W. E. Collinge, page 195 in the same volume, I find the following additions to the list of species and varieties, excluding the shells found in the lake marl in Crummockdale, which were not recent:—

<i>Limnæa peregra</i> .	<i>H. rufescens</i> var. <i>rubens</i> .
<i>Ancylus fluviatilis</i> .	<i>H. hispida</i> var. <i>albida</i> .
<i>Succinea elegans</i> .	<i>H. ericetorum</i> var. <i>minor</i> .
<i>Zonites cellarius</i> var. <i>albinos</i> .	<i>H. pygmæa</i> .
<i>Z. alliarius</i> var. <i>viridula</i> .	<i>H. pulchella</i> var. <i>costata</i> .
<i>Z. glaber</i> .	<i>Pupa umbilicata</i> var. <i>curta</i> .
<i>Z. nitidulus</i> .	<i>Vertigo pygmæa</i> .
<i>Helix aculeata</i> .	<i>V. pusilla</i> .
<i>H. aspersa</i> and vars. <i>conoidea</i> and <i>undulata</i> .	<i>Cochlicopa tridens</i> var. <i>crystal-</i> <i>lina</i> .
<i>H. arbustorum</i> vars. <i>alpestris</i> , <i>trochoidalis</i> , <i>fusca</i> , <i>marmo-</i> <i>rata</i> , and <i>flavescens</i> .	<i>C. lubrica</i> var. <i>lubricoides</i> .
	<i>C. lubrica</i> var. <i>ovata</i> .
	<i>Acme lineata</i> .

This makes an addition of fifteen species new to the district, excluding varieties. Of the species mentioned that we did not find, are:—

<i>Zonites nitidus</i> . I consider this a misprint for <i>Z. nitidulus</i> . <i>Helix lamellata</i> . <i>Pupa marginata</i> . <i>Helix concinna</i> .	<i>Pisidium pusillum</i> . <i>Planorbis vortex</i> . <i>Physa hypnorum</i> . <i>Limnæa glabra</i> .
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The last four are recorded as from a pond on Clapham Common, a locality I tried to find but did not succeed. One of the most interesting finds to me was *Helix ericetorum*, as I never expected it to turn up, although I have found it in some, to me, very unlikely localities, as on a grassy bank at Monsal Dale, Derbyshire, and a colony in the middle of a wheat-field at Morcott, Rutlandshire, in a steep part of the field that could not be ploughed. I notice that the Rev. W. C. Hey mentions in 'The Naturalist' for June, 1885, page 258, that he saw a few dead specimens of *Helix ericetorum* at the foot of Giggleswick Scar, this would be about ten miles from Ingleton, so they may be found elsewhere in the district.

I was rather surprised that I did not find *H. lapicida*, as it occurs so abundantly on the Limestone in Derbyshire. The nearest locality to Ingleton, from which I can find any record is Kilnsea Crag and Kettlewell in Wharfedale, mentioned by the Rev. W. C. Hey in vol. iii. of 'The Journal of Conchology,' page 178. Seeing that Ingleton is a district so rich in species, I hope that the members of this society will organize an excursion there during the coming season, and be able to add considerably to the species I have mentioned.



Helix rupestris, an ovo-viviparous species.—On looking through the *H. rupestris* I got at Ingleton I found one of them, from which I had tried to extract the animal, shewing in the mouth young shells with $1\frac{1}{2}$ or 2 whorls formed, embedded in the part of the animal shewing there. In turning to Jeffreys' British Conchology, I find this is an ovo-viviparous species, which this shell shews very well, and on looking carefully over my remaining duplicates I am pleased to say I found several more, all shewing the same feature.—EDWARD COLLIER.

PRELIMINARY NOTES ON THE
PHENOMENA OF MUSCLE-CONTRACTION
IN THE MOLLUSCA.

BY DR. J. W. WILLIAMS, M.A.

(Read before the Conchological Society, May 2nd, 1888, and recommended for publication by the Rev. A. H. Cooke, acting as referee).

THE phenomena of muscle-contraction resolve themselves into two great and somewhat distinct primary groups, one of which—CILIARY ACTION—is more simple in its character than the other—MUSCULAR CONTRACTION PROPER. In this paper we shall take, for the sake of more clearness in detail, each of these divisions separately.

And, first, with regard to CILIARY ACTION. Cilia are found in the intestinal canal of most molluscs, and on the gill-filaments of the lamellibranchs where they are more strongly developed at certain spots termed “ciliated junctions.” They are filamentous prolongations of the protoplasm of columnar, cubical, or spheroidal cells, the free borders of which are bright and seem to be made up of juxtaposed knobs from whence fine varicose filaments extend into the substance of the cells forming the rootlets of the cilia. From each of these knobs a somewhat long cilium—long when compared with a cilium from the mucous lining of the mammalian trachea—extends. Their function is to execute rapid lash-like movements (*motus undulatus* of Valentin) in order to drive the water in a given direction over the gills for respiratory purposes, or, else, to help the movement of the fluid ingesta along the intestinal tract onward to the anus. They do not seem to be under the control of the nervous or circulatory systems for the lashing of the cilia obtain when the cells to which they are attached are bodily removed or even when they are isolated from one another, but their motion

resembles, evidently, the spontaneous movement of protoplasm. But the work done represents a large amount of physical labour and is much greater than that performed by ordinary muscular contraction. The absolute force of movement is the weight that can be distinctly moved when covering a surface of one centimetre. This has not been estimated, so far as I am aware, in the mollusca, but the lowest value for the pharyngeal mucous membrane of the frog, an animal in which the cilia are much shorter, is 3·36 grammes. When the estimation is made for the mollusca we shall, therefore, expect a much greater estimate than this one. The rapidity with which the strokes succeed one another is very great—when moving at their fastest the movement of the whole resembles a stream of running water, and when moving more slowly it recalls a field of corn shaken by the wind. A temperature between 0°c and 40°c favours the movement, as also does the presence of oxygen, water, or air. Ozone, oxygen under a pressure of eight atmospheres, alkalis, acids, bile, dilute saline solutions, chloroform, amyl nitrite, ether, hydrogen and carbonic dioxide arrest or retard the movement. During movement electricity is set free, for a current has been observed passing from the superficial to the deeper parts. What the cause of the movement may be, in reality, due to has been the subject of much discussion. Engelmann has brought forward, what I consider, the most plausible theory, and one which we must accept only tentatively for the time being as something to hold on to in our work until some other still more plausible explanation is advanced by our brethren-workers either in this country or on the continent. He considers that each cilium is composed of serially arranged particles, to each of which he has given the name of an *inotagmen*, which, during rest, are contracted with the long axis parallel to that of the cilium, and, during action, spherical, the whole movement responding to external stimuli. That the contraction is a response to external stimuli is supported by the observation of Steinbuch, who found that a mechanical stimulus, insufficient to injure the

cilia, such as that produced by an impulse of a fluid current, aids in a marked degree the activity of the cilia. The first observer of ciliary movement was A. de Heyde, in 1683. Since then many observers have worked well in this direction, such as Sharpey, Valentin, Purkinje, Virchow, Kistiakowsky, Roth, Engelmann, Stuart, Neumann, Huzinga, Kühne, Bowditch, and Calliburcès.

Secondly, with regard to the second group—MUSCULAR CONTRACTION PROPER. In mammalian muscle the fibres are of two kinds, striated and unstriated. The striated muscle-fibres are elongated, about one-and-a-half inches in length, and more differentiated in character than the unstriated which are fusiform in shape and about $\frac{1}{800}$ inch in length. The former kind are found in those portions of the body where active and rapid movements are effected, the latter where much slower movements are needed. The fibres of the molluscan muscle are unicellular and unstriated, and consequently not so differentiated from protoplasm as the striated and unstriped vertebrate muscle-fibres. And since it is a physiological law that the more rapid the contraction the muscle performs the more differentiated in character are its fibres from the ordinary type of protoplasm, the features of muscle-contraction in the mollusca, we should naturally expect, would not be so well pronounced as those attending the contraction of the two kinds of muscle-fibres in the mammalia. This, however, is evident on seeing a snail crawl, the slow locomotory movements of which have earned for it the *sobriquet* of “tardy-gaited.” The latent period, *i.e.* the time which elapses during the passage of the wave of change along the nerve to the muscle and the chemical changes going on in the muscle previous to contraction—we also should expect to be longer, and we are not deceived, for in the vertebrates this is about $\frac{1}{100}$ sec. in striated and $\frac{8}{10}$ sec. in unstriated muscle, and H. Varigny¹ has shown that in the mollusca it varies from

¹ “Sur la période d’excitation latente de quelques muscles lisses de la vie de relation chez les invertébrés.” *Compt Rend*, cI, pp. 570—572.

$\frac{3.5}{3.0}$ sec. in *Scaphander lignarius* to $\frac{1.2.5}{3.0}$ sec. in *Sepia officinalis*. But while, as is evident from their structure, the kind of muscle in the vertebrates that they most resemble is the unstriated, yet they differ very greatly from that variety in being, as Varigny has demonstrated,² under the control of the will, sometimes very rapid in their contraction and relaxation, and, taking them on the whole, not less irritable than striated muscle. The only one analogy that comes to my mind as existing in the vertebrates—and I think it is the only one that can be safely assumed—is the ciliary muscle of the iris, which, though consisting of unstriped fibres, is yet under voluntary control through the medium of the third cranial nerve. But the work they can perform is great. Simroth³ states that a small *Helix* can still move along when burdened with a weight nine times its own, and E. Sandford⁴ has proved that a *H. aspersa* weighing $\frac{1}{3}$ oz. can draw along a horizontal plane a weight weighing 17 ozs., which is still much greater (51 times its own weight) and that another of the same species with a weight of $\frac{1}{4}$ oz. can drag up a vertical plane $2\frac{1}{4}$ oz. (nine times its own). But to have estimates a little more absolute. The absolute force of one square centimetre of the muscle of a frog is from 2.8 to 3 kilogrammeters and about 8 or 9 kilogrammeters in man. The mollusca do not fall short of these estimates. Plateau⁵ has found that in the adductor muscles of *Pectunculus glycymeris* it is equal to 10,152 grammes; in *Pecten maximus*, 3,786; in *Mytilus edulis*, 7,984; in *Ostrea edulis*, 5,867; in *Venus verrucosa*, 12,431; in *Mya arenaria*, 1,178; in *Cardium edule*, 2,856; in *Pecten opercularis*, 530; and in *Tridacna*, 1,595 grammes. It should, however, be mentioned that the adductor muscles of the genus

² "Sur quelque points de la physiologie des muscles lisses chez les invertébrés." Op. cit., ci, pp. 656—658.

³ "Die Thätigkeit der willkürlichen Muskulatur unserer Landschnecken." Z. Wiss, Zool. xxx suppl. vol. pp. 166—224.

⁴ "Experiments to test the strength of snails (*Helix aspersa*)." Zoologist (3) x, p. 491.

⁵ "Recherches sur la force absolue des muscles des invertébrés." I Partie, Bull. Ac. Belg. (3) vi, pp. 226—259.

Pecten have been found by R. Blanchard⁶ to be striated (though the striæ are not identical with those in the striated vertebrate muscle-fibres, yet this shows a differentiation), and that there is a possibility that the same muscles of the other bivalves mentioned may be striated also. He did not, however, find this in *Mytilus*, *Unio*, or *Anodonta*. A. Coutance⁷ has also found that a weight of 10,000 grammes. is needed to open a contracted Pecten weighing 85 grammes without the shell, and that then the muscles rupture, while an oyster weighing 12 grammes, without the shell needed the traction of 10 kilogrammes to close its valves. Striation in the muscle-cells has also been observed in the odontophore of *Haliotis* and *Patella*, in a species of *Acmaea* by Dall,⁸ and in the heart of Pecten, *Anodonta*, *Helix*, and *Aplysia* by J. Dogiel.⁹ And, according to Pawlow,¹⁰ two kinds of nerve-fibres supply the adductor muscles of *Anodonta cygnea*—one inhibitory, the other motor. The motor nerves spring from the ganglia next to the muscles, and carry contracting impulses; the inhibitory fibres pass from the two anterior ganglia only, and bear relaxing impulses. Prof. Hartmann¹¹ also states that he has observed the *primitive fibrillæ* of the muscles of Cephalopods to contract. During contraction the muscles become shorter and correspondingly thicker, oxygen is absorbed and carbonic dioxide excreted as a waste tissue product, and the temperature rises. Glycogen

⁶ "Note sur la présence de muscles striés chez les mollusques acephales monomyaires." *Rev. Int. Sci.*, 1880 (No 4); also Constance, in *Bull. Soc.*, Brest, 1879; abstr. *J. R., Micro. Soc.*, iii, p. 930.

⁷ "De l'énergie et de la structure musculaire chez les mollusques acéphales." Paris; 1878; 8vo.

⁸ *American Journal of Science*, Feb., 1871, p. 123; also *American Naturalist*, iv, p. 691.

⁹ "Die Muskeln und Nerven des Herzens bei einigen mollusken." *Arch. Mikr. Anat.*, xiv, pp. 59—65.

¹⁰ "Wie die Muschel ihre Schale öffnet Versuche und Fragen zur Allgemeinen Muskel-und-Nerven-physiologie." *Arch. Ges. Phys.*, xxxvii, pp. 6—31; abstr. *Nature*, xxxiii, p. 106.

¹¹ *S. B., Nat. Fr.*, 1873, p. 94.

is also used up, as has been shown by Dr. Barfurth,¹² in an inverse proportion to their activity, and this substance I have attempted to show in a previous communication¹³ is, in them, as in vertebrates, applied to the development of muscle-energy by oxidation, and, probably, derived from the carbohydrates (starches) and, in a less degree, the proteids (vegetable albumen, vegetable fibrin, gliadin, &c.) of the food-stuffs. According to W. Beidermann¹⁴ the adductor muscles of *Anodon* retain their irritability for several days when kept in the blood of that bivalve. And, in conclusion, with regard to some one or two very interesting points in the physiology of muscle-contraction in the mollusca which are unique in the animal kingdom. For these we must thank, in great part, Simroth,¹⁵ to whom, indeed, must be given the palm for original work and observation on that group of living beings over which I hope all the readers of this journal are enthusiastic. If the under surface of the foot of a snail be watched as it crawls along a glass plate it will be observed that a wave passes along the foot while the animal bends from side to side. These two movements are accomplished by two different sets of fibres and by two different modes. The former set run longitudinally in the substance of the foot (extensile fibres), the latter in an oblique direction (contractile fibres). The extensile fibres are the active agents in locomotion and cause an extension of the foot; the contractile fibres cause a shortening of the

¹² "Vergleichend-histochemische Untersuchungen über das Glycogen." Arch. Mikr. Anat., xxv, pp. 259—404.

¹³ "On the Meaning of the Glycogenic Function in the Mollusca."

¹⁴ "Ueber die electriche Erregung der Schliessmuskel von Anodonta." S. B. Ak., Wien, xci., pp. 29—96.

¹⁵ "Die Thätigkeit der willkürlichen Muskulatur unserer landschnecken." Z. Wiss. Zool., xxx, suppl. vol., pp. 166—224.

"Die Bewegung unserer landschnecken." *Op. cit.*, xxxii., pp. 284—322.

"Ueber die Bewegung und das Bewegungsorgan von *Cyclostoma elegans*, und der einheimischen Schnecken überhaupt." *Op. cit.*, xxxvi, pp. 1—67. Z. ges Naturw. (2) v, pp. 500—504.

foot and a swaying from side to side of the animal's body. The latter act, as their name implies, by contractions, and only with persistent waves of change passing along the nerves from the ganglia to the fibres. The latter do not contract at all, but become extended by a coagulation of their muscle-plasma (myosin?) which begins at one end and advances along the whole length of each fibre. This coagulation can only take place when the lacunæ of the pedal muscle are filled with blood, and a *single* impulse from the pedal nerves is enough to set it into action, after which it proceeds without the intervention of any nervous agency. The other interesting item is mentioned by A. Coutance (*loc. cit.*) who states that the adductor muscle of Pecten is composed of two parts—one, containing striated fibres ('muscular' part) and of a yellowish colour; the other, consisting of ordinary unstriated muscle-cells ('ligamentous' portion) and bluish-white in colour. The former portion, according to this author and H. von Ihering,¹⁶ closes the valves rapidly, the latter keeps them together when closed, so that the muscle, as a whole, is never at rest.

The pedal muscle of the snail can be thrown into a state of tetanus—*i. e.*, the fusion of a series of successive contractions into one continuous contraction—and here is another distinction from vertebrate unstriated muscle which is incapable of passing into a tetanic state of contraction. In this it resembles the striated muscle of the higher animals. The number of stimuli required in the case of the pedal muscle of the snail is ten per second; for the sake of comparison we may state that the wing-muscles of insects require three hundred.



Limax flavus var. rufescens in West Lancashire.—

Mr. W. H. Heathcote sent me last week a half-grown example of *Limax flavus*, which answers to Moquin's description of this variety, taken in his wood-yard at Avenham Lane, Preston, where the species is not uncommon.—W. DENISON ROEBUCK.

¹⁶ Ueber Anomia. Z. Wiss, Zool., xxx Suppl. vol., pp. 13—27.

THE MARINE SHELLS OF SCILLY.

BY CLIFFORD BURKILL AND J. T. MARSHALL.

(Read before the Conchological Society, Dec. 15th, 1888, and recommended for publication by the referee, Alex. Somerville).

IN the last number of the "Journal of Conchology" there appeared an account of the occurrence of *Argiope decollata* at Scilly, and a lengthy examination of the dredgings from those Islands had yielded such additions to those already recorded, that further details were promised.

These additions number forty-seven, the majority being rare species—a not inconsiderable number to the full lists published in 1885 and 1886 by Messrs. Smart and Cooke; and they were obtained by Mr. Burkill during a three months' stay at St. Mary's, where he was joined by Mr. B. Sturges Dodd in the month of August, when unfortunately the weather turned out unpropitious for dredging purposes; still a little was done, and a few of the undermentioned species were recorded by Mr. Dodd.

When it is remembered what a very fickle nature the climate of Scilly bears, and during a summer, moreover, when the weather was everywhere abnormal, it must be granted that Mr. Burkill has done good work in the time and with the means at his disposal.

The principal dredgings were taken off Menavawr Rock, in 40 fathoms; in St. Mary's Sound, 35—40 fathoms; off Muncoy Neck Rock, in about 30 fathoms; and in Crow Sound. A good deal of shore collecting was also done, but with no particular results not already recorded. Moreover, not one favourable low spring tide occurred during the entire three months.

Two new varieties appear in the following list which are additions to the British fauna—*Cerithiopsis tubercularis* var. *albescens* Marshall; and *Philine scabra* var. *circa* Marshall.

It may be interesting to add that *Helix revelata* occurred at the roots of grass on the cliffs near the sea at St. Mary's.

Argiope decollata Chem.—Noticed fully in the last number of the Journal.

A. cistellula S. Wood.—Menavawr. Valves only.

Modiolaria discors L.—St. Mary's, in dwarf weeds between tide-marks.

Galeomma turtoni Ed. Zool. Jour.—Menavawr. Smart and Cooke in their Supplement record one valve, and another occurred to Mr. Burkill. These valves had probably drifted from shallow water.

Lepton sulcatulum Jeff.—Menavawr and Muncoy Neck. A dozen perfect specimens and many valves. This species has hitherto been considered peculiar to the Channel Islands (excepting its foreign stations), where it lives at low-water mark in dwarf seaweeds.

L. clarkiae Clark.—Menavawr. Valves only.

Montacuta dawsoni Jeff.—Menavawr. A single valve, but unmistakable. Although this shell is a comparatively recent discovery, found by the late Mr. Dawson in the Moray Firth, I am able to record it from four additional localities—Donegal, Bartra Island in Killala Bay, Torbay, and now Scilly. I also found it not uncommon in dredgings from the coast of Greenland obtained during our last Arctic Expedition in 1875.

Tellina balaustina L.—St. Mary's Sound. A fine valve in fresh condition.

Amphidesma castaneum Mont.—Menavawr, Muncoy, and St. Mary's Sound. Valves are plentiful about the Land's End and at Scilly, but the two first-named localities are notable as having yielded from each place a perfect adult example.

Lyonsia norvegica Chem.—St. Mary's Sound.

Cyclostrema cutlerianum Clark.—Menavawr and Muncoy Neck.

C. nitens Phil.—Menavawr and Muncoy Neck.

C. serpuloides Mont.—Dead at Menavawr and Muncoy; living under stones at low water mark, and also dredged living in Crow Sound.

Trochus granulatus Born.—St. Mary's Sound. Messrs. Smart and Cooke record "a few dead and imperfect specimens," but living examples were taken on this occasion.

Trochus granulatus var. *lactea* Jeff.—With the preceding, also living.

Lacuna puteolus Tur.—St. Mary's, in weed at low water.

Rissoa striatula Mont.—Muncoy Neck.

R. calathus F. and H.—Muncoy Neck.

R. inconspicua Alder.—Muncoy Neck. This species is recorded as Scillonian, but with no authority, in a list of shells kept at Tresco Abbey. It may now be considered confirmed.

R. vitrea Mont.—St. Mary's Sound. Smart and Cooke's supposed *R. vitrea* were *R. proxima*, as altered in their Supplement.

R. soluta Phil.—St. Mary's Sound, Muncoy Neck, and Menavawr.

Jeffreysia diaphana Alder.—St. Mary's, in weed.

Skenea planorbis Fabr.—Under stones and on weeds between tide-marks.

Cæcum trachea Mont.—Menavawr and Muncoy.

C. glabrum Mont.—St. Mary's Sound, Menavawr, and Muncoy.

Aclis unica Mont.—Muncoy Neck.

A. ascaris Tur.—Muncoy Neck.

A. supranitida S. Wood.—St. Mary's Sound.

A. gulsonæ Clark.—Muncoy Neck and St. Mary's Sound.

- Odostomia minima** Jeff.—Menavawr. One specimen.
- O. nivosa** Mont.—Menavawr. This species is also recorded (as *O. cylindrica*) in the Tresco Abbey List, and now confirmed.
- O. truncatula** Jeff.—Menavawr.
- O. lukisi** Jeff.—Menavawr and Muncoy Neck.
- O. albella** Lov.—St. Mary's, under stones between tide marks.
- O. rissoides** Han.—St. Mary's, confirming Abbey List.
- O. diaphana** Jeff.—Menavawr.
- O. obliqua** Ald.—Menavawr.
- O. dolioliformis** Jeff.—Muncoy Neck.
- O. interstincta** var. **suturalis** Phil.—Muncoy Neck.
- O. scalaris** Phil.—St. Mary's Sound and Menavawr. This confirms Smart and Cooke's record in their Supplement.
- O. pusilla** Phil.—Menavawr.
- O. scillæ** Scac.—Menavawr. One specimen only.
- Adeorbis subcarinatus** S. Wood.—St. Mary's Sound. Dead specimens.
- Cerithium perversum** var. **pallescens** Jeff.—Menavawr.
I recognised this pretty variety among some of Mr. Smart's shells after his list was published.
- Cerithiopsis tubercularis** var. **nana** Jeff.—Menavawr and St. Mary's Sound.
- C. tubercularis** var. **albescens** Marshall.—Shell of a pale straw colour. Dredged at Muncoy and Menavawr. Mr. Smart dredged some examples on the latter ground that were half white, gradually toning to light brown.
- C. pulchella** Jeff.—Menavawr, Muncoy, and St. Mary's. This is another species recorded in the Abbey List, and now confirmed.
- Buccinum undatum** L.—St. Mary's. Smart and Cooke record "very old and worn shells only; exceedingly rare." Five living examples were taken here.
- Fusus gracilis** var. **convoluta** Jeff.—St. Mary's Sound. The type is recorded in the Abbey List as *F. islandicus*.

Nassa incrassata var. *minor* Jeff.—Menavawr.

Defrancia purpurea var. *philberti* Mich.—Muncoy Neck.

Pleurotoma rugulosa Phil.—Muncoy Neck. A young and fresh example of this very rare shell.

P. rufa var. *lactea* Jeff.—St. Mary's Sound.

Utriculus expansus Jeff.—Menavawr. A most interesting find. Several dead examples occurred of this very rare shell. Jeffreys gives the Shetland and Lofoden Islands for this species, but in addition to the Scilly locality now noted I can record it from the west coast of Ireland.

Philine scabra var. *circa* Marshall.—Shell having a broad white band round the body-whorl, and corresponding with the following variety. Dredged off Muncoy. This form is rare, and I can record it from one other locality only—Killala Bay, on the west coast of Ireland.

P. catena var. *zona* Jeff.—Menavawr.

P. pruinosa Clark.—St. Mary's Sound.

Aplysia punctata Cuv.—St. Martin's Flats, between tide-marks. Very fine.

Spiralis retroversus Flem.—Menavawr, Muncoy, and St. Mary's Sound.

The Rev. R. W. J. Smart has favoured us with the following unpublished additions to the Scilly List, which brings the Molluscan fauna of that region up to date:—

Pecten opercularis var. *lineata* Da Costa.—Menavawr and St. Martin's, alive (Smart and C. Jefferys).

Mytilus phaseolinus Phil.—Menavawr, small but numerous (C. Jefferys).

Montacuta substriata Mont.—St. Martin's Flats and Pentle Bay, on *spines* of *Spatangus purpureus*, common (C. Jefferys).

Loripes lacteus L.—St. Mary's, living (C. Jefferys).

Scrobicularia nitida Müll.—Identified among specimens of *S. alba* submitted to Mr. Marshall.

Rissoa cimicoides Forbes.—Also identified by Mr. Marshall among specimens of *R. reticulata*.

R. striatula Mont.—Menavawr, a large but broken specimen (A. H. Cooke).

Mr. Marshall has likewise identified the following *Odostomia* from the shells of that genus dredged by Messrs. Smart and Cooke :—

Odostomia rissoides Han.

O. rissoides var. *dubia* Jeff.

O. rissoides var. *alba* Jeff.

O. pallida var. *angusta* Jeff.

O. conoidea var. *australis* Jeff.

O. unidentata var. *elata* Jeff.

Akera bullata Müll.—Menavawr (A. H. Cooke). This is one of the species recorded by Lord Vernon, and now confirmed.

Sevenoaks, Torquay, December, 1888.

Obituary.

Sir David Barclay.

The loss of a veteran conchologist, Sir David William Barclay, tenth Baronet, which occurred at his residence, Holland Road, Kensington, on the 23rd November, in his 85th year, is worthy of a short record in the Journal of Conchology. His long residence in the Mauritius enabled him to make, not only a fine collection of the Land and Marine Shells of that locality, but also to visit other Islands and Reefs, thereby adding many new and interesting forms to science. His collections altogether contained about 17,000 species. On the occasion of my last visit to him, early in November, he had been unwell, but was then much better, and in capital spirits. We spent some hours in chatting and looking over some of his cabinets, and he recalled with great delight over a drawer of beautiful Mauritius Pectens, the various details concerning their capture. His name will be

remembered in connection with such shells as *Cyclostoma Barclayanum*, the rare and beautiful *Murex Barclayi*, and the unique *Cypræa Barclayi*, found by Sir David on the coral reefs of Diego Garcia, and now in the collection of my friend Miss Saul.—WALTER CROUCH, F.Z.S.

Rev. Churchill Babington, D.D., F.L.S.

The death of this well-known naturalist, on the 12th January last, has removed from us a man remarkable for his varied attainments. In the department of botany he held a place among the first, having from his youth been an ardent student of the science. Born in 1821, he appears as a contributor to Potter's "History of Charnwood Forest," both as a botanist and ornithologist. Watson's "Botanist's Guide to England and Wales," Sir W. J. Hooker's "Journal of Botany," and the "Flora of New Zealand," were under obligations to him. His last work was the "Catalogue of Suffolk Birds," published in 1886, and the forthcoming "Flora of Suffolk," by Rev. Dr. Hind, has been carefully revised by him. Few equalled Dr. Babington as a classical archæologist. His contributions to Smith and Cheetham's "Dictionary of Christian Antiquities" upon medals, rings, glass, tombs, seals and inscriptions have received high commendation. Conchology was among his later acquisitions, having been regularly undertaken only about ten years ago. With his characteristic thoroughness he mastered first the British species, and then proceeded to form a fine collection of both British and exotic specimens. He purchased the shells formerly in the museum at Sudbury, Suffolk, and made many expeditions on the coasts of Great Britain and the Channel Isles. At the time of his death he was contemplating a complete catalogue of Suffolk shells. His removal, at the age of 67, will be widely felt, as his amiable disposition was equal to his profound and varied learning.—C. G.

PRELIMINARY REMARKS ON THE MOLLUSCAN
FAUNA OF COLORADO.

By T. D. A. COCKERELL.

EVER since July, 1887, I have had in preparation a detailed list of the mollusca of Colorado, which, however, cannot yet be considered complete, since records are still entirely lacking for very many of the counties, and one or two questions of nomenclature still remain unsettled. It may therefore not be amiss to offer a few preliminary remarks on the subject, leaving details of precise localities, &c. to be given in the full list.

PREVIOUS RECORDS.—The foundation of Colorado Conchology was laid by E. Ingersoll, who enumerated some forty-two species in a paper in Bull. U.S. Geol. Survey, 1875. Since that date various notes and records have appeared, which, however, have not added greatly to our knowledge of the mollusca of the State. These, together with Ingersoll's contributions, bring the number of recorded species up to forty-eight, to which I can now add eleven, making a total of fifty-nine. This will seem an exceedingly small number to European Conchologists; but the paucity of species of mollusca is the most prominent feature of this region as compared with the eastern states and Europe.

CHARACTERISTIC FEATURES.—Besides the paucity of species there are other marked features, notably the great preponderance of boreal types—no less than twenty-five of the fifty-nine species being distinctly boreal—while several others approach thereto. There is but one species of slug, but that is variable, and was on this account divided into two by Ingersoll. *Hyalina* is abundant, and *Patula* well developed (though less so than in Utah), but excepting these and species of *Microphysa* and *Vallonia* there is not a single *Helix*—the great groups *Mesodon*,

Polygyra, &c. being wholly unrepresented. *Cochlicopa lubrica* occurs locally, and seems less variable than in Europe. *Pupa* (including *Vertigo*) is well represented, but the group *Leucochila* is rare. *Succinea* is frequent. Among freshwater species four species of operculata are on record, but they must be very scarce ; I never met with any of them. *Limnæa* has several species of the *Limnophysa* group. *Physa* is fairly numerous, but *Planorbis* is poorly represented. *Ancylus*, *Sphærium*, and *Pisidium* occur in the mountains, but *Unio* and *Anodonta* are only found in the north-east corner, almost in Nebraska.

DISTRICTS.—Colorado presents very varying conditions at altitudes from 3,450 to 14,480 feet. Roughly, it may be divided into the eastern plains, the central mountain region, and the lower western portion. For more detailed work I have divided it into seventy-eight counties and vice-counties, which fall under nine heads, according to the great river-basins, as follows :—

- | | |
|----------------------|---------------------|
| (1). ATLANTIC SLOPE. | (2). PACIFIC SLOPE. |
| a. Platte.—17. | e. San Juan.—5. |
| b. Republican.—4. | f. Dolores.—6. |
| c. Arkansas.—19. | g. Grand.—17. |
| d. Rio Grande.—6. | h. White.—1. |
| | i. Bear.—3. |

Platte.—This division is characterised by several species, found in Lodge Pole Creek, in Logan County, by Mr. Chas. T. Simpson, and at present known to occur nowhere else in the state, viz :—*Limnæa modicella* Lea, *Physa virgata* Gould, *Planorbis bicarinatus* Say, *Unio occidentis* Lea, *Anodonta ferrusaciana* Lea, and *A. plana* Lea. All but one of these are now recorded for Colorado for the first time.*

* Mr. C. T. Simpson also found the following species in the Platte district in S.W. Nebraska, quite close to Colorado ; they are not yet known for our state, but may be looked for in its N.E. portion :—*Limnæa bulimoides* Lea, *Physa gyrina* Say, *Planorbis exacutus* Say, *P. armigerus* Say, *Pupa fallax* Say, *P. armifera* Say, *P. contracta* Say, *Zonites minusculus* Binn., and young shells of what are probably *Unio gracilis* Barnes.

Republican.—Records are at present entirely wanting; probably some of the eastern Unionidæ, &c. may exist, the neighbouring state of Kansas boasting no less than forty-nine species of *Unio*, two of *Margaritana*, and twelve of *Anodonta*, while Nebraska has also numerous species belonging to these genera.

Arkansas.—The eastern portion of this division has no records as yet, but *Anodonta dejecta* Lewis, *Unio lachrymosus* Lea, and other species occur in the Arkansas River in Kansas. The mountainous portion of the Arkansas basin is the eastern limit of a few species belonging to the Rocky Mountains, *Agriolimax montanus* Ing., and *Patula cooperi* Binn., extending as far east as Pueblo Co., while *Patula cronkheitei* Newc.,* *Microphysa ingersollii* Bland, *Pupa Blundi* Morse, *P. corpulenta* Morse, and *P. alticola* Ing., have been found in Western Custer Co. *Vitrina pellucida* Müll. occurs in Custer Co., and *V. Pfeifferi* Newc. in Lake Co., *Hyalina radiatula* Alder in Custer and Pueblo Cos., and the var. *viridescens-alba* Jeffr.† in Custer Co., *H. arborea* Say is frequent in Custer, Chaffee, and Pueblo Cos.; in Custer Co. *Patula striatella* Anth. is found abundantly with it, as well as *Conulus fulvus* and *Helix pulchella* var. *costata*. *Cochlicopa lubrica* Müll. occurs abundantly near Swift Creek, in Custer Co., at about 8,400 feet altitude. The species of *Pupa* are numerous and puzzling. The common species in Custer Co. is *P. blandi* Morse, which presents various forms, one of which Mr. C. F. Ancey, to whom specimens were sent, refers to *P. bigranata* Rossm. Probably they are all referable to *P. marginata* Drap. as varieties. Dr. V. Sterki remarks that specimens of one of these forms which I sent

* This ascends as high as 10,000 feet altitude. Mr. H. A. Pilsbry informs me that it is probably to be considered a variety of the European *P. ruderata* Stud.

† *H. viridula* of American authors: it seems to me identical with the European form.

him are very much like *P. badia* (*marginata*) from Anticosti I. and also greatly resemble *P. sterri* v. Voith from Geissberg, Switzerland, of which he has been good enough to send me specimens. Then there is a small species which I have provisionally called *P. coloradensis* sp. nov., but forbear to describe it until it has been compared by Mr. Pilsbry with authentic specimens of *P. Rowelli* Newc. The only two Colorado species of the *Leucochila* section are also from this district,—*P. arizonensis* Gabb, from El Paso Co. according to Tryon (but not found since), and a minute *Leucochila* which I have found very sparingly at about 8,400 feet in West Custer Co., to which I have given the name *P. montanella* sp. nov., but do not describe it pending further investigations. Dr. v. Sterki writes that he has obtained a minute *Leucochila* from Minnesota, which is very distinct from all other species, and suggests that it may be identical with mine. *Succinea avara* Say occurs in Custer and Pueblo Cos., and another species, doubtfully referred to *S. stretchiana* Bland, is from Chaffee Co. *S. pfeifferi* Rossm. is found at West Cliff in Custer Co. at 7,700 feet altitude. *Limnæa truncatula* Müll is abundant in Custer Co., the only other *Limnæa* known from the district being a variety or sub-species of *L. palustris*, from Chaffee Co. *Physa hypnorum* and a small variety of *P. heterostropha* Say, occur near West Cliff, Custer Co., while the hot springs at Wellsville produce a very distinct sub-species of *P. heterostropha*, which I call *P. cupreonitens* sp. nov.* No species of *Planorbis*

* *P. cupreonitens*; parvula, nitida, pellucida, cuprascens. Smooth, pellucid, shiny, red brown or copper colour, whorls 4, somewhat convex, suture rather deep; spire sub-acute, of moderate length; mouth pearly within, oval, inclining to pyriform, not greatly attenuated above. Columella slender, straight. Inner lip a whitish film, not thickened. Long. $7\frac{1}{2}$, lat. $4\frac{1}{2}$ mill.; spire, long. $2\frac{1}{2}$ mill. Forms somewhat analogous to this are *Physa hypnorum* var. *cuprella*, from Sussex, England, and especially *Physa acuta* var. *minima*, which is only 7 mill. long, shiny and semitransparent, but of a PALE HORN COLOUR instead of coppery. It, like *P. cupreonitens*,

is yet known from the Arkansas division, while the only bivalves are *Pisidium variable* Prime and *P. pusillum* Gmel. from Custer Co., the latter going up to above 11,000 feet altitude.

Rio Grande.—Not much is known of the Mollusca of this district. In Hinsdale Co. Ingersoll reports *Planorbis plexatus* Ing. and *P. parvus* Say from St. Mary's Lake, and a *Limnæa* aff. *rowellii* Tryon was found in Rio Grande Co., while I have found *Agriolimax montanus* Ing., *Vitrina pellucida* Müll., *Patula cronkheitei* Newc., *Succinea avara* Say, *Physa heterostropha* Say, and *Pisidium pusillum* Gmel. in Saguache Co., and Ingersoll reports a few species from the same county.

San Juan.—Known only from Ingersoll's records—*Vitrina pfeifferi*, *Hyalina arborea*, *H. conspecta*, *Microphysa ingersolli*, *Pupa alticola*, *Pupa* "Californica Rowell," *Succinea* "lineata Binn.," *Limnæa stagnalis*, *L. ferruginea*, *Physa cooperi*, &c. Mr. C. F. Ancey, who has examined Ingersoll's specimens, informs me that the "*S. lineata*" are mostly *S. avara* Say (*S. lineata* does, however, occur in Colorado—Binney records it from Este's Park, in the Platte division) and that the "*P. californica*" belong to a distinct species, which he proposes to call *Pupa ingersolli* Ancey. Mr. H. A. Pilsbry had previously expressed to me (*in litt.*) his doubt whether Ingersoll's *Californica* was really that species.

Dolores.—Records are at present entirely wanting.

Grand.—The principal recorded species are *Patula strigosa*, *Pupa marginata*, *Succinea nuttalliana*, *S. rusticana*, *Limnæa desidiosa*, and *Physa wolfiana*. I have found *Hyalina radiatula* in Mesa and Garfield Cos., and var. *viridescenti-alba* in Mesa Co. *Conulus fulvus* occurs in

was found in a HOT spring, at Salut, near Bigorre, Pyrenees, where it was associated with *Neritina thermalis* Boubée. I am indebted to Mr. C. F. Ancey for specimens of this interesting variety of *P. acuta*.

Summit, Garfield, Mesa, and Delta Cos. *Patula cooperi* is perhaps more abundant than in any other district, and *P. striatella* occurs freely—its white variety was found near the Mam Mountains, Mesa Co. *Microphysa ingersollii* occurs on the Grand Mesa, at over 9,000 feet, and from Surface Creek, Delta Co., I obtained *Pupa blandi* Morse, *P. corpulenta* Morse, and a species referred by Mr. Pilsbry to *P. rowellii* Newc. *Physa heterostropha* abounds in the Gunnison River, and *P. elliptica* Lea has its only known Colorado station in Gunnison Co. *Ancylus fragilis* Tryon was found on boulders in Buzzard Creek, and *Sphærium occidentale* Prime occurred in a pond near Black Lake—both these species are additions to the Colorado list. A small *Pisidium*, having apparently somewhat the same relation to *P. pusillum* that *P. roseum* has to *P. nitidum*, is provisionally called *P. mesæ*. It is from the southern slope of the Grand Mesa, in Delta Co.; it may prove to be but a variety of *P. pusillum*.

White.—No records are at present forthcoming.

Bear.—Records entirely wanting.

PALÆONTOLOGY.—The fossil mollusca have been dealt with by White and others at some length. Species of *Ostrea*, *Pleurotomaria*, *Inoceramus*, *Productus*, *Rhynchonella*, *Terebratula*, &c., &c., have been discovered. I have an undeterminable fragment of *Ammonites* from Pueblo Co.



Helix nemoralis m. sinistrorsum in Middlesex.—I took a specimen of this variety while collecting shells last September, on the railway bank at West Drayton, Middlesex. It is a dead shell but in fairly good condition.—F. G. FENN, Syon Lodge, Isleworth, October, 1888.

NOTES AND CRITICAL REMARKS
ON A DONATION OF SHELLS SENT TO THE
MUSEUM OF THE CONCHOLOGICAL
SOCIETY OF GREAT BRITAIN AND IRELAND.

BY JOHN BRAZIER, F.L.S., C.M.Z.S., M.C.S.

(Read before the Conchological Society, Dec. 15th, 1887.)

- Murex Brazieri** Angas.—Hunters Bay, Middle Harbour, Port Jackson, New South Wales; found in shell-sand thrown up after south-east gale.
- Triton (Cumia) speciosa** Angas.—Hunters Bay, Middle Harbour, Port Jackson.
- Tritonidea Australis** Pease=*T. assimilis* Angas (non Reeve).—Bottle and Glass Rocks, Port Jackson. Found under stones at low water.
- Ranella pulchella** Sowerby = *Biplex perca* Perry.—Port Curtis, Queensland, N.E. Australia; ten fathoms.
- Zemira Australis**=*Eburna Australis* Sowerby.—Green Point, Watson Bay, Port Jackson; eight fathoms; rare.
- Nassa Jonasi** Dunker=*Nassa labecula* A. Adams.—Rose Bay, Port Jackson. Found in small pools on sandy mud flats.
- N. paupera** Gould=*N. rufocincta* Angas (non A. Adams).—Hunters Bay, Port Jackson, N.S.W. Found with *Murex Brazieri*. The *Nassa rufocincta* A. Adams is the *N. versicolor* of C. B. Adams. Mr. Angas named the Port Jackson species *N. rufocincta*.
- N. immersa** Carpenter.—Duke of York Island, New Britain. A very common species found crawling on sandy mud flats at half tide; used by natives to adorn their dresses and for armlets, &c. This is evidently a MS. name of Carpenter, have not been able to find out where described.

- Purpura neglecta** Angas=*Urosalpinx Tritoniformis* Tryon.
-Watson Bay, Port Jackson. Found under stones at low water. Mr. Tryon is evidently wrong, or he never saw this species, if he had he would never have placed it where it is in *Urosalpinx*.
- Latiaxis nodosa** A. Adams.—Bottle and Glass Rocks, Port Jackson. Found under stones at low water, spring tides.
- Olivella nympha** Adams and Angas.—Cabbage-Tree Bay, Manly Beach, New South Wales. Obtained from shell sand after S.E. gales. They are finer than those found in Port Jackson.
- O. leucozona** Adams and Angas.—Hunters Bay, Middle Harbour, Port Jackson. Found with *Murex Brazieri*.
- O. triticea** Duclos=*O. pardalis* Adams and Angas.—Hunters Bay, Middle Harbour, Port Jackson. Found in shell sand. A variable species in the marking. In two hours I found 50 specimens in a small nook in the rocks at Hunters Bay.
- Amalda oblonga** Sowerby.—Green Point, Watsons Bay, Port Jackson ; eight fathoms.
- Mitra rhodia** Reeve=*M. badia* Angas (non Reeve).—Bottle and Glass Rocks, Port Jackson. Found under stones at low water, spring tides. This species was always returned, named by Mr. Angas, as *Mitra badia* Reeve.
- Columbella lineolata** Pease (Brazier)=*C. dermestoides* Angas (non Kiener).—Hunters Bay, Middle Harbour, Port Jackson. Found with *Murex Brazieri*. There appears to be some confusion about this very pretty and interesting species, and I will endeavour to clear it up. On the 30th and 31st of October, 1870, I sent to Mr. Pease, of Honolulu, Hawaiian Islands, a large collection of Australian and Polynesian shells, and in that lot I sent a number of specimens of *Columbella dermestoides* Angas. Mr. Pease wrote me November 26th, 1870, acknowledging the arrival of my things, so that I may just as well quote the words from his letter, at present before me. "The *Columbella*

dermestoides which you have sent you may place in your collection as *Amycla lineolata* Pease. *Dermestoides* is a variety of *Nassa cornicula* Medit., and not your shell, though near it. It is intermediate between the Genera *Nassa* and *Columbella*, the inner lip being smooth and columella truncate at base. Pray send me all the specimens you can spare, especially varieties." In another letter, the last he wrote, dated January 27th, 1871, "I wrote you before that I have described the species which Angas called *Columbella dermestoides* to *C. lineolata*. I have discovered since that the Mediterranean shell belongs to genus 'Amycla' while your species is a true *Columbella*, the columella being dentate or laminate. I have been obliged to change the name to *Col. maculata*." Having found that Mr. Pease's last name was preoccupied, I wrote to him on the subject, but alas, he had gone over to the silent majority. I had distributed a large number of specimens under Mr. Pease's first name and consider it best to retain it. Mr. Pease described it in the *American Journal of Conchology*, Vol. VII. Part I. p. 22, August, 1871, as *Columbella maculosa*, so that his name of *lineolata* had been in use twelve months before Mr. Tryon in *Manual of Conchology* Vol. V. p. 138, says, "This species was described by Mr. W. H. Pease as *C. maculosa*, a name preoccupied by Sowerby, having been previously confused by Mr. Angas with *C. dermestoides* Kiener, and by Mr. Brazier with *C. lineata* Pease—which, apparently by a slip of the pen, he writes *lineolata*. Pease's description of *lineata* (I have no specimen, and it has not been figured) scarcely covers this form, and I therefore give the species the name under which it is so well known to Australian collectors." It will be seen by Mr. Pease's letters there is no slip of the pen on my part, but to give honour to whom honour is due as I had every respect for the late William Harper Pease as a jolly good fellow.

- C. Digglei** Brazier.—Port Curtis, Queensland, N.E. Australia; eight to ten fathoms. This differs from the type in being quite smooth and having the oblique reddish lines.
- C. Digglei** var.——.—Port Curtis, Queensland, N.E. Australia; eight to ten fathoms. This variety is of a slender form with a broad white opaque band below the suture; first three whorls smooth of a pinkish tinge, the fourth with two narrow reddish bands, fifth with three oblique bands, the sixth and last with nine to ten oblique reddish lines.
- C. Tayloriana** Reeve=*C. albomaculata* Angas.—Long Bay, near Sydney, N.S.W. Found in vast numbers in shell sand thrown up after S.E. gales. I consider *Columbella albomaculata* Angas, a synonym of *C. Tayloriana* Reeve, an opinion I stated in 1883 in the Proc. of the Linnean Society of New South Wales, p. 228. The Rev. Robert Boog Watson in his report on the Gasteropoda collected by H.M.S. Challenger, Vol. XV. p. 235 considers it to be *C. albomaculata* Angas; he says, "Mr. Tryon considers Angas' species=*Columbella Tayloriana* Reeve. His types in the British Museum seemed to me to be *Columbella Lincolnensis* Reeve; but I should have united that and several others to *Columbella acuminata* Menke." I attach very little value to Mr. Cuming's types, for he always had the knack of replacing what he considered better specimens for the actual types, therefore the value of the types are lost. *Columbella Lincolnensis* Reeve, *Columbella acuminata* Menke, is *C. Menkeana* Reeve: *Columbella albomaculata* Angas, is *C. Tayloriana* Reeve. The three species cannot be confounded. I give my opinion from having collected some hundreds of the three species; in marking, &c. there are not two specimens alike. Angas' types of his *C. albomaculata* were collected by me and sent to him in 1866. Reeve's enlarged figure of *C. Tayloriana* is very good, and his description—to the point in every respect; the natural length of Reeve's figure is $11\frac{1}{2}$ millimetres. Some

very fine specimens that I have from Middle Harbour measure 22 millimetres. Reeve's type was described from the collection of the late Mr. Thomas Lombe Taylor and not from the Cuming collection, as quoted by the Rev. Robert Boog Watson, and the locality, north-west Australia, as quoted by Reeve is also wrong.

Natica euzona Recluz=*N. areolata* Angas (non Recluz).—Green Point, Watsons Bay, Port Jackson; eight fathoms. Mr. Angas quotes this species in his list of Mollusca found in Port Jackson in Proc. of Zoo. Soc., London, p. 90, 1871, as *areolata* Recluz. I quite agree with the Rev. R. B. Watson that this is *N. euzona* Recluz, after reading up Recluz's original description and his figure given in the French *Journal de Conch.*, 1850, Vol. I., pl., 14, fig. 3.

Crossea concinna Angas.—Hunters Bay, Middle Harbour. Found in shell sand washed in after S.E. gales. Specimens also from between Balls Head and Goat Island, Port Jackson; eighteen fathoms.

Apicalia fulvescens A. Adams=*Eulima Caledonica* Morelet. Nouméa, New Caledonia. Found on the dorsal surface of a species of *Asterias* in 1865—1873; quite common. I sent specimens of this species to the British Museum, and they have been compared by Mr. E. A. Smith, F.Z.S., with A. Adams' types and they are pronounced by him to be just the same, so that Morelet's name must fall as a synonym.

Euryta trilineata Adams and Angas.—Hunters Bay, Middle Harbour, Port Jackson. Found in shell sand after S.E. gale.

Surcula Oweni=*Pleurotoma Oweni* Gray.—Green Point, Watsons Bay, Port Jackson; eight fathoms.

Drillia Metcalfei Angas=*Drillia Sinensis* Tryon (non Hinds). Green Point, Watsons Bay, Port Jackson; eight fathoms. There is a vast specific difference between this species and the *Drillia Sinensis* Hinds, that Mr. Tryon wishes to connect it with; having myself dredged the typical form of

Drillia Sinensis Hinds, in Torres Straits, I should be very sorry to lump it and *Drillia Metcalfei* Angas, as one species.

- D. Angasi** Crosse.—Hunters Bay, Middle Harbour, Port Jackson. This species is always distinct and need never be confused with *Drillia Beraudiana* Crosse, as Mr. Tryon pleases to make it a synonym. The *Drillia Angasi* Crosse, has always got longitudinal ribs, and never tuberculated at the shoulder whereas *D. Beraudiana* Crosse is strongly tuberculated at the shoulder and the last whorl is larger and more inflated.
- Daphnella mitralis** = *Bela mitralis* Adams and Angas.—Hunters Bay, Middle Harbour, Port Jackson. Found in shell sand.
- D. Jacksonensis** = *Mangelia jacksonensis* Angas.—Hunters Bay, Middle Harbour, Port Jackson.
- Clathurella zonulata** Angas.—Hunters Bay, Middle Harbour, Port Jackson.
- Neritina Turtoni** Recluz.—Rewa River, Viti Levu Island, Viti or Fiji Islands. Some of my original specimens obtained in 1865.
- N. adumbrata** Reeve.—Wano or Wanga Creek, San Christoval Island, Solomon Islands. Some of my original specimens obtained during my visit in 1865.
- Pirenella Layardi** A. Adams.—Mud Bay, Cape York, N. Australia. Found on mud flats.
- Melania Queenslandica** E. A. Smith.—Cardwell, Rockingham Bay, Queensland, N.E. Australia.
- M. Tatei** Brazier = *M. tetrica* Conrad (non Gould).—Port Curtis, Queensland.
- M. Balonnensis** Conrad = *M. oncooides* Tenison-Woods.—Hay, Murrumbidgee River, New South Wales. The species called *Melania oncooides* by Tenison-Woods are only *Melania Balonnensis* Conrad. We have Woods' types in the Australian Museum. They were also described from dead and worn specimens.

Hydrobia Brazieri E. A. Smith=*Amnicola positura* Petterd.

—South Grafton, Clarence River, New South Wales. Found in a freshwater stream on plants and wood with *Tatea rufilabris* A. Adams. This species was first described by Mr. E. A. Smith in the Linnean Society's Journal, London, Vol. XVI. p. 269, pl. 7, fig. 21, read April 21st, 1881, published April 6th, 1882, and in 1884 Mr. Petterd re-described it in the *Journal of Conchology*, No. 5, Vol. IV. p. 159, from Richmond River, N.S.W. I have it from Lismore, Richmond River, and a large number of specimens from the late Mr. Geoffrey Neville, who collected them in small water-holes about Brisbane, Queensland, when on a visit to that place for the benefit of his health. In October, 1871, I sent a number of specimens to Monsieur H. Crosse, Paris, but I never heard what they were. Later on I sent it to Mr. Tryon and he supposed it to be one of Frauenfeld's species, a view that I did not hold with. At the time I collected the specimens I now send the Society I named it in MS. *Amnicola carinata*.

Tatea rufilabris=*Diala rufilabris* A. Adams=*Hydrobia rufilabris* E. A. Smith=*Bythinia huonensis* Tenison-Woods=*Bithynia huonensis* Petterd.—South Grafton, Clarence River, N.S.W. Found in a freshwater creek or stream. This species was first described by Mr. A. Adams in the *Ann. and Mag. Nat. Hist.*, 1862, p. 298, as a *Diala*, from dead and worn specimens. The Rev. Tenison-Woods described it as *Bythinia huonensis* in the Proc. Royal Society of Tasmania, 1875, p. 71, and in 1878 erected it into a new genus as *Tatea*. The species has a wide range. I first found it in brackish water above the dam at Cooks River, New South Wales, in 1864, then again at Grafton, Clarence River, in a freshwater stream; it has also been found in Tasmania by the Rev. Tenison-Woods, Lieut. C. E. Beddome, and W. F. Petterd; Melbourne, Victoria, by Tenison-Woods, Petterd, and Kershaw.

Hemistomia Caledonica Crosse = *Rissoa* (*Hemistomia*) *Caledonica* Sowerby.—Prony Bay, New Caledonia. Found on plants and reeds in freshwater pools and holes with water. Mr. G. B. Sowerby in the twentieth volume of *Reeve's Conch. Icon.* places this genus in *Rissoa*, and informs us that "This shell bears so strongly the aspect of a true typical *Rissoa* that, in the absence of an operculum, it seems difficult to understand why a new genus should be created for it." It is quite evident that Mr. Sowerby never had the species before him but the figure from the French *Journal de Conch.*, 1872.

Paludina sublineata Conrad = *P. polita* Von Martens (non *Viv. polita* Frauenfeld).—Hay, Murrumbidgee River, New South Wales. Found in small running streams, specimens generally covered with mud.

P. Essingtonensis Shuttleworth.—Cardwell, Rockingham Bay, Queensland, N.E. Australia.

Turritella Australis Lam. = *T. granulifera* Tenison-Woods.—Port Arthur, Tasmania. This species is very common, and always more or less broken at the aperture; Kiener gives a splendid figure of it in his "Coquilles Vivantes."

Adeorbis plana A. Adams.—Port Denison, Queensland. Found in beach debris thrown up after a gale. I am under great obligation to my ever esteemed friend, Mr. E. A. Smith, of the British Museum, for comparing them with Mr. A. Adams' types in the British Museum.

Zizyphinus Poupineli Montrouzier = *Z. comptus* A. Adams (non *Trochus comptus* Philippi).—Hunters Bay, Middle Harbour, Port Jackson, N.S.W. Found on beach after south-east gale. This species was first described by A. Adams, in "Proc. Zool. Soc., London, 1854," p. 38, as *Zizyphinus comptus*, and re-described by Sowerby, in the French "Journal de Conch., 1875," p. 40, pl. iv, fig. 6, as *Trochus* (*Zizyphinus*) *Poupineli*. A. Adams' specific name of *comptus* being used by Philippi in the "Concho-

logical Cabinet," second edition ; Montrouzier's name must be retained for the New Caledonian and Australian species. It is rare to be obtained living under stones at low water spring tides.

Clanculus clangulus Gray = *C. clanguloïdes* Angas (non Gray).—Bottle and Glass Rocks, Port Jackson, N.S.W. Found under stones, low water spring tides. This species Mr. Angas quotes in his list of Port Jackson Mollusca as *Clanculus clanguloïdes* Gray. The *Clanculus clanguloïdes* of Gray is found at the Island of Art, New Caledonia, and not in Port Jackson, and is figured in "Wood Index Test.," pl. 6, fig. 39, Supplement. The present species, *Clanculus clangulus* Gray, is also figured in the same work on plate 5, fig. 31, and a very fine figure it is.

C. floridus Philippi = *C. gibbosus* Angas (non A. Adams).—Bottle and Glass Rocks, Port Jackson, N.S.W. Found under stones at low water spring tides. Mr. Angas quotes this in his list of Port Jackson Mollusca as *Clanculus gibbosus*. The figure of *C. floridus* Philippi, in the "Conchological Cabinet," is of rather too bright a colour ; I fancy it is figured from a specimen that has been exposed to the rays of the sun.

C. homalomphalus A. Adams.—Bottle and Glass Rocks, Port Jackson, N.S.W. Found under stones with the two former species.

Gena nigra Quoy and Gaimard = *G. strigata* Angas (non A. Adams). — Bottle and Glass Rocks, Port Jackson, N.S.W. Found under stones at low water spring tides. Mr. Angas quotes this in his list of Port Jackson mollusca as *Gena strigata* A. Adams. The specimens in the Australian Museum, Sydney, were named by Mr. Angas as *Gena nigra* Quoy and G., the specimens I turned out a few months ago so named, and in his own handwriting.

Buccinulus affinis A. Adams.—Green Point, Watson Bay, Port Jackson, N.S.W. ; eight fathoms.

Bullina lineata Gray = *Aplustrum scabrum* R. B. Watson (non Chemnitz).—Coogee Bay, Sydney, N.S.W. Found in rock pools. This very pretty species was first described by Dr. John Edward Gray, in 1825, in the "Annals of Philosophy," vol. ix., p. 408, as *Bulla lineata* from New Holland. The authors since Gray quote it as of Wood. The Rev. Robert Boog Watson, in the "Challenger Report," vol. xv, p. 633, calls it *Aplustrum scabrum* Chemnitz. The latter species is quite distinct from Gray's species in not being spirally banded with red lines. Chemnitz, in his description of *Bulla scabra*, only mentions longitudinal rose-red lines, and his figure only shows them as such. They only show as such in the figure given in "Wood's Index Test," Hanley's Edition, pl. xviii., fig. 28. The figure and description given in Reeve "Conch. Icon." is not the *Bulla scabra* of Chemnitz. The figure in "Sowerby's Thes. Conch. Bulla," pl. 120, fig. 1, does not represent Chemnitz's species. Mr. A. Adams, the author of the monograph in that work, gives Chemnitz's description, but Mr. Sowerby figures something else showing longitudinal and transverse rose-red lines. I have a true *Bulla scabra* Chemnitz marked in every way mentioned by that author. I obtained it thirty years ago, near Sydney Heads, in twenty fathoms. It is larger than *Bulla lineata* Gray, and does not show the transverse rose-red markings that are found in Gray's species. I hold that they are two distinct species—*Bulla scabra* Chemnitz and *B. lineata* Gray. As Mr. Angas and myself have observed that *Bulla lineata* has an operculum it should be placed in the genus Actæon = Tornatella; if not it must be erected into a new genus.

Alexia meridionalis Brazier.—Port Adelaide, South Australia.

Plecotrema typica H. and A. Adams.—Prony Bay, New Caledonia. This species appears to have a wide range.

I have found it also in various parts of Port Jackson, such as the head of Middle Harbour, under stones in damp places, near small runs of fresh water.

Planorbis Gilberti Dunker.—Lillesmere Lagoons, Burdekin River, Queensland.

Segmentina Australiensis E. A. Smith.—Swamps and watercourses, Waterloo, near Sydney, N.S.W. Mr. Edgar A. Smith informs me that he thinks that his *Segmentina Victoriae* may prove to be only a variety of his *S. Australiensis*. Of the vast number I sent the British Museum he says that in some he found they had the internal lamellæ, and others wanting it altogether. To settle the point a large series of the Victorian shell is required. From what I see of the few specimens of the *S. Victoriae* that I have I conclude that Mr. Smith is correct as to its being *S. Australiensis*.

Helix Novæ-Hollandiæ Gray = *H. dupuyana* Pfr.—Man-arm Creek, Bellenger River, N.S.W. Found under logs on the ground.

H. Kusteri Pfr.—Ponope, Caroline Islands. Found under decayed wood and leaves in damp ground.

H. eustoma Pfr. = *H. erinaceus* Pfr.—Uji Island, Solomon Island.

H. Broadbenti Brazier.—Laloki and Goldie Rivers, British New Guinea.

H. Goldiei Brazier = *H. oxystoma* E. A. Smith (non Thomæ).—Laloki and Goldie Rivers, and foot of the Mount Owen, Stanley Range, British New Guinea.

H. Strabo Brazier = *H. katauensis* Tapparone Canefri.—Krema District, Maclachie Point, foot of the Albert Range of Mountains, British New Guinea. The type of this species I collected in 1874, in the "Chevert" Expedition, at the Katan River, on the west side of the Gulf of Papua. The specimens sent the Society are from the east side of

- the Gulf. The species described by Dr. Tapparone Canefri are one of the many varieties of my *H. strabo*.
- H. Rehsei** Von Martens = *H. Gerrardi* E. A. Smith.—Foot of Mount Owen, Stanley Range, British New Guinea.
- H. Bazini** Crosse.—Artillery Point, Nouméa, New Caledonia.
- H. Turneri** Pfr. = *H. occlusa* Gassies.—Ducos Peninsula, Nouméa, New Caledonia. Gassies' species is only the young form of *H. Turneri* Pfr.
- H. brumeriensis** Forbes.—Millport Harbour, British New Guinea.
- H. Moseleyi** E. A. Smith.—Wild Island, Admiralty Islands.
- H. Labillardierei** E. A. Smith.—Wild Island, Admiralty Islands.
- H. Megei** Lambert.—Prony Bay, New Caledonia.
- Zonites cellarius** Müller = *Helix Sydneyensis* Cox.—Sydney, N.S.W. Found in my back yard under a water cask, 1886. I have also enclosed a small parcel with specimens from Tasmania.
- Bulimus Cleryi** Petit.—Wano or Wanga, San Christoval, Solomon Islands. This species is rare to be obtained in a perfect and good condition with the epidermis on. Wano, on the north-east side of San Christoval, appears to be the home of it. During a stay of fourteen days at Makira Harbour, on the opposite side of the island, I only found two specimens with imperfect lips.
- B. miltocheilus** Reeve.—Wano or Wanga, San Christoval, Solomon Islands. Typical form all white, with vermilion lip. Found on the leaves of trees. Some of my original lot obtained in 1865.
- B. miltocheilus** var.—Reeve.—Uji or Gulf Island, Solomon Islands. Shell, very dwarf; straw yellow, with blood red lip. Found on palm tree trunks, some six to twenty feet from the ground. Obtained in 1865.
- B. Christovalensis** = *B. San-Christovalensis* Cox.—Recherche Bay, San Christoval Island, Solomon Islands. I

was the first to obtain this species in 1865. I obtained five specimens in the possession of hermit crabs, one specimen, a very good one, I sent to my esteemed friend, Mr. G. F. Angas, in 1869. Mr. Angas, having returned specimen with the appended in his own handwriting, my number with the specimen was 36 :—" This may be a monstrous growth of the above [the above refers to my number 35, since called *B. Hargravesi* Cox], and is *very like B. elobatus with a produced spire*, which may be, as often is, merely a local growth. However, until I see more of them it would be unsafe to make new species of what may at the best be merely accidental varieties of some already known species. This group of *Bulimi* run into one another, and are sadly perplexing to determine. Both shells have been carefully examined and compared by Mr. H. Adams and myself, and we both agree it is not safe to describe them as new species at present." This was described by Dr. Cox, in "Proc. Zool. Soc. of London," 1870, p. 172, pl. xvi, fig. 7, as *Bulimus San-Christovalensis*. I think it far better to drop the San, and call it *B. Christovalensis* Cox.

- B. Seemanni** Dohrn.—Kandavu, Viti or Fiji Islands. These are some of my original specimens, obtained in 1865.
- B. Hargravesi** Cox.—Ulaua or Contrariété Island, Solomon Islands. When Cox described this species he gave the habitat Treasury Island, Solomon Islands. The species is not found there, having myself been through the group three times, and the only island in the group that it is found on is Ulaua or Contrariété Island. In my visit in 1865 I found one specimen, and in 1869 I sent it home to Mr. Angas to describe. I append his remarks on the species, my specimen being numbered 35 :—"I should not like to describe the shell as a *new species* from this *single* example. If you get more of them we may decide it. It is very close to some of the varieties of *B. fulguratus* Jay and *B. elobatus* Gld., both from the Fijis. This shell and

number 36 are remarkable as coming from the Solomon group." This species was described by Cox in the "Proc. Zool. Soc. of London," in 1871, p. 323, pl. xxxiv, fig. 3, from a number of specimens said to have come from Treasury Island. Cox's specimens were collected by Mr. Perry, who was stationed at the Island of San Christoval, and in his rounds through the group collecting trade obtained a large quantity of the *Bulimi* at Contrariété Island; this information I received from him when at San Christoval in 1872, having carried the same specimen that I had collected in 1865. As soon as I showed Perry the specimen he said it is only found on the Island Ulaua, and from the information I received from him, that he must have obtained the specimens in 1869 or 1870; but, says he:—"Your life is not safe there now [1872], through the kidnapping of the natives by the so-called labour vessels."

- B. Sellersi** Cox.—Guadalcanar Island, Solomon Islands.
- B. Kreffti** Cox.—Florida Island, Solomon Islands. Some of my original lot collected in 1872.
- B. Rossiteri** Brazier.—Bonebondia, Nehone, north-west coast of New Caledonia.
- B. Loyaltyensis** Souverbie.—Mare, Loyalty Islands, near New Caledonia.
- B. pyrostomus** Pfr. = *Partula salomonis* Pfr. (a misnomer).—Aneiteum, New Hebrides. Found under the tufts of grass. Dr. Pfeiffer first described this species as a *Partula* from the Solomon Islands in "Proc. Zool. Soc. of London," 1852, p. 137, and in the "Proc." for the year 1860, p. 137, he re-describes the same shell for Mr. Cuming as *Bulimus pyrostomus*. I think that it is far better to retain the last specific name for the species, as it is only found in the New Hebrides, and not in any island of the Solomon group. These are some of my original specimens that I collected in 1865 in the mountain ranges of the Island of Aneiteum.

- B. fuliginus** Pfr.—Aneiteum, New Hebrides. Found under tufts of grass in the mountain ranges in company of *B. pyrostomus* Pfr.
- B. dux** Pfr.—Bald Head, King George's Sound, south-west coast of Australia.
- B. Hombroni** Crosse = *B. Founaki* Hombron and Jacquinet.—Ysabel, Solomon Islands. I quite agree with M. Crosse in changing the specific name of this species to *B. Hombroni*, for the name given by Hombron and Jacquinet is quite absurd, it being the native name for that shell, "Founak." Mr. E. A. Smith records it from Faro Island, Bougainville Straits, collected by Dr. H. B. Guppy. During my last visit to the Solomons in 1872 I also found it on Treasury Island with *Helix Hombroni* Pfr. The specimens I sent of *B. Hombroni* Crosse are some of my original ones obtained in 1865.
- Partula Layardi** Brazier (prototype).—Tuker Tuker, Vate or Sandwich Island, New Hebrides. Found under rocks and dead leaves.
- P. Layardi** var. **alba** Brazier (type). Shell all white with fine thickened reflected peristome.
- Vertigo Rossiteri** Brazier = *Pupa Strangei* var. Cox.—South Creek, N.S.W. Generally found under decayed leaves at the roots of trees. Cox figured it in his "Monograph of Australian Land Shells," 1868, as a variety of *Pupa Strangei* Pfr.
- Pupina Thomsoni** Forbes.—Fitzroy Island, north-east coast of Australia. Found at the roots of trees at the watering-place in 1871.
- P. Petterdi** Crosse = *P. Macleayi* Brazier.—Endeavour River, Queensland.—This species was first described by M. Crosse in the French "Journal de Conchyliologie," vol. xxii, 1874, p. 370; vol. xxiii, 1875, p. 141, pl. 6, fig. 5, as *Pupina Pettardi*; it should read *Pupina Petterdi*.

About the time that Crosse described it I had named it *P. Maclayi*; Crosse's name has priority of some months.

Diplommatina Gowllandi Brazier.—Fitzroy Island, north-east coast of Australia. Some of my original specimens obtained in 1871.

Georissa multilirata Brazier.—Fitzroy Island, north-east coast of Australia. Found with *Diplommatina Gowllandi* Brazier.

Helicina suprafasciata Sowerby.—Blanche Bay, New Britain.

Truncatella valida Pfr.—Prony Bay, New Caledonia.

T. Vitiana Gould.—Anse Vata, Nouméa, New Caledonia.

Corbula Smithiana Brazier = *C. venusta* Angas (non Gould).—Green Point, Watson Bay, Port Jackson; eight fathoms.

Mactra Jacksonensis E. A. Smith = *Trigonella pusilla* Angas (non A. Adams).—Green Point, Watson Bay, Port Jackson; eight fathoms.

Corbicula Nepeanensis Lesson.—Wollondilly River, N.S.W.

C. sublævigata E. A. Smith.—Marsdens Bridge, Wollondilly River, N.S.W.

Unio Beccarianus Tapparone-Canefri.—Fly River, British New Guinea.

U. Parramattaensis Lea.—Ponds in Parramatta Park, Parramatta, N.S.W.

Crenella varicosa Gould = *C. strigata* Angas (non Hanley).—Shark Point, Port Jackson, twelve fathoms.

Crenella varicosa Gould (*in situ*).—Off Balls Head, Port Jackson; fifteen fathoms. The bottom, at some seasons of the year, is covered many feet square with this species as sent *in situ*. In one day, at two hauls of the dredge, I obtained 4,000 specimens off Shark Point. Obtained in 1879; sample of them sent.

Trigonia Strangei A. Adams.—Port Jackson, near the Heads; 8-10 fathoms. Of this very rare species I have

only ever obtained one single living specimen in thirty years. Dead and somewhat worn valves are often found in the dredge. I send the Society one of the best valves I have.

T. dubia Sowerby.—Mouth of the River Tamar, Tasmania.

T. Lamarcki Gray = *T. pectinata* Stutchbury (non Lam.)—Green Point, Watson Bay, Port Jackson, N.S.W.; eight fathoms.

Arca gubernaculum Reeve = *A. chalcanthum* Reeve = *A. luzonica* Reeve.—Green Point, Watson Bay, Port Jackson; eight fathoms.

Waldheimia flavescens Lam. = *Terebratula flavescens* Lam. = *T. dentata* Lam. = *T. Australis* Quoy = *W. Australis* King = *T. recurva* Quoy.—Green Point, Watson Bay, Port Jackson. Found under rocks and stones, low water spring tides. Numerous specimens in bottle with spirits. Also a block of stone with five specimens of *W. flavescens* and seven of *Kraussina Lamarckiana* adhering to it.—Green Point, Watson Bay, Port Jackson.

Magasella Cumingi = *Terebratella Cumingi* Davidson = *Magas Cumingi* Gray = *Terebratula (Bouchardia) Cumingi* Reeve = *T. (Bouchardia) fibula* Reeve.—South Reef, Port Jackson Heads, N.S.W.; seven fathoms. Fine living specimens. The so-called *Bouchardia fibula* Reeve is only a large specimen of *Magasella Cumingi* Davidson. As for the man Calvert having dredged it in Bass Straits in 200 fathoms, that is a myth of the highest order.

M. Cumingi Davidson.—Sow and Pigs' Reef, Port Jackson; five fathoms. Very large, and always found dead; of a white colour.

Megrelia pulchella = *Terebratula pulchella* Sowerby = *Megrelia sanguinea* Davidson (non Chemnitz).—Green Point, Watson Bay, Port Jackson; eight fathoms. This pretty little species appears to have its home in Port Jackson, at various parts near the heads. My esteemed friend, Dr. Davidson, in

his report on the Brachiopoda "Voyage of the 'Challenger,'" vol. i, pp. 20—52, identified it with Chemnitz's species. Both species are quite distinct. Mr. Angas, in "Proc. Zool. Soc., London," 1871, p. 101, called it *Terebratella sanguinea* Lam. from specimens that I had obtained dead at Green Point, in 1879. I sent specimens to Dr. Davidson, labelled as *Megerlia pulchella* Sowerby, and on the 30th July, 1879, I received an answer from Dr. Davidson as follows:—"Megerlia pulchella is a species with which I am not fully satisfied. It may be *distinct* from *Megerlia sanguinea*; but most naturalists seem to believe that it merges into *sanguinea*, and of which it may be a variety. I dare not yet pass a positive opinion on the subject, and for the present the name *pulchella* may be retained." I published these notes in the "Proc. Linnean Soc., of N.S.W.," September 4th, 1879, vol. iv.; and in 1885 I sent Dr. Davidson a large series of Brachiopoda, from Port Jackson and the coast of N.S.W., and in his, I am sorry to say, last letter, dated Town Free Museum, Church Road, Brighton, 22nd July, 1885, he writes:—"I will say only a few words about two of the species that have interested me very much: first, about the *Ismenia pulchella*, I agree with you it is distinct from *I. sanguinea*; the second species is an extremely interesting species; it is certainly not a *Morrisia* or *Platidia*, but more nearly resembles the *Atretia gnomon* of Jeffreys, and if new I will give it your name. I will study it with very great care, and in my next letter will tell you more about it." This last species he named *Atretia Brazieri* M.S. It has since been fully described by Miss Agnes Crane, in the "Proc. Zool. Soc. of London," 1886, p. 181. Only this year I have sent a series of *Megerlia pulchella* to the British Museum, and I am pleased to say that my very great friend, Mr. Edgar A. Smith, coincides with my views and Dr. Davidson's that *M. pulchella* is quite distinct from

M. sanguinea Chem.

Kraussina Lamarckiana = *Terebratella Lamarckiana* Davidson = *Kraussia Lamarckiana* Davidson = *Kraussina Lamarckiana* Davidson.—Green Point, Watson Bay, Port Jackson, N.S.W. Found under stones, low water spring tides. Twenty-one specimens sent.



Bulimus Goodallii at Croydon.—In one of the hot houses in the garden of a neighbour this species occurs in such vast numbers that it recently became necessary to collect all the soil from that particular hot house and burn it, in the hope of exterminating them. These are the only British specimens that have come under my notice, but as more than thirty years have elapsed since Gray mentioned *B. Goodallii* as acclimatised in this country they must surely have spread widely. Perhaps this note may be the means of drawing attention to them. I should add that these Croydon specimens are only about 5/9ths of the size of the type from Guadaloupe.—KENNETH MCKEAN.



Note on the Marine Shells of Scilly.—In our paper on the above in the last number of the Journal the following species should be added:—*Chiton cancellatus*, *Rissoa cingillus* var. *rupestris*, *Odostomia Warreni*. *Montacuta Dawsoni* valve should read *specimen*, and the number of additions should be *fifty-two* instead of *forty-seven*.—C. BURKILL and J. T. MARSHALL.



Helix aculeata Müll in S. Lancashire.—I have recently found this species at Farington, near Preston. It seems to be uncommon in this district, as I am only aware of three previous records.—W. H. HEATHCOTE, Preston.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY.

Meeting

HELD ON THE 10TH OF OCTOBER, 1888.

Mr. W. E. Collinge in the chair.

DONATIONS.

The following donations were laid on the table:—

“Description of Sixteen New Species of Shells” (Re-print) by Mr. G. B. Sowerby, F.L.S., F.Z.S.; presented by the Author.

“Notes on the Pleistocene Land and Freshwater Mollusca of the Barnwell Gravels (Reprint) by Mr. B. B. Woodward, F.G.S.; presented by the Author. The thanks of the Meeting were accorded the Donors for their gifts.

NEW MEMBER.

Mr. John J. Halstead, Carlisle, was nominated for membership by Mr. A. Somerville, B.Sc., F.L.S. and Mr. Thos. W. Bell.

PAPER READ.

“Dorsetshire Marine Shells,” by the Rev. Carleton Greene, M.A.

SPECIMENS EXHIBITED.

Mr. A. Somerville, B.Sc., F.L.S. showed a number of shells on behalf of Mrs. Knox, Ballina, County Mayo:—*Neritina fluviatilis*, *Spherium corneum*, *Planorbis albus*, *Valvata piscinalis*, and *Pisidium nitidum* from County Mayo; and *Helix rupestris*, *Clausilia rugosa*, *Valvata cristata*, *Succinea elegans*, and *Physa hypnorum* from County Sligo.

Meeting

HELD NOVEMBER 7TH, 1888.

Mr. J. W. Taylor, F.L.S., Vice-President, in the chair.

The Minutes of the previous Meeting were read and confirmed.

DONATIONS.

“Proceedings of the Royal Society of Queensland,” vol. v, part 1, 1888; presented by the Society.

NEW MEMBERS.

Mr. J. J. Halstead, Carlisle, was elected a Member of the Society.

The undernamed were nominated for Membership:—Mr. Joseph Grafton Milne, Bowdon, Cheshire, by Mr. C. Oldham and Mr. E. Collier; Mr. Loftus St. George Byne, Teignmouth, by Mr. A. Somerville, B.Sc., and Mr. J. T. Marshall; Mr. Clifford Burkill, Scarboro', by Mr. A. Somerville, B.Sc. and Mr. J. T. Marshall; Mr. Chas. A. S. Bell Cox, B.A., M.R.C.S., Canterbury, by Mr. A. Somerville, B.Sc., and Mr. J. T. Marshall; Mr. J. Radcliffe, Ashton-under-Lyne, by Mr. A. Somerville, B.Sc., and Mr. W. Denison Roebuck, F.L.S.; Mr. Riley Fortune, Harrogate, by Mr. F. R. Fitzgerald and Mr. T. W. Bell.

PAPER READ.

“The Land and Freshwater Mollusca of the Harrogate District,” by Mr. F. R. Fitzgerald.

SPECIMENS EXHIBITED.

A large collection of Land and Freshwater Shells was shown by Mr. Fitzgerald in illustration of his paper; also a number of specimens from other localities.

The Chairman exhibited on behalf of Mr. Ed. Collier, of Manchester, specimens of *Helix rupestris*, from Ingleton, containing young; on behalf of Mr. R. Standen several specimens of *Dreissena polymorpha*, *Neritina fluviatilis* and *Ancylus fluviatilis*, from near Preston; from Mr. J. Saunders a large collection of shells from Bedfordshire; from Mr. J. Bickerton Morgan specimens of *Unio margaritifera*, *Zonites fulvus*, and others from Montgomeryshire; from Mr. W. H. Heathcote specimens of *Sphaerium ovale* and *Planorbis dilatatus* from a new locality near Blackburn; from Mr. T. Scott, Edinburgh, *Limax maximus* var. *ferrussaci* and *Helix hortensis* from Cramond, Edinburgh; and from Mr. Whitwell living examples of *Helix pisana* from Tenby.

Annual Meeting

HELD DECEMBER 15TH, 1888.

Mr. J. W. Taylor, F.L.S., Vice-President, presided. The Minutes of the November Meeting were read and confirmed. Messrs. F. R. Fitzgerald and Chas. Oldham were appointed Scrutineers; Mr. C. Harvard Pierson was elected to Audit the Accounts.

DONATIONS.

The following Donations were announced:—

“Pflanzen und Schnecken,” by Mr. R. D. Darbishire, F.G.S.

“Zoology of Victoria,” decade xvi; presented by the Government of Victoria.

“Journal and Proceedings of the Royal Society of New South Wales,” vol. xxii, part 1; presented by the Society.

“The Proceedings of the Royal Society of Queensland,” vol. v, part 2; presented by the Society.

Specimens of *Littorina littorea* from Ailsa Craig in the Forth of Clyde; presented by Mr. Jas. Steel.

A collection of the shells of North Berwick and neighbourhood, in the county of East Lothian; presented by the Rev. J. McMurtrie.

Specimens of *Helix caperata* and *Helix virgata* from Blaxhall, Suffolk; presented by Mr. G. T. Rope.

NEW MEMBERS.

The following were duly elected Members of the Society:—Mr. J. G. Milne, Bowdon, Cheshire; Mr. Loftus St. George Byne, Teignmouth; Mr. Clifford Burkill, Scarborough; Mr. C. A. Bell Cox, B.A., M.R.C.S., Canterbury; Mr. J. Radcliffe, Ashton-under-Lyne; and Mr. Riley Fortune, Harrogate.

The undernamed were nominated for Membership :—Mr. A. Paling, B.A., B.Sc., London, by J. W. Williams and Mr. J. W. Taylor, F.L.S.; Mr. Thomas P. Smyth, J.P., London, by Mr. J. T. Marshall and Mr. A. Somerville, B.Sc., F.L.S.; Mr. Alfred Hartley, Idle, near Bradford, by Mr. R. Standen and Mr. E. Collier; Mr. Oswald Dawson, Leeds, by Mr. W. E. Collinge and Mr. W. Nelson; Mr. Sidney Trice Martin, Manchester, by Mr. J. C. Melvill, M.A., F.L.S., and Mr. R. D. Darbshire, B.A., F.G.S.

Correspondence was brought forward from several Members, five of whom resigned their Membership, viz:—Messrs. J. Clegg, J. T. T. Reed, W. Dean, C. H. Pierson, and A. Leipner.

PAPERS READ OR TAKEN AS READ.

“Description of three New Species of Shells—*Zizyphinus haliarchus*, *Coralliophila andamana*, and *Eulima epeterion*,” by J. C. Melvill, M.A., F.L.S.

“A List of Shells taken at Tenby, September, 1888,” by James W. Cundall.

“The Marine Shells of Scilly,” by Clifford Burkill and J. T. Marshall.

“A List of Land and Freshwater Shells of Derbyshire,” by Thos Hey.

“The Land and Freshwater Shells of North Berwick and Neighbourhood, in the County of East Lothian,” by Rev. J. McMurtrie.

“Respiration of *Ancylus fluviatilis*”; “Note on a Pathological Neomorph on the Left Pallium of *Anodonta cygnea*”; “A Curious *Helix aspersa*”; “*Helix pisana* in Guernsey”; by J. W. Williams.

ANNUAL REPORT.

The Annual Report was read by the Secretary, and unanimously adopted. The Curator and Recorder also gave brief Reports of their special work. The Annual Balance Sheet was next presented by the Treasurer, and adopted.

ELECTION OF OFFICERS.

The Scrutineers announced result of the voting to be:—

For President, James Cosmo Melvill, M.A., F.L.S.

For Vice-Presidents, Rev. A. H. Cooke, M.A., F.Z.S., R. D. Darbshire, B.A., F.G.S., G. B. Sowerby, F.L.S., F.Z.S., Jno. W. Taylor, F.L.S. Treasurer and Secretary, Thos. W. Bell.

Council, Wm. Cash, F.G.S., F.L.S., W. E. Hoyle, M.A., M.R.C.S., F.R.S.E., Jas. T. Marshall, R. F. Scharff, B.Sc., Ph.D., Edgar A. Smith, F.Z.S., A. Somerville, B.Sc., F.L.S.

Recorder, Wm. Denison Roebuck, F.L.S.

Curator, Wm. Nelson.

Librarian, W. E. Collinge.

ALTERATION OF RULES.

Mr. Collinge brought forward three Resolutions for the alteration of the Rules of the Society, of which he had given due notice :—The 1st provided

that none but Members of over twelve months standing should be allowed to propose or second New Members; this was withdrawn after some discussion in deference to the feeling of the Meeting. The 2nd, which proposed to rescind the Rule authorising Members to use the initials of the Society (M.C.S.), was rejected. The 3rd, that the Curator, Recorder, and Librarian be ex-officio members of the General Council, was adopted unanimously.

FORMATION OF BRANCHES.

The proceedings of the Council in relation to the formation of a Branch Society in the Manchester District were read to the Meeting, and after some conversation it was resolved:—That the action of the Council in relation to the establishment of the Manchester Branch of this Society be confirmed.

PUBLICATIONS OF THE SOCIETY.

As to the proceedings of the Council on the question of the Society's Publication, the following proposals of the Council were recommended for adoption:— 1. That the Society arrange with Mr. Taylor from the conclusion of the present year for the publication of the Society's Proceedings and matter, at the rate of Half-a-Crown a page, with a guarantee of not less than Ten Pounds per annum (for Four Numbers), with Threepence per Copy in addition, and Plates according to cost—for one year as an experiment. The Society's matter to be printed on a separate sheet or pages. 2. That Mr. Taylor be requested to publish in each number of the *Journal of Conchology* a note to the effect that the authors are alone accountable for the matter of their Papers. 3. That the Council arrange with Mr. Taylor some plan of dividing the Books received in exchange. 4. That for the next year the Subscription remain as at present—Five Shillings.

It was resolved:—That the proposals of the Council be adopted.

SPECIMENS EXHIBITED.

A very large number of specimens were placed on exhibition; included were the Shells presented to the Society by the Rev. J. McMurtrie, and Messrs. J. Steel and G. T. Rope.

Mr. Melvill showed the specimens described in his Paper, besides many other species of *Zizyphinus*, for comparison with the new form, and other very fine and rare marine shells. He also exhibited a fine specimen of *Bembix alvina* (Lischke), a most beautifully sculptured nacreous shell, of great rarity, belonging to the family Trochidæ, dredged in deep water off the coast of Japan. He mentioned that the type of this genus was the *Bembix wola* (Watson), a much smaller species than that now exhibited, dredged in the depths of the Pacific by the "Challenger" expedition; one other species has also been obtained, also from the deep sea, intermediate in size between *Bembix wola* and *Bembix alvina*, and a strong family resemblance, excepting in point of size, characterizes the three. Doubtless many other beautiful forms await the deep sea explorer. *Gaza dødala* (Watson), allied to the above, is unique at the present time, also the first of the deep sea dredgings of H.M.S. "Challenger." This is a wonderfully nacreous Trochoid shell, in shape like a *Helicina*. Doubtless the nearest affinity these possess is to the well-known forms *Margarita*.

The Chairman, Mr. J. W. Taylor, showed a large number of fine specimens of land and freshwater shells from various localities.

Mr. F. Rhodes showed, amongst a variety of shells, some very good examples of *Anodonta cygnea*, from Pudsey.

Mr. Heathcote, of Preston, showed a fine specimen of *Helix nemoralis* var. *undulata*, from Southport, and mounted darts of twelve species of Helicidae.

Mr. F. Burrows, Cheadle, sent for exhibition some choice specimens from the Isle of Wight, Rottingdean, Sussex, and from Staffordshire; the collection included *Helix cantiana*, *Helix virgata*, and varieties, *Pupa umbilicata*, and *Cyclostoma elegans*, from Brading; *Helix hortensis*, from Bembridge; *Paludina vivipara*, Richmond-on-Thames; *Helix ericetorum* and *Pupa marginata*, from Rottingdean; *Clausilia laminata*, Welton, Lincolnshire, and others.

Mr. R. D. Darbishire exhibited one case with large specimens of *Unio tumidus* and *Unio pictorum*, from Birmingham; one case with specimens of *Mülleria lobata*, from River Madalena, Santa Fe, Bogota, Granada, South America; and specimens of *Bartlettia stefanensis*, from the Amazons; one case also containing *Spondylus*, *Avicula ala-perdicis*, *Perna imbricata*, *Chama*, and two *Serpulas*, with several pieces of Pumice Stone, taken from the sea, off the Mauritius, in September, 1885, and supposed to have come from the eruption of Krakatoa, in August, 1884, with specimens of attached shells, *Ostrea multiradiata* and two others. Through constant friction in the water the *Ostrea* named had entirely lost the common lamellate surface, and was worn smooth so as to look like a coloured nullipore.

Mr. Edward Collier exhibited specimens of *Helix aspersa*, *Helix nemoralis*, *Helix hortensis*, *Helix arbustorum*, *Helix virgata*, and *Helix ericetorum*, showing variations in form and colour, including the rare forms *Helix nemoralis* var. *studeria* and *Helix arbustorum* var. *trochoidalis*.

Mr. R. Standen exhibited a collection of the smaller shells (*Zonites*, &c.), shewing a new system of tube mounting, in which the Shells could not take any harm, and could be easily handed about and examined.

Mr. Madison sent the following for exhibition:—*Unio tumidus* var. *arcuata*, Stratford Canal, Earlswood, 1884; *Anodonta rayii*, Salford Priors, 1882, and Evesham, 1883; *Anodonta scaldiana*, Sutton Park, 1884; *Anodonta piscinalis* var., Canal, Acock's Green, near Birmingham, 1883; *Anodonta arelatensis*, Canal, Acock's Green, near Birmingham, 1885; *Anodonta rayii*, King's Heath, near Birmingham, 1888; *Anodonta milletti*, Yardley Wood, near Birmingham, 1887; *Dreissena polymorpha*, with the septum notched, Canal, Hamstead, 1881; *Clausilia laminata*, decollated, and *C. laminata* abraded; these were found on the trees, and the animals were alive and seemed healthy, Cooper's Hill, 1882; *Planorbis campanulatus*, Higgin's Lake, Michigan, U.S.; *Planorbis complanatus*, scalariform, Dudley Port, near Birmingham, 1888; *Planorbis corneus*, distorted, King's Norton, near Birmingham, 1884; *Planorbis spirorbis*, Red Hill, near Birmingham, 1883; *Limæa peregra* var. *labiosa*, the lip turned back, Strustoke, near Birmingham, 1886.

ANNUAL REPORT.

Your Committee are pleased to have still to record a steady and continuous growth of the Society. The accession of New Members has again been very gratifying—thirty names having been enrolled during the year. Unfortunately five gentlemen have intimated their intention of ceasing to be Members at the close of the current year, and one esteemed friend of the science, and a past President of the Society—Dr. W. H. Evans, has, we regret to say, been removed from our midst by death. At each Meeting during the past year Donations to either the Library or the Collection have been announced. By these means many valuable acquisitions have come to the Society. The list is too long for reproduction here, but we would make special reference to the Portrait of the late Dr. Gwyn Jeffreys, painted and kindly presented to the Society by Mrs. M. Skilton, of Brentford; and to the valuable work, “A Prodomus of the Zoology of Victoria,” issued by the Government of that Colony. A larger number of Papers have been communicated than in any previous year. The Exhibits also have been very numerous and generally of considerable interest. The movement set on foot at the last Annual Meeting for providing Cabinets by voluntary subscription for the Society’s specimens has been well received. The total amount contributed to this date is £10 8s. 6d., and three Cabinets have been procured at a cost of £7 2s. 6d. During the past year the following matters of importance have engaged the attention of the Council:—1. The formation of Local Branch Societies: Such a Branch has been formed in the Manchester District, and the question will be brought forward for the approval of the Meeting. 2. The Publications of Papers read before the Society: This question was raised with the view of securing the greatest possible accuracy in the statements of Papers read before the Society and intended for Publication. After consideration the Council adopted a series of Rules which they think will effectually secure the object desired. 3. The question of the Society’s Publishing a Proceedings of its own:

That these matters might be considered with care and deliberation the Council appointed a Sub-Committee to make enquiries and report. This was done, and as a result the Council passed certain resolutions which will be laid before the Meeting, and recommended for adoption by it. The Balance Sheet was read and adopted; it showed the receipts to be £42 7s. 7d. and expenditure £36 17s. 9d., the balance, £5 9s. 10d., being carried forward.

RECORDER’S REPORT.

During the twelve months ending with the 15th December, 1888, the number of records made and authenticated by the Society’s Referees has been 2,081, being an increase upon the 1,621 records made in 1887, but not reaching the figures of previous years. The total number of records now on the books is 23,880, no less than 20,798 of these being for England and Wales alone, while there are but 1,517 for Scotland, 741 for Ireland, and 824 for Extra-British localities. This shows that while in England and Wales

attention merely needs to be directed upon a few neglected areas here and there, a very large amount of work still remains to be done in Scotland and Ireland, and that it is very desirable that vastly increased numbers of foreign specimens of the British species ought to be submitted to the Referees. It is therefore hoped that members will hasten the completion of the work of registration by submitting Scottish, Irish and Foreign shells in large numbers during the next and future years. It is at all times to be thoroughly understood that no record or species whatever can be entered in the Record-Book, unless the specimens have actually been examined by the Referees and no book-records however trustworthy, can be taken cognizance of, from the very essence of the Record-system.

The averages which have been struck as to the number of *species* recorded for the various counties show that while for England and Welsh counties the average is as high as 52 species recorded per county, for Scotland it is only 16 and for Ireland only 9½ per county, the latter average being eminently unsatisfactory, as showing the large amount of work still remaining to be done in respect of the molluscan fauna of Ireland.

The virgin counties, those from which not a single record has yet been made, have been reduced from 17 to 12 in number. The solitary South British county hitherto uninvestigated—Cardigan—has now been worked by Mr. E. Collier and W. Whitwell, while specimens from Elgin and East Ross have been sent by Messrs Alex. and J. E. Somerville, and from Meath by Messrs R. Scharff and W. F. de V. Kane, and a record has been submitted from North Tipperary. There still remain for special attention from conchologists who are desirous of assisting to promote the success of the Record-system, the counties of Wigton in Scotland, Monaghan, Fermanagh, Cavan, Louth, Carlow, Kilkenny, Queen's Co., Longford, Leitrim, East Mayo, and East Galway.

In addition to these from which no records whatever have been submitted, attention may be directed to the counties of Radnor, Cheviotland, Dumfries, Linlithgow, Stirling, South Perth, North Aberdeen, Banff, Elgin, Easternness, Westernness, South Ebudes, North Ebudes, East Ross, Hebrides, Orkneys, Shetlands, Armagh, Donegal, Meath, Kildare, Wicklow, Wexford, King's Co., Roscommon, Clare, North Tipperary, North Cork, and South Cork (29 in number) from none of which has the number of species as placed on record reached ten.

W. DENISON ROEBUCK,
RECORDER.

December 15th, 1888.

CABINET FUND ACCOUNT.

RECEIPTS—

	£	s.	d.
Mr. J. W. Taylor, F.L.S. - - - - -	2	5	0
Mr. R. D. Darbshire, F.G.S. - - - - -	1	1	0
Mr. Jas. Cosmo Melvill, M.A. - - - - -	1	1	0
Rev. H. Milnes, M.A. - - - - -	1	1	0
Lieut. Col. G. S. Parry - - - - -	1	0	0

RECEIPTS (<i>Continued</i>)—		£	s.	d.
Mr. R. C. Chaytor	- - - - -	0	10	6
Mr. G. B. Sowerby, F.Z.S., F.L.S.	- - - - -	0	10	0
Mr. S. J. da Costa	- - - - -	0	10	0
Mr. Wm. Whitwell	- - - - -	0	10	0
Mr. H. F. Dale, F.L.S., F.R.M.S.	- - - - -	0	10	0
Mr. H. Coates	- - - - -	0	10	0
Rev. E. S. Dewick, M.A.	- - - - -	0	10	0
Mr. G. W. Mellor	- - - - -	0	5	0
Mr. J. Hagger	- - - - -	0	5	0
		<hr/>		
		£	10	8 6
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EXPENSES—		£	s.	d.
By One Cabinet	- - - - -	2	7	6
„ Balance in Hand	- - - - -	8	1	0
		<hr/>		
		£	10	8 6
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NOTE.—Two Cabinets, shown at the Annual Meeting, arrived too late to be included in the past year's accounts.

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CONSTITUTION AND LIST OF MEMBERS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.

- 1.—That this Society be called “**The Conchological Society of Great Britain and Ireland.**”
- 2.—That its objects shall be the promotion of the Science of Conchology, by the holding of meetings for the reading and discussion of original papers, by the publication of proceedings, and by the formation of a Library and Collections illustrative of the Science.
- 3.—That it shall consist of Ordinary and Honorary Members.
- 4.—That Ordinary Members shall be proposed by two members at one meeting, and balloted for at the next. They shall pay, in advance on the 1st January in each year, a subscription of 5/-, or may compound for life by the payment of Three Guineas. Foreign Members shall pay an annual subscription of 7/6.
- 5.—That composition fees shall be invited in Book, Cabinets, or other permanent property, or in such other manner as the Council may think most conducive to the benefit of the Society.

- 6.—That Members shall have the privilege of appending to their names the initial letters M.C.S. (Member of the Conchological Society).
- 7.—That the number of Honorary Members shall be limited to ten, and they shall be exempt from all payments and have the privileges of Ordinary Members.
- 8.—That it shall be governed by a Council, consisting of a President, four Vice-Presidents, a Treasurer, a Secretary, a Curator, a Recorder, a Librarian, and six other members, who shall be elected annually by ballot; the voting paper issued to be returned to the Secretary, under cover of sealed envelope, addressed to the Scrutineers.
- 9.—That the President shall not hold office for more than one year continuously, and that he be expected to give an address.
- 10.—That the meetings shall be held in Leeds, monthly, at the time and place fixed by the Council, who shall also have power to arrange such additional meetings as they may think desirable.
- 11.—That three shall be a quorum at all meetings.
- 12.—That the Annual Meeting be held in December to receive the Report and Balance Sheets of the outgoing Council, and to elect the new Council.
- 13.—That the accounts, before being presented, shall be audited by two members, appointed at a previous meeting.
- 14.—That the proceedings shall be published periodically, under the direction of the Council.
- 15.—That the Capital and Property be vested in two Trustees, elected by the Society.
- 16.—That no alterations in the rules shall be made, unless by a majority of three-fourths of the members present at a meeting which has been specially summoned.

HONORARY MEMBERS.

(Limited to ten in number).

Bourguignat, J. R., Rue des Ursulines, 6, St. Germain-en-Laye, Seine et Oise.
 Kobelt, Dr. W., Schwannheim, Frankfort-am-Main.
 Martens, Prof. Dr. E. von, 28, Paul Strasse, Berlin, N.W.

ORDINARY MEMBERS.

Adams, Lionel E., B.A., Rose Hill, Penistone, near Sheffield.
 Akers, Fredk., 48, Mabgate, Leeds.
 Bailey, Rev. Geo., F.R.M.S., The Manse, Finchingfield, Essex.
 Baillie, William, M.G.C. Ed. U., Brora Sutherlandshire.
 Barnacle, Rev. H. Glanville, M.A., F.R.A.S., The Vicarage, Holmes Chapel, Crewe, R.S.O.

- Beulah, John, Ravensthorpe, Brigg.
 Bell, Alfred, 140, Lower Marsh, Lambeth, London.
 Bell, Thomas William, 2, Carr Lane, Leeds.
 Bendall, Wilfrid, Nottingham Place, London, W.
 Bostock, Edwin D., The Radfords, Stone, Staffordshire.
 Brazier, John, F.L.S., C.M.Z.S., Corr. Mem. Acad. Nat. Sc., Philad. &c.,
 Windmill Street, Sydney, N.S.W.
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 Burkill, Clifford, Westwood, Scarbro'.
 Burrows, Thos. F., Daisy Bank, Cheadle, Staffordshire.
 Butterell, J. Darker, 4, Willow Grove, Westwood, Beverley.
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 Cash, Wm., F.G.S., F.L.S., F.R.M.S., 38, Elmfield Terrace, Halifax.
 Chaytor, R. C., Scafton Lodge, Middleham, Yorkshire.
 Clarke, Wm. E., F.L.S., M.B.O.U., Museum of Science and Art, Edinburgh.
 Coates, Henry, F.R.P.S., Pitcullen House, Perth.
 Coates, William, Brookside, Eastbourne Road, Linthorpe, Middlesbrough.
 Cockerell, Sydney C., 5, Priory Road, Bedford Park, Chiswick.
 Cockerell, T. D. A., West Cliff, Custer Co., Colorado, U.S.A.
 Collier, Edward, 3, Friday Street, Manchester.
 Collinge, W. E., 20, Blenheim Place, Leeds.
 Cooke, Rev. Alfred Hands, M.A., F.Z.S., King's College, Cambridge.
 Costa, S. J. Da, 2, Craven Hill, Lancaster Gate, London, W.
 Coulson, Frank, 6, Montague Terrace, Kelvinside, Glasgow.
 Cox, Chas A. Stanley Bell, B.A., M.R.C.S., L.R.C.P., Fordwick House,
 Fordwick, Canterbury.
 Craven, Alfred E., F.G.S., F.L.S., F.Z.S., 65, St. George's Road, Warwick.
 Square, London.
 Crick, Walter D., 7, Alfred Street, Northampton.
 Crouch, Walter, F.Z.S., Grafton House, Wellesley Road, Wanstead, Essex.
 Cundall, J. W., Carrville, Alexandra Park, Redland, Bristol.
 Dale, Hy. F., F.R.G.S., F.R.M.S., F.L.S., F.Z.S., 2, Saville Row,
 London.
 Dale, (Mrs.) V. 2, Saville Row, London.
 Dale, (Miss) M. L., Hatherley, Bampfylde Road, Torquay.
 Dale, (Miss) E. E., Hatherley, Bampfylde Road, Torquay.
 Dale, (Miss) A. M., Hatherley, Bampfylde Road, Torquay.
 Darbishire, R. D., B.A., F.S.A., F.G.S., Victoria Park, Manchester.
 Davis, Jas. W., F.S.A., F.L.S., F.G.S., Chevinedge, Halifax.
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 Dewick, Rev. Edwd. S., M.A., F.G.S., 26, Oxford Square, London, W.
 Dixon, George, Sen., Great Ayton, Northallerton.
 Dodd, B. Sturges, 67, Beech Avenue, New Basford, Nottingham.
 Duncan, Wm., 1, India Street, Montrose.
 Dyer, (Mrs.) A. M., 1, Richmond Villas, Swansea.

- Elliott, Edward J., High Street, Stroud.
Evans, (Mrs.) A. Sen., Brimscombe Court, Thrupp, near Stroud.
Eyre, Rev. W. L. W., Swarraton Rectory, Alresford, Hants.
Fairbrass, (Miss) E. R., Abbey Street, Faversham.
Falloon, (Mrs.) B. J., Long Ashton Vicarage, near Clifton, Bristol.
Fenn, F. G., Syon Lodge, Isleworth, Middlesex.
Fitzgerald, (Mrs.) J., 10, West Terrace, Folkestone.
Fitzgerald, H. Purefoy, North Hall, Preston Candover. Hants.
Fitzgerald, F. R., F.S.Sc., Clifford House, Harrogate.
Fortune, Riley, Alston House, Harrogate.
Gain, Wm. Albert, Tuxford, Newark.
Galizia, Joseph Sylvester, B.A., 64, Piazza Celsi, Valetta, Malta.
Galway, (Miss) H., 5, Earlsfort Terrace, Dublin.
Gaskell, Roger, M.A., North Hill, Highgate, Middlesex.
Gatto, Alfred C. de Conti, B.A., 59, Strada Levante, Valetta, Malta.
Gerland, Conrad, M.Sc., Ph.D., Church Hall, Church, Lancashire.
Godlee, Theodore, Whips Cross, Walthamstow, Essex.
Gordon, Rev. George, L.L.D., The Manse, Birnie, Elgin, N.B.
Green, Rev. Carleton, M.A., Gt. Barford Vicarage, St. Neots, Huants.
Gwatkin, H. M., M.A., Scrope Terrace, Cambridge.
Hagger, Jno., Repton School, Burton-on-Trent.
Hargreaves, J. A., 19, Millholme Terrace, Carlisle.
Hargreaves, J. A., 2, Rothbury Street, Scarbro'.
Hartley, Alfred, 8, Cavendish Road, Idle, near Bradford.
Harvard, T. Mawson, 41, Union Street, Leyland, near Preston.
Heathcote, Wm. Hy., 54, Frenchwood Street, Preston.
Hedworth, Thos. H., 1, Railway Terrace, Dunstan-on-Tyne.
Heitland, (Mrs.) M., The Priory, Shrewsbury.
Hepburn, Frederick, B.A., Sutton, Surrey.
Hey, Rev. W. C., M.A., St. Olave's Vicarage, York.
Hey, Thos., Bloomfield Street, Derby.
Hillman, Thos. Stanton, Eastgate Street, Lewes, Sussex.
Hockin, (Miss) S., Phillack Rectory, Hayle, Cornwall.
Hodgson, (Mrs.) J., Chalgrave Vicarage, Leighton Buzzard, Beds.
Holmes, W. J. O., J.P., F.L.S., Strumpshaw Hall, Norwich.
Howell, G. O., 3, Ripon Villas, Ripon Road, Plumstead.
Hoyle, W. E., M.A., M.R.C.S., F.R.S.E., Owens College, Manchester.
Hudson, Baker, 5, Westbourne Grove, Coatham, Redcar.
James, Jno. H., A.R.I. Cornwall, 3, Truro Veian Terrace, Truro.
Jeffrey, Wm., Ratham, Chichester.
Jeffrey, Chas., 15, Warren Street, Tenby.
Jenkins, A. J., 6, Douglas Terrace, Deptford.
Jones, (Miss) L. C., 5, Alexandra Road, Clifton, Bristol.
Jones, Wm. Jas. Jun., 27, Mayton Street, Holloway, London, N.
Jordan, Henry K., F.G.S., The Knoll, Clytha Park, Newport, Mon.
Kew, H. Wallis, F.E.S., 112, Hanley Road, Stroud Green, N.
Laver, Hy., M.R.C.S., F.L.S., Trinity Street, Colchester.

- Leicester, A., Enfield Place, Brighton Road, Birkdale, Southport.
 Lightwood, Jas. T., Hope House, Lytham.
 Linter, (Miss) J. E., Arragon Close, Twickenham.
 Lowe, E. J., D.L., J.P., F.R.S., F.L.S., F.G.S., F.R.A.S., F.R.Met.S.
 &c., Shirenewton Hall, Chepstow.
 Luther, S. M., Garrettsville, Ohio, U.S.A.
 Madison, Jas., 167, Bradford Street, Birmingham.
 Marquand, Ernest D., M.A., Fermain House, Guernsey.
 Marshall, J. T., Sevenoaks, Torquay.
 Martin, Sydney Trice, Hanover Chambers, King Street, Manchester.
 Masefield, J. R. B., M.A., Rosehill, Cheadle, Staffordshire.
 Mason, Philip B., M.R.C.S., F.L.S., F.Z.S., Burton-on-Trent.
 McKean, Kenneth, F.L.S., Summerfield, Warham Road, Croydon.
 McMurtrie, Rev. Jas., M.A., 14, Inverleith Road, Edinburgh.
 Mellor, Geo. W., 7, Second Avenue, Sherwood Rise, Nottingham.
 Melvill, Jas. Cosmo., M.A., F.L.S., F.E.S., Kersal Cottage, Prestwich.
 Milne, Joseph Grafton, Albert Square Bowden, Cheshire, and Corpus
 Christi College, Oxford.
 Milnes, Rev. H., Winster Vicarage, near Derby.
 Morgan, J. Bickerton, 30, Severn Street, Welshpool.
 Nelson, Wm., Freehold Street, York Road, Leeds.
 Newstead, A. H. L., Roseacre, Epping, and Christs College, Cambridge.
 North, S. W., M.R.C.S., F.G.S., Micklegate, York.
 Oldham, Charles, Ashlands, Ashton-on-Mersey.
 Paling, Albert, B.A., B.Sc., Middlesex Hospital, London.
 Parke, Geo. H., F.L.S., F.G.S., Infield Lodge, Barrow-in-Furness.
 Parry, Col. G. S., 13, Hyde Gardens, Eastbourne.
 Peal, Chas. N., F.L.S., F.R.M.S., Fernhurst, Maltoch Lane, Ealing.
 Pearce, Rev. S. Spencer, M.A., Tower Hill, Much Hadham. near Ware,
 Herts.
 Pidgeon, D., Assoc.Inst.C.E., F.G.S., Holmwood, Putney, Hill, London.
 Pocock, Thomas W., J.P., Glenridge, Virginia Water, Staines.
 Ponsonby, John H., F.Z.S., 4, Halkin Street, Grosvenor Place, S.W.
 Quilter, H. E., 4, Cedar Road, Leicester
 Radcliffe, John, 111, Oxford Street, Ashton-under-Lyne.
 Ramage, John, 20, Hill Street, Dundee.
 Reader, T. W., 171, Hemingford Road, Barnsbury, London, N.
 Renton, Robert, Fans Road, Greenlaw, Berwickshire.
 Rhodes, Frederick, 26, East View, Eccleshill, near Bradford.
 Roberts, George, Lofthouse, near Leeds.
 Robertson, David, F.L.S., F.G.S., Fernbank, Millport, N.B., President
 Nat. Hist. Soc. of Glasgow.
 Roebuck, Wm. Denison, F.L.S., Sunny Bank, Leeds.
 Rogers, Thomas, 27, Oldham Road, Manchester.
 Rope, George Thomas, Blaxhall, Wickham Market, Suffolk.
 Saunders, Ed., F.L.S., St. Ann's, Mount Hermon, Woking.
 Scharff, Robert F., Ph.D., B.Sc., M.R.I.A., Museum of Science and Art,
 Dublin.

- Sclater, A. J. R., Bank Street, Teignmouth.
Scott, Thomas, Fishery Board, Central Laboratory, Edinburgh University.
Shaw, Alexander, 56, Dover Street, Glasgow.
Shrubsole, George Wm., Town Hall Square, Chester.
Skilton, (Mrs.) M., 21, London Road, Brentford.
Smart, Rev. R. W. J., M.A., Parkham Rectory, Bideford, North Devon.
Smith, Edgar A., F.Z.S., Natural History Museum, South Kensington.
Smont, Charles L., 8, Trinity Street, Hastings.
Smyth, Thos. Pooley, 2, Stanhope Terrace, Hyde Park Gardens, London.
Somerville, Alex, B.Sc., F.L.S., 4, Bute Mansions, Hillhead, Glasgow.
Somerville, Rev. J. E., M.A., B.D., 11, Southpark Terrace, Hillhead, Glasgow.
- Sowerby, G. B., F.L.S., F.Z.S., 121, Fulham Road, London, S.W.
Standen, Robert, 40, Palmerston Street, Moss Side, Manchester.
Stanley, Frederick, 6, Clifton Gardens, Margate.
Steel, James, Glass Stainer, 104, Renfrew Street, Glasgow.
Stirrup, Mark, F.G.S., High Thorn, Bowden, near Manchester.
Storrs, Geo. Godwyn C., Sandown Vicarage, Isle of Wight.
Story, J. A., B.A., St. Joseph's High School, Cardiff.
Sykes, Ernest Ruthven, 9, Belvedere, Weymouth.
Taylor, (Miss) H. L., Woodside, Rowditch, Derby.
Taylor, Jno. W., F.L.S., Sovereign Street, Leeds.
Taylor, J. M. B., Free Museum, Paisley, N.B.
Tomlin, J. R. B., B.A., 59, Liverpool Road, Chester.
Turner, Rev. Wm., 5, St. Andrew's Square, Edinburgh.
Tye, G. Sherriff, 10, Richmond Road, Handsworth, Birmingham.
Viner, C. W., M.A., Ph.D., 9, Seymour Street, Bath.
Waters, A. H., B.A., Willoughby House, Mill Road, Cambridge.
Watson, Rev. R. Boog, B.A., F.R.S.E., F.L.S., F.G.S., Free Church Manse, Cardross, Dumbartonshire.
Webb, F. B., Church Terrace, Cheadle, Staffordshire.
Whatmore, Chas. A., Much Marde, Herefordshire.
Whitwell, Wm., 4, Thurleigh Road, Balham, London, S.W.
Williams, J. W., 13, Ravelly Street, Kentish Town.
Wood, Jas. Wm., 2, Windsor Terrace, Bedford.
Woodward, B. B., F.G.S., F.R.M.S., 23, Batoum Gardens, West Kensington Park, S.W.
Wotton, F. W., 11, Moira Crescent, Cardiff.
Wright, Bryce M., M.A.I., F.R.G.S., F.R.S.S., F.R.S., North. A., F.R. Hist.S. F.Z.S. &c., The Museum, 26, Saville Row, London, W.

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PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY.

NOTE.—All communications *intended for the Society* should be sent to the Secretary, Mr. T. W. BELL, 2, Carr Lane, Leeds.

Meeting

HELD APRIL 3RD, 1889.

Mr. J. W. Taylor, F.L.S., Vice-President, presided.

DONATIONS.

The following donations were laid on the table :—

“The Naturalist,” for April; presented by Yorkshire Naturalists’ Union.

“Proceedings of the Royal Society of Queensland,” vol., v, part 5; presented by the Society.

NEW MEMBERS.

Mr. H. K. Jordan, F.G.S., Newport, and Mr. T. H. Hedworth, Dunstan-on-Tyne, were duly elected Members of the Society.

Mr. Percy Kilburn, F.G.S., Owens College, Manchester, was nominated for membership by Mr. J. Cosmo Melvill, M.A., F.L.S., and Mr. J. W. Taylor, F.L.S.

PAPERS READ.

“List of Land and Freshwater Shells of Derby,” by Mr. Thos. Hey.

“Testacella in Renfrewshire,” by Mr. J. M. B. Taylor.

“Cysts in *Anodonta cygnea*,” by Mr. J. W. Williams.

SPECIMENS EXHIBITED.

A number of shells from Jamaica were shown by the Chairman on behalf of Mr. J. Saunders, of Luton.

Meeting

HELD MAY 1ST, 1889.

Mr. J. W. Taylor, F.L.S., Vice-President, occupied the chair.

DONATIONS.

“The Naturalist” for May; presented by the Yorkshire Naturalists’ Union.

NEW MEMBERS.

Mr. Percy Kilburn, of Manchester, was duly elected a Member of the Society.

The following were nominated for Membership :—Mr. F. L. Seggs, B.A., Middlesex Hospital, by Mr. J. W. Williams and Mr. J. W. Taylor, F.L.S.; Rev. Chas. Crawshaw, Linden House, Shipley, by Mr. J. W. Taylor, F.L.S., and Mr. W. Nelson.

SPECIMENS EXHIBITED.

The Chairman showed living specimens of *Helix cingulata*, *H. niciensis*, and *H. cespitum* collected at Mentone by the Rev. J. E. Somerville, B.A.; also a living specimen of *Helix aculeata* from Farington, near Preston,

sent by Mr. W. H. Heathcote. Mr. W. Denison Roebuck, F.L.S., exhibited an unusually large *Limax flavus* taken in Leeds, also *Amalia marginata*, *Limax maximus* var. *fasciata*, and other species, from Luton, sent by Mr. J. Saunders.

Meeting

HELD JUNE 5TH, 1889.

Mr. J. W. Taylor, F.L.S., Vice-President, presided.

DONATIONS.

The following donations were announced :—

“The Naturalist,” for June; presented by the Yorkshire Naturalists’ Union.

“Proceedings of the Royal Society of Queensland”; presented by the Society.

“Proceedings of the Linnean Society of New South Wales”; presented by the Society.

“A Manuscript List of the Land and Freshwater Mollusca of the British Isles”; presented by Mr. T. D. A. Cockerell. [This donation was made to the Society some time ago but inadvertently omitted from the list.]

NEW MEMBERS.

The under-named were nominated for Membership :—Mr. Jas. J. MacAndrews, Ivy Bridge, Devonshire, by Mr. G. B. Sowerby, F.L.S., and Mr. T. W. Bell; Mr. Samuel A. Adamson, F.G.S., Leeds, by Mr. T. W. Bell and Mr. W. Denison Roebuck, F.L.S.

PAPERS READ.

“On the Morphology of the Gonads in *Helix punctata*,” by Mr. Joseph W. Williams.

“On the varieties of our banded Snails, especially those of *Helix caperata* (Montagu),” by the Rev. S. Spencer Pearce, B.A. This paper was illustrated by a good collection of specimens.

A note was read from Mr. W. H. Heathcote respecting the dart of *Helix cingulata* and *H. niciensis*.

SPECIMENS EXHIBITED.

Specimens of *Testacella scutulum* were shown from Mr. Wallis Kew, F.E.S., London, and Mr. W. Jeffery, Ratham; *Testacella haliotideia* from Mr. G. T. Rope, Wickham Market, Suffolk; *Testacella maugei* and *Arion ater* var. *bicolor* from Mr. E. J. Lowe, F.R.S., Chepstow; *Testacella maugei* from Algeciras and Tangiers, sent by Mr. J. H. Ponsonby, F.Z.S.; examples of *Clausilia rugosa* var. *everetti* and *C. laminata* (a decollated specimen) sent by the Rev. W. L. W. Eyre, of Swarraton Rectory, were also shown.

The Chairman also exhibited the following :—From Mr. R. D. Darbishire, B.A., F.G.S., *Limax gagates* and a number of Land and Freshwater Shells collected at San Juan, near Cannes; from Mr. W. Whitwell *Arion ater* var. *albo-lateralis*, *H. nemoralis*, *H. hortensis*, *H. rufescens*, and *H. concinna*, collected at Abbotsbury, Dorset; a collection of Yorkshire

shells (East Riding), including *Paludina contecta*, sent by Mr. Albert Harker, Cambridge; from Mr. Hugh Richardson *Unio pictorum* and various Helices from Minden, Westphalia; from Mr. W. A. Gain, a collection of shells, including *Helix undata* and its curious dart; from Rev. H. Milnes, a collection of varieties of *Helix arbustorum* from Derbyshire.

MANCHESTER BRANCH.—APRIL 13TH, 1889.

Mr. Darbishire exhibited specimens of *Helix aperta* and read the following notes:—“*Helix aperta*, reviving after long drought.” It has long been a matter of curious observation that Helices of species which are often exposed to very dry seasons preserve their life through long intervals. Aucapitaine, writing on the climate of Algeria, observes that in certain parts of the deserts, where there is a constant heat of over 110° Fahr. and where there is not a trace of vegetation to be seen, the ground is sometimes covered with *Helix lactea* so as to seem whitened. At the end of 1858 he collected a dozen of these shells while passing through places where, it is said, no rain had fallen for five years. The shells were put in a box, and packed away and forgotten. In August, 1862, he found them, and threw them into water to clean them. Next morning, to his astonishment, he found them all gone. They had escaped from his basin, and, full of life, *se promenaient*, every one of them, on the furniture of his study (L’Escargot, Dr. J. Reynes). Dr. Baird’s *H. desertorum*, having been brought from Egypt, was fastened on a tablet on the 25th of March, 1846, and on the 7th of March, 1850, came out, but could not get away, was released, bathed, and “marvellously recovered.” Similar facts have been reported by other naturalists. On the 18th of February, 1885, I bought in the market at Nice a quantity of *Helix aperta*, which, at that season, is found in the red muddy soil with its calcareous operculum strongly sealed on, and is much sought for cookery. I kept a few in cotton wool and a paper box in my workshop. Not one certainly ever opened his door to look out. In December last it occurred to me to try if these snails could yet be alive. The shells seemed to have lost all perceptible weight and coolness (both common signs of life), and one, which I broke up, showed the animal dried up like a bit of hard horn. I placed two on a pad of flannel under a shade and kept them thus in a moist atmosphere in my living room. After a few weeks the opercula were forced off, and the edge of the mantle was seen as if the animal had just withdrawn rather far back. Afterwards the mantle advanced and the foot slowly became more and more visible and sensitive to irritation. I put the two on some moss in a damp fern case and on the 29th of March I had the pleasure of meeting my two Helices out walking, slightly feeble, but in good colour and substance, and gave them some fresh cabbage leaf of which they ate temperately. This is, perhaps, a more remarkable case than that of *H. desertorum*, which has habitually to calculate upon prolonged abstinence. *H. aperta* is a comparatively large, fleshy snail, and no doubt usually enjoys spring and autumn regularly.

A LIST OF SHELLS TAKEN AT TENBY,
SEPTEMBER, 1888.

By J. W. CUNDALL.

(Read before the Conchological Society, December 15th, 1888.)

A long-intended visit to this quaint old watering-place, so rich in its historic associations, was carried into effect this Autumn, and I was enabled to devote a considerable time to shell-seeking. The following list is, no doubt, a very incomplete one of the Mollusca of the locality, no dredging having been done, still, on the whole, I did not consider the result unsatisfactory, and the record may prove of interest to the Society. In the "Journal of Conchology," vol. i, page 30, there is given a short list of shells met with in this quarter, on reference to which it will be seen that the catalogue of species has now been considerably increased, and it is to be hoped that the following may have the effect of leading to a complete enumeration of the Mollusca of the Tenby District.

MARINE.

Anomia ephippium L.—Small and odd valves common.

Ostrea edulis L.

Pecten pusio (L.).—Odd valves only, and chiefly small.

P. varius (L.).—Odd valves only, and chiefly small.

P. opercularis (L.).—Odd valves only, and chiefly small.

Mytilus edulis L.—Extraordinarily abundant.

M. barbatus L.—One fine shell at Giltar.

M. adriaticus (Lmk.).—A few odd valves.

Nucula nucleus (L.).—Odd valves common.

Lasæa rubra (Mont.).—At Giltar.

Kellia suborbicularis (Mont.).—With *Saxicava rugosa* at Giltar.

Lucina borealis (L.).—Odd valves very common.

Axinus flexuosus (Mont.).—Odd valves abundant.

- Cardium echinatum* L.—Odd valves common.
C. edule L.
Cyprina islandica (L.).—Odd valves.
Venus gallina L.—Very common at Saundersfoot.
Tapes pullastra (Mont.).—Common.
Lucinopsis undata (Penn.). — One specimen taken at
 Saundersfoot.
Tellina balthica L.—Common.
T. tenuis DaC.—Common.
T. fabula Gron.—Frequent at Saundersfoot.
T. squalida Pult.—Common.
Psammobia ferroensis (Chem.).—Odd valves only.
Donax vittatus (DaC.).—Frequent.
Mactra solida L.—Common.
M. subtruncata (DaC.).—Common.
M. stultorum L.—Common.
Lutraria elliptica Lmk.—Odd valves numerous.
Scrobicularia alba (Wood).—At Saundersfoot.
S. piperata (Gm.).—One at Saundersfoot.
Ceratisolen legumen (L.).—Abundant, especially at Saunders-
 foot.
Solen ensis L. Abundant, especially at Saundersfoot.
S. siliqua L.—Abundant, especially at Saundersfoot.
Thracia papyracea (Poli.).—At Saundersfoot.
Corbula gibba Olivi.—Odd valves common.
Mya truncata L.—Only odd valves.
Saxicava rugosa (L.).—At Giltar Point.
Pholas dactylus L.—Odd valves only.
Pholadidea papyracea (Turt.).—Odd valves only.
Dentalium tarentinum Lmk.—Frequent.
Chiton fascicularis L.—At Lydstep Caves.
C. discrepans Bro.—At Lydstep Caves.
C. cinereus L.—At Giltar Point.
Patella vulgata L.
Helcion pellucidum (L.).—Abundant at Lydstep on Laminaria.

- Tectura virginea* (Müll.).—Common.
- Fissurella græca* (L.).—One specimen only.
- Calyptræa chinensis* (L.).—Dead shells common on the sands; a few living taken at Giltar.
- Trochus magus* L.—Fragments only.
- T. cinerarius* L.—Common.
- T. umbilicatus* (Mont.).—Common.
- T. zizyphinus* L.—Sparingly.
- Phasianella pullus* (L.).—Among broken shells and sand.
- Littorina obtusata* (L.).—Common.
- L. rudis* Maton.—Common.
- L. littorea* (L.).—Common.
- Rissoa parva* (DaC.).—Among broken shells and sand.
- R. membranacea* (Ad.).—Among broken shells and sand.
- R. violacea* Desm.—Among broken shells and sand.
- R. striata* (Ad.).—Among broken shells and sand.
- Hydrobia ulvæ* (Penn.).—Very abundant.
- Turritella terebra* (L.).—Dead shells, much worn.
- Scalaria communis* Lmk.—A few shells much worn.
- Odostomia rissoides* Han.—Among broken shells and sand.
- O. indistincta* (Mont.).—Among broken shells and sand.
- O. rufa* (Phil.).—Among broken shells and sand.
- O. lactea* (L.) var. *paullula* Jeffr.—Among broken shells and sand.
- Natica catena* (DaC.).—Common at Saundersfoot.
- N. Alderi* Forb.—A few at Saundersfoot.
- Velutina lævigata* (Penn.).—One at Giltar.
- Cerithium reticulatum* (DaC.).—Very common.
- Purpura lapillus* (L.).—Very abundant and fine.
- Buccinum undatum* L.—Abundant.
- Murex erinaceus* L.—Live shells at Monkstone.
- Nassa reticulata* (L.).—Common.
- N. incrassata* (Str.).—Common.
- Pleurotoma attenuata* (Mont.).—Among broken shells and sand.

- P. nebula* (Mont.).—Among broken shells and sand.
P. turricula (Mont.).—Among broken shells and sand.
Cypræa europæa Mont.—Abundant.
Cylichna cylindracea (Penn.).—One specimen.
Actæon tornatilis (L.).—Only two specimens.
Philine aperta (L.).—Dead shells, common; one living taken at Giltar.

LAND AND FRESHWATER.

- Arion hortensis* Fer.—Common.
Limax flavus L.—Hoyle's Mouth Wood.
Zonites cellarius (Müll.).—Hoyle's Mouth Wood.
Z. crystallinus (Müll.).—Hoyle's Mouth Wood.
Helix aspersa Müll.
H. nemoralis L.—The Burrows, common.
H. hispida L.—Hoyle's Mouth Wood.
H. pisana Müll.—Very abundant.
H. pisana var. *alba* Shuttl.—Very abundant.
H. virgata DaCosta.—The Burrows, common.
H. caperata Mont.—The Burrows, common.
H. ericetorum Müll.—The Burrows, common.
H. ericetorum var. *alba* Charp.—The Burrows, common.
H. rotundata Müll.—Hoyle's Mouth Wood.
Bulimus acutus (Müll.).—Common.
Pupa umbilicata Drap.—The Burrows.
Clausilia rugosa (Drap.).—Hoyle's Mouth Wood.
Carychium minimum Müll.—Hoyle's Mouth Wood.
Cyclostoma elegans (Müll.).—Between Giltar and Penally.
Planorbis albus Müll.—The Marshes.
Physa fontinalis (L.).—The Marshes.
Limnæa peregra (Müll.).—The Marshes.
L. truncatula (Müll.).—The Marshes.

Only a very casual search was made for either Land or Freshwater Shells, but probably they are not at all numerous represented in the locality. *Helix pisana* and its variety are most extraordinarily abundant, especially on the Castle Hill,

and on the coarse grass bordering the esplanade. Neither *Helix hortensis*, nor *rufescens* were observed, but I was informed that both were abundant. *Helix aculeata*, I heard was plentiful at Hoyle's Mouth Wood, but I failed to find it.

Altogether 84 Marine species, 17 species and 2 varieties of Land, and 4 species of Freshwater Mollusca were observed.

THE LAND SHELLS AND FRESHWATER SHELLS
OF THE COAST OF NORTH NORTHUMBERLAND
FROM ALNMOUTH TO THE TWEED.

BY THE REV. J. McMURTRIE, M.A.

(Read before the Conchological Society, December 15th, 1888.)

IT will be seen that the Alnmouth land shells of the genus *Helix* are interesting. They attracted my attention during autumn holidays, which I spent there some years ago. I had no thought at the time of forming a complete collection of the local shells; and this accounts for various blanks, especially the absence of freshwater shells of Alnmouth from the list. The neighbourhood of Alnmouth, considered as a collecting ground, is wanting in freshwater pools and streams, and the river Alne is tidal for some distance; but no doubt some freshwater species could be got even there, and at any rate the searcher could go further afield.

The determination of the northern limit of *Helix virgata* is of some interest. Dr. Jeffreys supposed it did not extend beyond Yorkshire. Mr. Rimmer (on my authority) quoted Alnmouth. The shell is common at Amble, Alnmouth, and Bamborough, and the albino form with translucent lines (var. *alba* Taylor) is also unusually plentiful at all these places. It is still plentiful half-a-mile north of Bamborough, with the var. *albicans* Grat., but I could not find it at Beal. I have not

visited Holy Island. Dr. Jeffreys quotes the remark of Bouchard-Chantereaux that *H. virgata* never hibernates. But, if so, it seems to change its habit in the north. In spring I found only dead shells at Bamborough, while in early summer living specimens, mostly with the shell-lip unfinished, were numerous.

Pisidium pusillum Gmelin? — Small stream at railway station, Beal.

Limnæa peregra Müll.—Beal.

L. truncatula var. *minor* Moq.—Beal.

L. truncatula var. *elegans* Jeff.—Belford, abundant in a small marsh in a field east from the railway station, a few years ago. The marsh has now been drained, but it will probably be found elsewhere, as it seems a North of England shell. It is plentiful at South Shields (Durham), near the sea.

Arion ater L.—Tweedmouth.

A. bourguignati Mabille.—Tweedmouth.

A. hortensis var. *subfuscus*.—Under stones, Tweedmouth.

Limax agrestis L.—Tweedmouth.

Vitrina pellucida Müll.—Alnmouth; Beal.

Zonites cellarius Müll.—Beal; Tweedmouth.

Z. alliarius Müll.—Alnmouth; Beal.

Z. alliarius var. *viridula* Jeff.—Alnmouth.

Z. nitidulus Drap.—Tweedmouth.

Helix aspersa Müll.—Alnmouth; Bamborough.

H. aspersa var. *undulata* Moq.—Bamborough.

H. aspersa, somewhat approaching var. *albofasciata* Jeff.—Alnmouth.

H. nemoralis L.—Alnmouth; Bamborough.

H. nemoralis.—A conical form. Alnmouth, rare.

H. nemoralis monstr. *subscalariforme*.—Alnmouth, rare.

H. nemoralis var. *hyalozonata* Taylor.—Alnmouth, sand-hills on south side of the Alne, not rare.

H. nemoralis var. *libellula* Risso.—Bands becoming obsolete. Alnmouth, south side, common.

- H. nemoralis** var. **rubella** Moq.—Bands becoming obsolete. Alnmouth, south side, somewhat common.
- H. nemoralis** var. **castanea** Moq.—Bands becoming obsolete. Alnmouth, south side, less common.
- H. nemoralis rubella** var. **bimarginata** Moq.—Bamborough (the specimens also approach var. *albolabiata* Von Mart.).
- H. nemoralis** var. **roseolabiata** Taylor?—Alnmouth, north side, rare.
- H. hortensis** var. **lutea** Moq.—12345, (12)3(45), (12345), Alnmouth.
- H. hortensis** var. **minor** Moq.—123(45), 00000, *lutea*, Alnmouth.
- H. hortensis** var. **roseolabiata** Taylor. — Alnmouth, not rare, on rising ground on the golf links near the sea.
- H. hortensis** var. **arenicola** Macgill.—Alnmouth, with the preceding, not rare.
- H. hortensis** var. **albina** Moq. (?)—Alnmouth, with the preceding, not rare. (This is the same shell as var. *arenicola*, but without translucent lines).
- H. arbustorum** L.—Handsome, somewhat umbilicate. Tweedmouth, under stones, in December.
- H. hispida** L.—Alnmouth ; Beal ; Tweedmouth.
- H. hispida** var. **subrufa** Moq.—Alnmouth ; Beal ; Tweedmouth.
- H. hispida** near var. **nana** Jeff.—Alnmouth.
- H. hispida** with bands (*concinna minor?*).—Alnmouth, rare.
- H. virgata** Da Costa.—Amble (some miles south of Alnmouth), common ; Alnmouth, very abundant on the golf links ; Bamborough, common.
- H. virgata** var. **major** Taylor.—At Alnmouth the shell often reaches or approaches this variety.
- H. virgata** var. **albicans** Grat.—Alnmouth, not rare ; Bamborough, somewhat common.
- H. virgata** var. **alba** Taylor.—Amble, somewhat abundant ; Alnmouth, abundant at the foot of the Alne, on the north

- side, more sparingly on the golf links; Bamborough, somewhat common.
- H. caperata* Mont.—Alnmouth, abundant.
- H. caperata* var. *major* Jeff.—Alnmouth, at the foot of the Alne, on the south side, not rare.
- H. caperata* var. *major-ornata*.—Alnmouth, with preceding but less common.
- H. caperata* var. *major-alba*.—Alnmouth, with preceding, not common.
- H. caperata* var. *ornata* Picard.—Alnmouth, abundant.
- H. caperata* var. *alba* Picard.—Alnmouth, somewhat common.
- H. caperata* var. *subscalaris* Jeff.—Alnmouth, rare and not usually very characteristic.
- H. caperata* var. *subscalaris-alba*.—A more characteristic specimen.
- H. caperata* var. *obliterata* Picard.—Alnmouth, on banks near the sea by the golf links, not plentiful.
- H. caperata*.—A white form with a single line above the periphery. Alnmouth not rare.
- H. caperata*.—A dark form, with lines confluent above and below the periphery, leaving a white line at the periphery. Alnmouth, not rare.
- H. rotundata* Müll.—Beal; Tweedmouth. Probably common everywhere in waste places.
- H. pulchella* Müll.—Alnmouth.
- H. pulchella* var. *costata* Müll.—Alnmouth, not common.
- Pupa umbilicata* Drap.—Beal; Tweedmouth.
- P. marginata* Drap.—Alnmouth.
- P. marginata* var. *edentula* Moq.—Alnmouth, perhaps commoner than the species.
- Cochlicopa lubrica* Müll.—Alnmouth; Beal.
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DORSETSHIRE MARINE SHELLS.

 BY REV. CARLETON GREENE, M.A.

(Read before the Conchological Society, October 10th, 1888.)

THE visitor at Bournemouth will find a shell-beach a few miles off, on either side of the mouth of Poole Harbour, reaching from Poole Head to Studland. Specimens of the following shells were obtained in one visit. I mention the common species because some of the most common British shells appear to be rarities in this locality. Those which are most plentiful are marked with an asterisk.

- | | |
|----------------------------------|-------------------------------------|
| * <i>Anomia ephippium</i> L. | <i>Solen ensis</i> L. |
| <i>Pecten varius</i> (L.). | * <i>S. siliqua</i> L. |
| * <i>P. opercularis</i> (L.). | * <i>Pandora inæquivalvis</i> (L.). |
| <i>P. maximus</i> (L.). | <i>Thracia papyracea</i> (Poli). |
| <i>Mytilus edulis</i> L. | <i>Mya truncata</i> L. |
| <i>M. barbatus</i> L. | <i>Pholas dactylus</i> L. |
| * <i>Cardium tuberculatum</i> L. | <i>P. candida</i> L. |
| <i>C. edule</i> L. | <i>Dentalium entalis</i> L. |
| <i>C. norvegicum</i> Speng. | <i>Calyptrea chinensis</i> (L.). |
| * <i>Venus linctæ</i> Pult. | * <i>Trochus magus</i> L. |
| * <i>V. casina</i> L. | <i>T. cinerarius</i> L. |
| <i>V. gallina</i> L. | <i>Littorina obtusata</i> (L.). |
| <i>Tapes aureus</i> (Gm.). | <i>L. littorea</i> (L.). |
| * <i>T. pullastra</i> (Mont.). | <i>Velutina lævigata</i> (Penn.). |
| <i>T. decussatus</i> (L.). | <i>Aporrhais pes-pelecani</i> (L.). |
| <i>Tellina balthica</i> L. | <i>Buccinum undatum</i> L. |
| <i>T. tenuis</i> DaC. | <i>Murex erinaceus</i> L. |
| <i>Mactra solida</i> L. | <i>Nassa reticulata</i> (L.). |
| * <i>M. subtruncata</i> (DaC.). | <i>Cypræa europæa</i> Mont. |
| <i>M. stultorum</i> L. | |

ADDENDA.

<i>Nucula nucleus</i> (L.).	<i>C. perversum</i> (L.).
<i>Trochus exasperatus</i> Penn.	<i>Defrancia reticulata</i> (Ren.).
<i>T. tumidus</i> Mont.	<i>D. linearis</i> (Mont.).
<i>Phasianella pullus</i> (L.).	<i>Pleurotoma attenuata</i> (Mont)
<i>Rissoa cancellata</i> (DaC.).	<i>Cylichna cylindracea</i> (Penn).
<i>R. parva</i> (DaC.).	<i>Bulla utriculus</i> (Broc.).
<i>Eulima polita</i> (L.).	<i>B. hydalis</i>
<i>Cerith. reticulatum</i> (DaC.).	

 CONTRIBUTIONS TOWARDS A

 FUTURE KNOWLEDGE OF WORCESTERSHIRE
 MOLLUSCA.

 BY J. W. WILLIAMS.

The Molluscan fauna of Worcestershire has been I believe little worked, and the following list includes the various species and varieties taken by me during a stay of three weeks last summer at Stourport, a small town situate in the north-west portion of the county and about twelve miles distant from its capital. The country around the town is extremely rural in character, well-watered, hilly, very woody and picturesque, forming a spot in which naturalist and tourist alike may dwell in delight. The list cannot, however, be considered even approximately complete, since during my stay there were many rainy days on which no work could be done, and for some portion of it, I was confined to my room with pleurisy which succeeded a cold due to getting wet through on the very first day I went out collecting. The ground worked is included in a circle of three miles radius taking the town as the centre.

Arion ater Linn.—Bishop's Park ; Hartlebury.

A. ater var. **brunnæ** Roeb.—Bishop's Park ; Hartlebury.

A. hortensis Fér.—Garden in Stourport.

- A. hortensis* var. *rufescens* Moq.—Garden in Stourport.
Amalia gagates Drap.—Garden in Stourport.
A. gagates var. *plumbea* Moq.—Garden in Stourport.
A. gagates var. *rava* Wms.—Garden in Stourport.
Limax flavus Linn.—Cellars in Stourport.
L. agrestis Linn.—Common everywhere.
L. agrestis var. *sylvatica* Drap.—Common everywhere.
L. agrestis var. *filans* Hoy.—Garden in Stourport.
L. agrestis var. *punctata* Moq.—Garden in Stourport.
L. agrestis var. *albida* Picard.—Garden in Stourport.
L. maximus Auct.—Garden in Stourport.
L. maximus var. *Johnstoni* Moq.—Garden in Stourport.
Vitrina pellucida Müll.—Lincomb Bay.
Hyalina cellaria Müll.—Lincomb Bay ; Hartlebury.
H. alliaria Mill.—Lincomb Bay.
Helix aspersa Müll.—Common everywhere.
H. aspersa var. *undulata* Moq.—Dunley.
H. nemoralis Linn.—Dunley ; Hartlebury ; Stourport ; and
 Charlton.
H. nemoralis var. *carnea*.—Stourport ; Wildon.
H. nemoralis var. *libellula* Risso.—02345. Stourport.
H. nemoralis var. *rubella* Moq.—00300. Crossway Green ;
 Wildon.
H. nemoralis var. *conoidea* Jenner.—Wildon.
H. hortensis Müll.—Common everywhere.
H. hortensis var. *albina* Moq.—Dunley.
H. hortensis var. *arenicola* Macg.—Dunley.
H. hortensis var. *lutea* Moq.—00000. Lincomb Bay.
 Mrs. Clewer's garden in Jenny Hole ; Stourport ; Dunley ;
 and Wildon. 1(2345) : Mrs. Clewer's garden in Jenny
 Hole.
H. hortensis var. *albina-fasciata*.—Dunley ; Mrs. Clewer's
 garden in Jenny Hole.
H. hortensis var. *subalbida* Locard.—12345, (123)45,
 (12345), 1(2345), 12(345), (12)3(45), (123)(45), (1234)5,

- 1(234)5, 123(45); Mrs. Clewer's garden in Jenny Hole.
 1(23)(45), (123)45, 12345, (1234)5; Mr. Pretty's garden at
 Wildon. 12345, (123)(45), (12)345, (123)45; Dunley.
- H. rufescens* Penn.—Lincomb Bay.
- H. rufescens* var. *alba* Moq.—Lincomb Bay.
- H. sericea* Müll.—Lincomb Bay.
- H. rotundata* Müll.—Lincomb Bay.
- Bulimus obscurus* Müll.—Lincomb Bay.
- Clausilia rugosa* Drap.—Charlton; Lincomb Bay.
- C. laminata* Mont.—Lincomb Bay.
- Cochlicopa lubrica* Müll.—Lincomb Bay.
- Sphærium corneum* Linn.—Hillage Pool; Stinton Pool at
 Crossway Green; Wildon Pool; Staffordshire and Wor-
 cestershire canal.
- S. corneum* var. *flavescens* Macgill.—Wildon Pool.
- S. corneum* var. *compressa* Gray.—Hillage Pool.
- S. ovale* Fér.—Pool in Shrawley Wood (one dead specimen
 only).
- S. lacustre* Müll.—“Rush Pool” on Hartlebury Common,
 in great quantity.
- Pisidium amnicum* Müll.—Staffordshire and Worcestershire
 canal.
- Unio tumidus* Phil.—Hillage Pool.
- Dreissena polymorpha* Pall.—Severn Basins; Staffordshire
 and Worcestershire canal; Wildon Pool, very plentiful.
- Paludina vivipara* Linn.—Staffordshire and Worcestershire
 canal.
- P. vivipara* var. *unicolor* Jeff.—Staffordshire and Wor-
 cestershire canal.
- Bythinia tentaculata* Linn.—Hillage Pool; Staffordshire
 and Worcestershire canal.
- B. tentaculata* var. *albida* Rimmer.—Hillage Pool.
- B. tentaculata* var. *ventricosa* Menke.—Hillage Pool.
- Planorbis lineatus* Walk.—Stinton Pool at Crossway Green.
- P. albus* Müll.—Hillage Pool.

P. spirorbis Müll.—“Rush Pool” on Hartlebury Common ;
small pool at Wildon.

P. complanatus Linn.—Hillage Pool.

Physa fontinalis Linn.—Hillage Pool.

Limnæa peregra Müll.—River Stour ; Hillage Pool ; Stinton
Pool ; Staffordshire and Worcestershire canal.

L. peregra var. *ovata* Drap.—Hillage Pool.

L. peregra var. *labiosa* Jeff.—Hillage Pool.

Limnæa auricularia Linn.—Staffordshire and Worcester-
shire canal (one specimen only).

L. glabra Müll.—Small pool on Hartlebury Common. Four
specimens only could be found.

A few of the shells enumerated above have not before been
recorded for Worcestershire, while of those hitherto recorded
several are absent from this present list.



TESTACELLA SCUTULUM Sow. IN RENFREWSHIRE

BY J. M. B. TAYLOR.

(Read before the Conchological Society, April 3rd, 1889).

IN working up the land and freshwater shells of Renfrewshire I
was informed that living specimens of *Testacella* had been got
near Paisley. On the 30th April, 1887, I made the following
notes as related to me by a person who had kept some of them
alive for sometime :—

“They were got outside a green-house at Gartland Place
(this is to the north-east of Paisley, in the suburbs), and six of
them were kept alive for sometime. The place was searched at
night with a light at the time the vines and asters were being
cut, and the creatures found. If introduced it must have been
a long time ago as no plants have been introduced to the
garden of recent years.” I was also told that the shells were
preserved somewhere, but that “somewhere” was not dis-

covered until the spring of 1888, when I was shown ten of these shells which bore marks that the animals they belonged to had died and decayed. These living *Testacella* had been kept by my informant over five years before I got the above notes. It may be observed that the above notes lead to the belief that *Testacella* eat "vines and asters," whereas they live on animals. On the morning of Friday, 22nd of February, 1889, I saw living specimens of *Testacella* brought into the Paisley Free Museum, and some eggs of that species had also been found, but these burst whilst in the man's hand. The broken fragments of these ova were remarkable egg-shell like in shape, with the inner surface glossy. Not a single ovum of this collecting escaped unbroken. That same day I visited Kilnside Gardens, from where they had been dug, and I found them there in abundance. I also obtained ova of the species. Kilnside, I may say, is to the east of Paisley. These *T. scutulum* were about nine inches deep in the ground. When dug out they were quite dormant, and showed little signs of moving. After being kept for some hours in a large wide-mouthed glass bottle, in a warm room, some of them began to creep about slowly. Some days afterwards they were supplied with about five inches of earth, in which they buried themselves, but many of them lay against the glass of the bottle, among the earth, after burying themselves. Last year, in the plot from which they were dug, cabbages, peas, and cauliflowers were grown, but these were little cut. Seeing that the specimens of *Testacella* were dormant, the temperature of the soil on the 22nd February, 1889, as taken at the Coats' Observatory, Paisley, is given below :—

3 inches deep.	12 inches deep.	22 inches deep.
39.7°	... 40.1°	... 41.1°

The following is the mean temperature at the same depths, as taken at the same Observatory, for the first four months of 1888 :—

	3 inches deep.	12 inches deep.	22 inches deep.
January ...	39°0′.	... 39°7′.	... 40°9′.
February ...	37°0′.	... 37°7′.	... 39°5′.
March ...	37°0′.	... 38°0′.	... 39°5′.
April ...	42°0′.	... 42°5′.	... 42°4′.

Showing the living specimens to the party who had kept some of the living *Testacella*, as mentioned above, he did not think they were the same;—his were a brighter orange, and their form somewhat different. The shells I was shown are certainly larger and look different. The two localities referred to (Gartland Place and Kilnside) although in the suburbs are on the same side of Paisley and not very far apart.

LIST OF LAND AND
FRESHWATER SHELLS OF DERBYSHIRE,
COLLECTED IN 1888.

BY THOS. HEY, M.C.S.

(Read before the Conchological Society, April 3rd, 1889.)

- Sphærium corneum.**—Very common in all the canals and ditches around Derby, and certainly one of our commonest shells.
- S. rivicola.**—Occurs very commonly in the canal between Shardlon and Chellaston.
- S. ovale.**—I found one specimen in canal near Sawley at the junction with the river Trent.
- S. lacustre.**—Found sparingly in the above localities; also in canal near Ambergate.
- Pisidium amnicum.**—Seems pretty well distributed throughout the district, but the best and largest specimens have been found in canal between Cromford and Ambergate.
- P. fontinale.**—The only place I have found this up to the present time is the River Wye, at Monsal Dale, at the mouth of a small tributary.

- P. pusillum.**—These remarks also refer to this species; they are not very plentiful either.
- P. nitidum.**—I find this in the Cromford Canal near the terminus to the High Peak Railway; it is not very common; also in a small tributary of the Derwent near Ambergate.
- P. roseum.**—I have certainly found this in the county, but am uncertain as to locality.
[I find some difficulty in recognising species of this order, and during the coming season intend sending specimens for verification by the Society's referees].
- Unio tumidus.**—Very plentiful in the canals around Derby, but are best secured when the water is off for repairs.
- U. pictorum.**—The same remarks apply as for *U. tumidus*. I think the Derby to Burton canal is most prolific in this species.
- Anodonta cygnea.**—Quite common in the canals close to the town of Derby.
- A. anatina.**—Also very plentiful; one day, a short time ago, the water was low in the Derby and Burton Canal, when I took the opportunity to secure about a scuttle-full of the four preceding species.
- Dreissena polymorpha.**—Very plentiful where it occurs, but somewhat local. I have found it near Borrowash in the Derby and Nottingham Canal; near Willington in canal; near Butterley Ironworks in a large pond. The Midland Railway crosses this pond by means of a pile bridge, the wooden piles of which are covered some inches thick for more than ten feet deep, in fact every piece of timber that is under water is simply smothered with them.
- Neritina fluviatilis.**—Somewhat common in the canal at Borrowash; also at Weston. I have found a few specimens nearly black at the mouth of the canal where it enters the River Trent near Sawley.
- Paludina contecta.**—Up to the present time I have only met with two specimens of this species in the Derby and Burton Canal, near Willington.

- P. vivipara.**—Very plentiful in the same canal, where it grows to a large size, and may be found quite close to the town of Derby. Although I have taken hundreds out of the water for examination with the hope of finding *P. contecta*, I have as yet failed.
- Bythia tentaculata.**—Occurs very commonly in all the canals and in most ditches.
- B. leachii.**—Occurs fairly commonly in the Shardlow Canal, at Weston-on-Trent, and in the Black Pool, which is a back-water from the Trent and a splendid hunting ground.
- Valvata piscinalis.**—Common all over the district.
- Planorbis albus.**—Fairly distributed in canals at Weston, Willington, Chellaston near Derby, Little Eaton, &c.
- P. spirorbis.**—I find this abundant in ditches at Little Eaton, Alvaston, near Derby, and at Weston-on-Trent.
- P. vortex.**—Occurs in the same localities and is quite as common.
- P. carinatus.**—Very plentiful in the same localities as *P. spirorbis* and *P. vortex*.
- P. complanatus.**—Certainly the commonest of the genus in this locality ; it is very plentiful in all the ditches in the low-lying country.
- P. corneus.**—This I find fairly plentiful in all the canals ; some specimens attain to a large size.
- P. contortus.**—I find a few specimens at most places ; Weston Canal, Black Pool and ditches, Little Eaton Canal and ditches, Cromford Canal, &c.
- Physa hypnorum.**—As yet I have only found a few specimens, in the canal at Little Eaton.
- P. fontinalis.**—A very common species, and in one ditch at Alvaston, near Derby, it can be seen in thousands and gathered a scoop full at a time ; it also occurs in canals and ditches at Little Eaton, Willington and Weston, Sinfin Brook, &c.
- Limnæa glutinosa.**—Very scarce (as yet) ; only found two specimens in Sinfin Brook, near Derby.

- L. peregra.**—I think I need not say much about this, only that we have plenty of them and some fine ones too.
- L. auricularia.**—Fairly common and very fine at Weston, Chellaston, Little Eaton, and Derby Canals.
- L. stagnalis.**—The same remarks apply as for *L. auricularia*. I have also taken some fine specimens with beautifully reflected lips.
- L. palustris.**—Rather scarce ; I have only found a few specimens at Weston.
- L. truncatula.**—Sparingly distributed ; I have taken it in dried-up horse pond at Wingfield, a semi-aquatic ditch at Chellaston, and near Derby (south side).
- L. glabra.**—Very scarce ; as yet I have only found two specimens from pond in Farnah Hall grounds (near Derby).
- Ancylus fluviatilis.**—Found in all the brooks throughout the district.
- A. lacustris.**—Not very common, but local ; I have taken it in Black Pool at Weston-on-Trent.
- Succinea putris.**—Fairly common in the lower portion of the county ; Weston, in osier bed on canal banks, in some cases quite twenty yards from water side, feeding on willows.
- S. elegans.**—With *S. putris* and equally common.
- Vitrina pellucida.**—Common at Ambergate, Cromford, Lea Hurst (the seat of Miss Nightingale), Millers-dale, Weston, Markeaton, Duffield, &c.
- Zonites cellarius.**—Common enough throughout the district.
- Z. alliarius.**—I find this in most places under damp stones and dead leaves throughout the county.
- Z. glaber.**—In the same localities as *Z. cellarius* and *Z. alliarius*.
- Z. nitidulus.**—Fairly common at Sinfyn, Chellaston, Weston, Little Eaton, and Willington. Lifting up a piece of old bark from a fallen tree a short time ago at Willington, I found many hundreds of these shells congregated there ; they seemed to be from a few months' old to full-grown and mature shells.

- Z. purus.**—I have taken this at Millers-dale, Cromford, Ambergate, Little Eaton, &c.
- Z. radiatulus.**—I have (as yet) only found this in a little cop-pice near the limekiln at Ambergate.
- Z. nitidus.**—To be met with throughout the district, in Ambergate woods particularly.
- Z. excavatus.**—This I have found at Millers-dale, but I am not certain where else.
- Z. crystallinus.**—I think we may call this fairly common, as I have taken it under damp leaves and amongst moss throughout the district.
- Z. fulvus.**—This I have taken at Cromford, Ambergate, Weston, &c.
- Helix aculeata.**—I think this will turn out to be a rather common shell, seeing that I have turned it up in four different places; Matlock, Cromford, Ambergate, and Etwall.
- H. aspersa.**—Not very common in the district; I have only found a few in the direction of Littleover.
- H. nemoralis.**—Pretty common, and occurs all over the district.
- H. hortensis.**—Like *H. nemoralis*, to be met with throughout the district.
- H. arbustorum.**—Throughout the district.
- H. rufescens.**—Not a very common shell, although it occurs in profusion near Belper in an old quarry, the only place where I have met with it.
- H. concinna.**—This species, although such a near relation to the preceding one, is very abundant throughout the whole district.
- H. hispida.**—Pretty fairly distributed; I have met with it at Willington, Breedon, Melbourn, Weston, Derby, Belper, Ambergate, Cromford, Millers-dale, &c.
- H. sericea.**—Not very common, but rather local; it occurs at Ambergate, Little Eaton, Weston, &c.

- H. virgata*.—Confined to one place (as far as I know), near Willington Station, and is probably an importation with ballast when making the line.
- H. caperata*.—I have only found this in one place at Ambergate, although I have searched diligently for it.
- H. ericetorum*.—Rather an uncommon shell, although it is plentiful in the adjoining county of Leicester, and within three miles of the border. I have found a few dead shells near Millers-dale, but never a living one; I have found a few in Dovedale.
- H. rotundata*.—One of our commonest shells; the only difficulty would be where not to find it.
- H. rupestris*.—This small shell is very common everywhere in the Peak district, say from Ambergate to Buxton.
- H. pygmæa*.—To be found in the neighbourhood of Monsal-dale and Millers-dale amongst the damp moss on the hill sides.
- H. pulchella*.—Very plentiful in the same localities as *H. pygmæa*.
- H. lapicida*.—A very abundant species, and occurs all over the Peak district. I found a very strong colony at Ambergate on a sandstone wall—very fine ones and of a very dark colour.
- Bulimus obscurus*.—Rather a common species in the Peak district; about Buxton, Millers-dale, Monsal-dale, and as low down as Ambergate.
- Pupa secale*.—Not very common; but I have found it at Millers-dale, Monsal-dale, and near Haddon Hall.
- P. ringens*.—I have found a few near Buxton, which is the only place (as yet) where I find it.
- P. umbilicata*.—Very abundant from Ambergate to the Peak of Derbyshire, on old walls (not necessarily limestone) and in the crevices of the limestone rocks.
- P. marginata*.—I have found about half-a-dozen on the rocks near Buxton, in company with *P. umbilicata*.

Vertigo edentula.—I found this species near Buxton, and one in the Pavilion Gardens at Buxton.

Balea perversa.—Not common here; I have found it near Haddon Hall in the park under bark of fallen trees, also in the London Road Wharf, Derby, probably brought here with timber.

Clausilia rugosa.—Very plentiful throughout the district.

Cl. laminata.—Not a very common shell by any means, although I often take half-a-dozen or so in an hour's hunt near Millers-dale, also at Monsal-dale and Monks-dale.

Cochlicopa tridens.—I find this shell near Cromford, but not common; also on Sinfyn Moor near Derby.

C. lubrica.—Very common throughout the district.

Achatina acicula.—Although the habits of this little shell are very obscure, it is fairly plentiful in the neighbourhood of Millers-dale and Monsal-dale.

Carychium minimum.—May be found throughout the district. I have taken it at Millers-dale, Monsal-dale, Buxton, Bakewell, Matlock, Cromford, Ambergate, Chellaston, Weston, &c.



The Fluid emitted by *Limnæa stagnalis.*—It is a well known fact to collectors that now and again on taking some of this species rather roughly out of the water a pale bluish or purplish coloured emission from the animal can be seen at the mouth of the shell. It is worth knowing in connection with this—as it gives a suggestion as to the character of this emission—that the hæmolymp of this species contains a respiratory substance in its composition termed Hæmocyanin which consists of copper united with a proteid. Unoxidised hæmocyanin is colorless; oxidised hæmocyanin, on the other hand, is bluish, exactly the color of the emission. It seems to me exceedingly probable that this emission—since no gland can be demonstrated to secrete this fluid, on dissection, as in *Purpura* and *Murex*

(Tyrian purple)—is in reality hæmolymph extruded as the result of some forcible rupture of the tissues on the part of the animal, which on exposure to the air becomes oxidised and consequently of a bluish color due to the hæmocyanin it contains. Of course, it would be exceedingly difficult to demonstrate any such rupture in the tissues, but it certainly bears the face of probability. It is interesting to note also that this hæmocyanin exists also in the hæmolymph of *Helix pomatia*, *H. aspersa* and *Paludina vivipara* and that it seems to function as the hæmoglobin in the plasma of the hæmolymph of *Planorbis*. Mac Munn ("Chromatology of Blood of some Invertebrates," *Quart. Journ. of Micros. Science*, 1885) finds no absorption bands in the hæmocyanin of the hæmolymph of these species.—
J. W. WILLIAMS.



ON THE VARIETIES OF OUR BANDED SNAILS,
ESPECIALLY THOSE OF *HELIX CAPERATA* MONT.

BY REV. S. SPENCER PEARCE, B.A.

(Read before the Conchological Society, June 5th).

AMONG the many questions that await solution at our hands, none would be more full of interest than that which would help us to elucidate the purpose and meaning of the infinite variety of markings and colouring, or the manifold differences in size and shape occurring in the shells of such molluscs as *Helix virgata*, *Helix caperata*, *Helix ericetorum*, and *Bulimus acutus*. The endless diversity shewn in the varieties of these shells is obvious to the most casual observer. There is no doubt that, if we could interpret aright these variations in shape, size, or markings, they would make clear to us very much which is now dark and inexplicable in the life histories of these species. For the conchologist, like all other enquirers into nature,

believes a signification to belong to every variation: to use the words of another, we believe that 'there is not a line, nor a spot, nor a colour for which there is not a reason, which has not a purpose or a meaning in the economy of nature.'*

I have gathered together from various localities a good deal of material in the shape of collections of *Helix virgata*, *Helix caperata*, *Helix ericetorum*, and *Bulimus acutus*, together with their numerous varieties, and noted at the time any points connected with any finds that needed to be remembered, as for instance: the surroundings of the molluscs' habitat; the proportions in which the different species and varieties were associated together.

Helix caperata is the easiest of the species to deal with, because its variations in form and markings are simpler and less puzzling than is the case with our other banded snails; and further, the markings of *Helix caperata* offer us, as I hope to show, with a line of interpretation which, seemingly, may explain the phenomena presented to us in the markings of *Helix virgata*, and perhaps too, of *Helix ericetorum* and *Bulimus acutus*. Primarily, therefore, this paper has to do only with *Helix caperata*.

Helix caperata we find to present to our notice variations which fall under the three usual headings:—*Variations of Size, of Markings or Colouring, of Form or Shape*. The variations in colour or markings will concern us more especially in this paper, but not so as to exclude our noticing first of all the other two classes of variation:—those of Size and those of Form.

With regard to the *Variations in Size*, we have as the extreme of largeness the var. *major* (Jeffreys' B.C. Vol. I. p 214), while the extreme towards smallness, which as yet has not been named, would have to be characterized as a var. *minor*. I think we may venture to suggest the causes which have given rise to these variations. Judging from the fact that the larger forms

* Sir Jno. Lubbock.

of *Helix caperata*, and also those of *Helix virgata* are found on arable ground, especially in the borders of cultivated fields in limestone districts, size would seem to depend only on the combined presence both of an abundance of food-plants such as are supplied in the cultivated field, with a calcareous soil. Proper herbage apart from the calcareous earth, and vice versa, the calcareous soil without the richer food-plants will not suffice to increase the shells in size. The two conditions must be united and then a consequent largeness seems to result, at any rate the largest individuals of both *Helix caperata* and of *Helix virgata* in my collection came from the borders of cultivated fields on a chalk soil, in the county of Sussex; while on the open down close by, in the sand neighbourhood where there is an absence of the richer herbage found in the tilled fields, though the chalk formation may be identically the same, only shells of the usual or smaller size can be gathered.

In the next place, with regard to that more important *Variation in Form or Shape*, *Helix caperata* exhibits only *two lines of divergence*, either we find that the shell is a compact and close one with a somewhat raised spire—(we have an extreme embodiment of this variation in the var. *subscalaris* of Jeffreys' in B.C. Vol. I. p. 214),—or else, instead of the compact shell, we have a looser shell with a flattened spire and a wider umbilicus like to Jeffreys' var. 4 *Gigaxii*.

It is to be noticed that whilst we find the latter of these two distinct forms in the borders of fields, and especially in clover fields, the other more compact variety seems to keep entirely to the open downs and pastures and uncultivated places, like sand-hills, etc., where it is so frequently associated with *Helix virgata*. Perhaps it is in these different habitats that we discover the explanation of how these two distinct forms of *Helix caperata* have come into existence. In the tilled fields where we always find the variety with the less compact shell like the var. *Gigaxii*, the flatter shell is of more use, enabling the snail the better to crawl about with house low down upon

the soil, close under the radical leaves or matted weeds which only too often are found on arable lands, and so it lives out a slow sluggish life, rarely, if ever seeking to climb up higher by any neighbouring stalk or stem.

But while a flattish loose shell with a somewhat depressed spire is an advantage to *Helix caperata* in the cultivated field, such a shaped shell would manifestly be a hindrance to the same species living on the turf or thick grass of our open downs, heaths, and sheep pastures. On the turf and grass of such localities a more compact, smaller, and so handier shell is required in order that the animal may the more easily and actively manœuvre up and down, in and out, and among the many blades and stems of grass, which otherwise, of course, would prove insurmountable impediments to successful progress from one feeding place to another. This latter variety of *Helix caperata*, belonging to the open down, indulges in climbs up the stalks and stems of grass like its oft companion *Helix virgata*; indeed it has acquired a greater activity of movement all round compared with its more sluggish relative of the cultivated field.

We now come to consider what is much more difficult to speak of:—*The Variations in Colouring, Marking, Banding, and Mottling*, as found upon the shells of *Helix caperata* and other kindred species.

In *Helix caperata* the variation in this respect seems on the whole capable of a twofold division:—(1) Those in which the markings are mottlings. (2) Those in which the markings take the shape of dark or black spiral bands or lines on a lighter ground, as with the bandings in the usual form of *Helix virgata*.

With regard to the first—By ‘mottlings’ one would wish to signify those blotches of different colour, size, and form which are scattered over the surface of the shell. These mottled forms differ among themselves very considerably. Sometimes the darker blotches run together, and diffusing over the whole shell, give it a uniformly brown appearance; these we have in the variety *fulva*; or else the dark blotches tend together

to form a more or less regular arrangement, which, carried a little further would be incipient spiral banding ; in other cases the different points of colouring keep distinct from each other, and present that speckled appearance or pepper-and-salt look we are so familiar with on the shell in the majority of cases ; but very often (and chiefly this is the case with the flatter form of the *Helix caperata* found only on the arable lands) the mottlings and markings tend to disappear entirely, or remain only in a faint and broken way, and thus not infrequently the result is an unicolourous creamy or brownish white shell, very much in harmony with the tone of the earth on which the snail lives.

But, in addition to the numerous variations in the mottled form, we have also (2) the variety which, being entirely without mottlings or any such thing, concentrates all its markings in one or more bands of dark or blackish shade, which run spirally on a whitish shell, the usual arrangement of the bands on the last whorl being one above and four if present below the periphery.

This banded form is *the variety ornata* in Dr. Jeffreys' work (B.C., p. 214), and is worthy of its name, offering a sufficiently striking contrast to the more common mottled forms.

But yet, though the two extreme variations: the var. *ornata* and the mottled form, shew this great contrast, it is to be remembered that we cannot draw any abrupt dividing line between them. There exist innumerable links which connect together the two extreme forms. In many a mottled individual we find the distinctive bands of the var. *ornata* appearing, sometimes so manifestly that we hesitate as to which variety we shall say it really belongs ; and then many an *ornata* has the bands so broken up, or blurred and diffused, that we cannot but see therein an early step made from the strictly mottled form towards the banded variety.

The variety *ornata* varies in size, but in form affects the compactly built shell, with a somewhat raised spire, and, as might be inferred from what we have already said on this

shape of shell in this particular species, it is found on the turf and grass of our downs, heaths, and sheep pastures.

And how is it possible to attempt to answer the question as to the cause of these various markings and bandings in *Helix caperata*? How, for instance, may we seek to explain the association together on our downs of two varieties with such distinct markings as those of the variety *ornata* and the mottled forms we have just referred to? If the markings mean anything we cannot but suppose that there is an advantage in the one class of marking over the other which meets some special circumstance or need in the life of the mollusc.

Now I have been brought gradually to think that the sheep that browse on our open downs and pastures have been the chief, if not the sole, means by which the variety has been evolved from the mottled form. One was first led to consider this a probability from noticing that the var. *ornata* is practically restricted to localities where sheep are pastured with frequency; while in the localities where sheep never feed—such as sand-hills by the sea, or rocky broken ground, and other places impracticable as sheep-pastures—the mottled variation is seen to be universal, though just now and then, very unfrequently, one or two individuals of the variety *ornata* may turn up, as if to remind us that there is such a variety in existence.

To briefly put into a tabular form the sum of our evidence gathered together in support of the above proposition, we find the proportion in which the two varieties of *Helix caperata* occur in sheep pastures is as under:—

PLACE.	VAR. <i>ornata</i> .	MOTTLED VAR.
Isle of Wight Downs, Sept., 1887 ...	27. ...	14.
Cow Gap, Eastbourne, Jan. 1888 ...	49. ...	100.
Ditto Sept., 1888 ...	33. ...	18.
Beachy Head, near Eastbourne, } Aug., 1888 }	26. ...	27.
TOTALS ...	<u>135.</u>	<u>159.</u>

But in the places which have not been used as sheep-pastures the numbers prove very different:—

PLACE.	VAR. <i>ornata</i> .	MOTTLED VAR.
Burnham and Berrow Sand-hills, } Somerset, Oct., 1888 } ...	1. ...	66.
Isle of Wight Downs, Sept., 1887 ...	5. ...	85.
South Devon, near Torquay, } Aug., 1888 }	4. ...	14.
	0. ...	27.
TOTALS ...	10.	192.

Thus in the pastures, though there are always a large number of the mottled form of *Helix caperata*, at the same time the var. *ornata* always proves nearly as numerous, at times more so than the mottled form. Whereas in localities where there is no sheep-feeding the var. *ornata* all but entirely disappears, and the mottled forms are exclusively found.

If, then, we conclude that the variety *ornata* is practically restricted in this way to sheep-pastures, we seek further to know how sheep can have in any way aided in the production of this so conspicuous a variety of *Helix caperata* on their feeding grounds.

There is only one way by which it is conceivable that sheep can unknowingly effect any result. Remembering the great abundance of *Helix caperata* on the turf of our downs, and that the sheep, as they browse in solid compact flocks of several hundreds, in cropping the grass they must, of necessity, eat many and many an unseen snail, shell and all, whether of *Helix caperata* or *Helix virgata*.

That the sheep in feeding devour many a snail with the grass is a fact, and not a merely wide-spread popular fancy, anyone can satisfy himself if he trouble to watch the flocks of sheep pasturing, for instance, on the south downs. The animals when feeding move onwards from down to down in solid phalanxes, the head of one sheep close by the head of its neighbour, cropping closely the blades of grass whereon the snail with its compactly formed shell lives and moves and has so much of its being.

But, now, inasmuch as the sheep would find the shells eaten, even when ground down small by the action of their molars, but an unpleasant addition to their ordinary food, the shells if only seen in time would be avoided and rejected. Hence the result that only the inconspicuous or mottled forms would be consumed with the grass; the more easily detected variety *ornata*, with its black banding and its white shell, would escape, because perceived by the sheep as it fed, and so avoided. Thus the white and banded shell, or the shell with a tendency towards this banded and white form, is, under the circumstances of the sheep pasture, an advantage to these varieties of *Helix caperata*. And the var. *ornata* on the sheep pasture must tend to increase, and the inconspicuous mottled form, which is liable to be eaten by the sheep, to decrease.

For we have learnt from the author of the 'Origin of Species' that any variation (like this, towards dark banding on a whitish shell) however slight and from whatever cause proceeding, if it be in any degree profitable to the individuals of a species in their relations to other organic beings and to their physical conditions of life, will tend to the preservation of such individuals, and will be generally inherited by the offspring. ('Origin of Species,' chap. ii, p. 49).

So has been the history, we may perhaps believe, of the variety *ornata*. That slightest tendency in some of the mottled forms to make bands gave those particular individuals an advantage over the run of the ordinary mottled forms in the struggle to live on the same pastures where sheep customarily come to feed. This variation towards the variety *ornata*, which from its conspicuousness was safe from the sheep's mouth, tended to increase in numbers, so that after a lapse of time we can understand how it is we now find on the well-used pastures of the downs the variety *ornata* so plentiful; but on the sand-hills and such like spots which sheep do not frequent it is entirely absent or only occurs very scantily.

Now, it becomes evident that any interest attaching to what has been suggested as an interpretation of the markings of *Helix caperata* and its varieties is much increased and widened, if we think that it may be applied, perhaps, to explain as well the marking and bandings of other and kindred species.

We have opened up to us a further field for investigation, if we would seek to discover whether the bandings of the typical form of *Helix virgata*, *Helix ericetorum*, and of the variety *bizona* of *Bulimus acutus* are to be attributed to the feeding of sheep in the pastures, where these mollusca occur; to say nothing of the bandings of the kindred continental forms like *Helix neglecta*, *Helix variabilis*, *Helix pyramidata*, *Helix candidula*, *Helix cespitum*, etc. These continental species seem to vary in the same way as our English banded forms, and therefore we may infer, have the same cause or causes tending to make them so to vary.

To revert, in conclusion, to our species, *Helix caperata*, which, with its varieties, has occupied our attention so far, we can imagine that the development which the colouring and marking have passed through represent to us a gradual change, through mottled forms, from an original form which had a uniformly brown shell, which tends, owing to the surroundings of an arid, open, and sunny habitat, to a uniform whitish or white shell, which we know is the prevailing characteristic colour of species living in dry and sunburnt countries.

The variety *ornata* being really an aside form, so to speak, prominent only on the sheep pastures, arises from the causes previously explained. Thus, to bring out the serial connection between the forms, in accordance with the above hypothesis, we may put all the variations into the following table of arrangement:—

(1) Form with uniformly brown shell, now represented perhaps by the variety *fulva* which is probably a reversion from No. 2 or No. 3.

(2) Form in which paler shades appear on brown shell.

(3) Form in which pale and dark shades or mottlings are equally balanced—*Ordinary mottled form*.

(4) Form in which dark mottlings are fast disappearing.

(5) Form with an uniformly pale whitish shell without any mottlings—var. *albicaus*.

Forms in which mottlings tending to form bands, have been perpetuated by sheep on pasture lands—var. *ornata*.

Form in which the dark band or bands of var. *ornata* are lost until a shell similar to var. *albicaus* is arrived at.

N.B.—Those rare forms in which the dark mottlings or banding are replaced by transparent markings, may be explained by the failure of the animal material, which is the basis of the dark colouring matter in the shell. It is possible for any of the above forms to show translucent characteristics.

The evidence as to the proportion in which the varieties of *H. caperata* occur in the sheep pastures and in other localities, given only summarily in the body of this paper, we here append in detail.

In September, 1887, on the chalk downs between Freshwater and the Needles Point, Isle of Wight, I gathered material which first suggested the fact that the variety *ornata* was restricted to places where sheep pastured. From seven squares of three feet each, measured out, but at different points on the above downs, where sheep frequently pastured, I collected the two varieties of *Helix caperata* in the following proportions:—

27 individuals of the var. *ornata*, to
14 " " " mottled form.

Quite at the extremity of the down at the Needles Point, where the down surface has become rubbly and loose, and so is not suitable for sheep pasturing, the two varieties of *Helix caperata* occurred in an exactly reverse proportion:—

4 individuals of the var. *ornata*, to
14 " " " mottled form.

Next, to take the evidence afforded by some frequently used sheep pastures, which lie between Eastbourne and Beachy Head, on the Sussex coast. These pastures, locally known as Cow Gap, are in reality a turf-covered gap or break of about three-quarters of a mile in length, in the otherwise continuous line of chalk cliff. The gap has been caused, in long time past, by a landslip, in which the super-incumbent chalk strata have slipt down over the worn upper greensand formation, which forms the basement of the cliff at this point. This locality is a distinctly favourite sheep-pasturing place, and since it lies open to the sea facing the S.S.E., it is always warmer than other neighbouring parts of the down, and the snails appear to hibernate much later here than elsewhere.

In January of the present year (1888) from eight squares of three feet each, I took the varieties of *Helix caperata* in the following proportions :—

49 individuals of the var. *ornata*, to
100 „ „ „ mottled form.

The above, I may add, were associated with 372 typical marked individuals of *Helix virgata* and a few *Helix ericetorum*.

Visiting this locality again in September last, I collected in the proportion of

33 individuals of the var. *ornata*, to
18 „ „ „ mottled form.

Again, on the slope of the down just under the Coast-guard Station, at Beachy Head, where there were evidences of sheep pasturing, there were gathered by me :—

26 individuals of the var. *ornata*, to
27 „ „ „ mottled form.

Typical *Helix virgata* and *Helix ericetorum* being taken at the same time.

I give now the figures relating to localities not used as sheep pastures. On the 22nd and 27th of October, I visited the sand hills on the Somersetshire coast near Burnham, already known as the habitat of some singular varieties of *Helix virgata*.

On the sand-hills which lie between Burnham and the mouth of the river Brue, the proportion in which the varieties of *H. caperata* occurred was :—

5 individuals of the var. *ornata*, to
85 „ „ „ „ mottled form.

With them were associated *Helix virgata* and *Bulimus acutus*.

On the other side of Burnham, northwards to Berrow Church, the sand-hills yielded an even more striking proportion between the two varieties :—

1 individual of the var. *ornata*, to
66 „ „ „ „ mottled form.

Among the eighty-five and sixty-six mottled forms just mentioned, thirty-two and one, respectively, of them are of the variety *fulva*, having a unicolourous dark brown hue, which makes them appear very different to the ordinary mottled forms. But I have classed them thus, since the uniformity of dark colouring has evidently come about from the expansion and running together of the darker blotches, till the whole shell has become suffused. In the variety *nigrescens* of *Helix virgata*, we are presented with an analogous case.

Though I have no evidence to the point, it would not be much of a surprise to me should we find out, eventually, that both these dark varieties, the var. *fulva* of *Helix caperata* and var. *nigrescens* of *Helix virgata*, are really reversions, backwards, from mottled forms to some ancestral form with a wholly brown shell. The casual manner and out-of-the-way localities in which both these varieties turn up, would seem perhaps, to point to this conclusion.

Localities for the (a) var. *fulva* of *Helix caperata* and (b) var. *nigrescens* of *Helix virgata*.

(a) On chalk down (bleak and barren) in Firle Beacon, Sussex, 1881. On sand-hills near Burnham, Somersetshire, 1888. A very near approach to this var. from Shaldon, near Teignmouth, South Devonshire, 1888.

(b) On very edge of cliff near Beachy Head, Sussex, 1888. Berry Head, South Devonshire, 1888. Single individual at Needles Point, Isle of Wight, 1887; on edge of cliff near Beacon Hill Freshwater, (Mr. Ashford see *Journal of Conchology*.) On sand-hills, near Berrow church and in church-yard, Somersetshire, 1888.

A few scattered gatherings made during August, 1888, in the South of Devonshire, in localities which, as far as I could see, are not sheep pastures:—viz.: amongst stones and herbage on blown sand on the coast west of Paignton, also near Babbicombe Bay: and the grass within the west Fort of Berry Head, yielded no variety *ornata* at all, but twenty-seven individuals of the mottled form.

Putting all that we have written into tabular form we find then, that the proportion in which the two varieties of *Helix caperata* occur in sheep pastures is as under:—

PLACE.	VAR. <i>ornata</i> .	MOTTLED FORM.
Isle of Wight downs, Sept., 1887	... 27.	... 14.
Cow Gap, Eastbourne, Jan., 1888	... 49.	... 100.
Ditto. Sept., 1888	... 33.	... 18.
Beachy Head, Aug., 1888	... 26.	... 27.
TOTAL	... 135.	... 159.

But in the places which have not been used as sheep pastures, the numbers prove very different:—

PLACE.	VAR. <i>ornata</i> .	MOTTLED FORM.
Burnham and Berrow sand-hills, {	... 1.	... 66.
Oct., 1888 }	... 5.	... 85.
Isle of Wight downs, Sept., 1887	... 4.	... 14.
South Devon localities, Aug., 1888	... 0.	... 27.
TOTAL	... 10.	... 192.

ERRATUM.

On page 125 (No. 3, Vol. vi.), in the 13th line from top of page:—"In the *sand* neighbourhood," should read "in the *same* neighbourhood."

THE LAND AND FRESHWATER MOLLUSCA
OF SOUTH DEVON.

BY ERNEST D. MARQUAND, M.A.

AMONG the county lists published in the last two volumes of this Journal there is none for South Devon; and, therefore, I am induced to send one as a commencement, although it is obviously very deficient, notably in the slugs and larger bivalves. To many persons it is much more gratifying to add to an existing list than to compile an entirely new one, so that I feel sure the present contribution will soon be materially extended by those who have a wider knowledge of the mollusca of this district. All the species and varieties now enumerated were collected by me at odd times during 1886 and 1887. In order to ascertain roughly the relative frequency of *Helix nemoralis* and *H. hortensis* in my own neighbourhood, viz., the village of Alphington, a mile or two south of Exeter, I collected indiscriminately during the early summer of the latter year about two hundred and fifty full-grown living specimens, taken at random during various rambles in different directions. Subsequent classification showed the following proportion:—*Helix nemoralis*, 36 per cent.; *H. hortensis*, 64 per cent. Of the *nemoralis* batch very nearly one-half consisted of the form *rubella* 00300, some of the specimens having the band broad. The next commonest form was *castanea* 00000. The var. *libellula* was represented by only a single example, 00300. The prevailing variety of *H. hortensis* was the bandless *lutea*, with its sub-varieties *minor*, *subalbida*, and *roseolabiata*. These composed exactly two-thirds of the lot; the next most frequent form being *lutea* 12345, which composed one-sixth.

With the exception of the larger towns—Plymouth, Torquay, Ashburton, and Kingsbridge, and the picturesque village of Ivybridge—all the places mentioned in the list are situated

within a few miles of Exeter. It is interesting to note the occurrence of *H. cantiana* so far west as Tamerton Folliott, a village four miles beyond Plymouth, on the very borders of Cornwall, in fact.

Sphærium corneum L.—Exminster marshes. River Exe, below Exeter.

S. lacustre Mull.—Exminster marshes.

Pisidium fontinale Mull.—Exminster marshes.

Paludina vivipara L.—Exeter canal, abundant; much eroded and encrusted.

Bythinia tentaculata L. and var. *producta* Menke.—Exminster marshes. Ditches near the Exeter canal. St. Mary's Clyst.

Planorbis albus Mull.—St. Mary's Clyst. Exminster marshes.

P. vortex L.—St. Mary's Clyst. Exminster marshes.

P. complanatus L.—Exminster marshes.

P. contortus L.—Exminster marshes. St. Mary's Clyst.

Physa fontinalis L.—Not common. Exminster marshes. St. Mary's Clyst.

Limnæa peregra, and var. *curta*.—Common. Exminster marshes.

L. peregra var. *ovata* Drap.—Ide.

L. peregra var. *labiosa* Jeff.—St. Mary's Clyst.

L. auricularia L.—Exeter canal and river Exe near Exeter.

L. palustris var. *elongata* Moq.—Rare. Exeter canal. Exminster marshes.

L. palustris var. *conica* Jeff.—Exeter canal.

L. truncatula Mull.—Ide. Exwick. Alphington stream.

L. truncatula var. *minor*.—Banks of the Exe, under Countess Weir Bridge.

L. truncatula var. (with purple bands), Shillingford; one specimen.

Ancylus fluviatilis Mull.—Ide.

A. lacustris L.—St. Mary's Clyst.

- Succinea putris** L.—Banks of the Exe. St. Mary's Clyst.
Exminster marshes.
- S. elegans** Risso.—Exminster marshes.
- Vitrina pellucida** Müll. and var. **depressiuscula**.—Haldon
and Stoke woods; frequent.
- Zonites cellarius** Müll.—Alphington. Kenn. Stoke woods.
- Z. Draparnaldi**.—Holbeton near Ermington (Ivybridge);
one specimen.
- Z. alliarius** Mill.—Alphington. Haldon.
- Z. glaber** Stud.—Stoke woods.
- Z. nitidulus** Drap. — Alphington. Ide. Haldon.
- Z. nitidulus** var. **nitens**.—Matford and Alphington.
- Z. purus** Ald. and var. **margaritacea**.—Haldon and Stoke
woods.
- Z. excavatus** var. **vitrina** Fer.—Plentiful in one spot in the
Erme woods, Ivybridge.
- Z. crystallinus** Müll.—Haldon and Stoke woods.
- Z. crystallinus** var. **contracta** Cless.—Haldon and Stoke
woods.
- Z. fulvus** Müll.—Haldon and Stoke woods.
- Helix aculeata** Müll. — Occasional among dead leaves.
Kingsbridge. Haldon and Stoke woods.
- H. aspersa** Müll.—Common. In May, 1886, I found at
Ashburton a very perfect living specimen of the reversed
form *sinistrorsum*.
- H. aspersa** var. **minor** Moq.—Alphington. Kingsbridge.
- H. aspersa** var. **unicolor** Moq.—Matford.
- H. aspersa** var. **grisea** Moq.—Ashburton; two specimens.
- H. nemoralis** var. **minor** Moq. — Frequent at Ivybridge.
Near Alphington.
- H. nemoralis** var. **bimarginata** Moq.—Near Exeter, one
specimens.
- H. nemoralis** var. **libellula** Ris.—Alphington; one specimen.
- H. nemoralis** var. **rubella** Moq.—Very common near Exeter.
- H. nemoralis** var. **castanea** Moq.—Common about Exeter.

- H. nemoralis* var. *carnea*.—Occasional.
- H. nemoralis* var. *conoidea*.—Alphington; one specimen.
- H. hortensis* Müll.—Frequent.
- H. hortensis* var. *minor* Moq.—Frequent. Alphington.
- H. hortensis* var. *lutea* Moq.—Common. Alphington.
- H. hortensis* var. *incarnata* Moq. — Alphington; two specimens.
- H. hortensis* var. *olivacea-roseolabiata*.—Frequent.
- H. hortensis* var. *arenicola* Macg.—Alphington; one specimen, scarcely typical.
- H. arbustorum* L.—Rather common about Exeter.
- H. arbustorum* var. *major* Pfr.—Alphington; one specimen.
- H. cantiana* Mont.—Rare, and very local about Exeter. Tamerton Folliott, near Plymouth.
- H. cantiana* var. *albida* Tayl.—Sparingly in a hedge at Topsham.
- H. rufescens* Penn.—Ivybridge. Torquay. I have not seen this species about Exeter.
- H. rufescens* var. *alba* Moq.—Kingsbridge.
- H. concinna* Jeff.—Alphington. Haldon.
- H. hispida* L.—Alphington. Matford Bottoms. Stoke woods.
- H. fusca* Mont.—Local. Frequent in a hedge at Haldon.
- H. virgata* Da Costa and var. *albicans* Grat., are probably the most abundant of all the *Helices* about Exeter.
- H. virgata* var. *leucozona* Tayl.—St. George's Clyst, near Exeter.
- H. caperata* Mont.—Generally distributed. St. George's Clyst.
- H. caperata* var. *major* Jeff.—Dunchidioc; one specimen.
- H. caperata* var. *lutescens*.—Peamore Park, near Exeter.
- H. rotundata* Mull.—Haldon; Common.
- H. rupestris* Drap.—Ivybridge. Torquay.
- H. pygmæa* Drap.—Frequent among dead leaves. Haldon and Stoke woods.
- H. lapicida* L.—Plentiful in one or two spots at Ashburton.

Bulimus acutus var. *alba* Req. and var. *elongata*.—
Charleston, near Kingsbridge.

B. acutus var. *strigata* Menke.—Also at Charleston.

B. obscurus Mull.—Ivybridge; two specimens.

Pupa umbilicata Drap.—Kennford and Stoke woods, rare;
more common at Ivybridge and Kingsbridge.

Vertigo edentula Drap.—Haldon woods; a single specimen
only has occurred to me.

Balea perversa L.—Mossy walls at Haldon and Matford;
rare. Common on tree-trunks in a wood at Kingsbridge.

Clausilia rugosa Drap.—Common. Haldon.

C. rugosa var. *tumidula* Jeff.—Ivybridge.

C. rugosa var. *gracilior* Jeff.—Tamerton Folliott, near
Plymouth.

Cochlicopa lubrica Mull.—Alphington. Haldon. Matford.

Carychium minimum Mull.—Haldon; Common.



ON HYDROBLÆ AND ASSIMINEÆ FROM THE THAMES VALLEY.

By J. T. MARSHALL.

VARIOUS correspondents during the last few years have sent me, as *Hydrobia similis*, a variety of *H. ventrosa* which is Jeffreys' var. *ovata*, and is defined by him as "having a much shorter spire, consisting of only four whorls, which are more swollen than usual, and the last considerably exceeds one-half the shell." I believe this variety has been considerably distributed among collectors as *H. similis*, and I will therefore point out the chief differences between the two. *H. similis* is but half the length, much more tumid, thinner and paler, has a pronounced umbilicus and a deep suture, with turreted whorls; the operculæ, however, are almost identical. It occurs in ditches occasionally overflowed by the Thames, and is strictly local and confined to certain narrow limits, but is not uncommon where found. *H. ventrosa* var. *ovata* is the prevalent form on the Plumstead marshes, and

occurs in great numbers. There is no published figure of it, but it stands in the same relation to *H. similis* as *Paludina vivipara* does to *P. contecta*. Both Sowerby's and Jeffreys' figures of *H. similis* are excellent, but the dimensions given by the latter are too large by one-third, and his generic figures in Vol. I. of 'British Conchology' are not so reliable. When the foregoing was published in 1862 its recorded habitat was "the side of the Thames from Greenwich to below Woolwich." In 1875, I found it had migrated down the river at least ten miles, and extended onwards to Tilbury. The Rev. J. W. Horsley, of Woolwich, has been trying my old collecting ground, but cannot find the species without going two or three miles further down the river to Erith, so that it still appears to be migrating. A clear white form that occurs with it I have named var. *caudida*. There is also a form of *H. ventrosa* which I propose naming var. *carinata*, described as follows:—Shell of the var. *ovata* form, having a sharply defined line encircling each whorl, nearly in the centre. This line is not really part of the shell, but of the epidermis, which is pinched up into a sharp ridge with a ragged edge. Young shells also have this ridge, but as they grow it wears off and appears in the adult specimen on the last two or, sometimes, three whorls only. It appears much more conspicuous on some specimens than on others, for as the animal grows old this ridge wears down and becomes obscure through wear and tear. This variety is not uncommon, and occurs with the type.

Assimineæ grayana, I would add, is also migrating down-riverwards. Many years ago it was found abundantly in the Greenwich Marshes, but when Dr. Jeffreys in 1868 wanted fresh specimens for the purpose of illustrating his fifth volume, he could find only two specimens after a most diligent search, assisted by myself, and his recorded habitat in that volume was: "Banks of the Thames, between Greenwich and a little below Gravesend, making altogether a distance of about twenty miles," but a note in my interleaved copy, written in 1872, says: "This

habitat, which was correct twenty years ago, has undergone some change in the interval. At that time Clark and Barlee found it in myriads between Greenwich and Charlton, but at the present time neither Mr. Jeffreys nor myself can find it there. We have, however, found it in countless thousands at Abbey Wood and Erith, on the raised banks of the Thames, which now seems its nearest locality to London, so that they appear to have migrated for a distance of about ten miles." As Mr. Horsley has been searching for this species also at the latter stations without success, it must have migrated further still, if the Sewage Outfall Works of recent years has not altogether exterminated it.

Sevenoaks, Torquay.

NOTES ON BRITISH *HYDROBIÆ* WITH A
DESCRIPTION OF A SUPPOSED NEW SPECIES.

BY EDGAR A. SMITH, F.Z.S.

A few weeks ago Mr. A. J. Jenkins submitted to me for determination some specimens of *Hydrobia* which he had collected at Plumstead and which he was unable to identify satisfactorily with any of the British species as they are usually understood by English conchologists and as described and figured by Jeffreys in his 'British Conchology.' At the commencement of 1889 similar specimens were sent me by Mr. W. Crouch who found them inhabiting ditches at Beeton near North Woolwich.

After careful consideration I have arrived at the conclusion that they must belong to a distinct species for which I propose the name *H. jenkinsi*. In order to ascertain if it was known as a continental species* I sent specimens to Dr. Boettger, of

* It is quite impossible to identify these small species from description and figures. Between two and three hundred forms from Europe alone under the various names of *Hydrobia*, *Paludinella*, *Amnicola*, *Bythinella*, *Peringia*, *Belgrandia*, &c., &c., have already been described.

Frankfort. He informed me that he did not recognise it, and that the most nearly allied species with which he was acquainted was *H. legrandiana* of Brazier from Tasmania.

Through the liberality of Lieut. Beddome, the British Museum possesses a series of eighteen specimens of this species from near Hobart Town and Launceston. Although very closely resembling the Plumstead species I think they may be regarded as distinct. *H. jenkinsi* attains larger dimensions and the relative proportions of the spire to the body-whorl is different. Mr. Marshall, of Torquay, has also had examples of this same Plumstead shell sent him by various correspondents and he has very kindly allowed me to see his notes upon them which precede this paper. He is of opinion that they belong to Jeffreys' var. *ovata* of *H. ventrosa*. As I have come to a different conclusion I thought it advisable that our opinions should appear side by side, so that the probable correctness of either might be the better estimated. Since sending the first batch of specimens, Mr. Jenkins has been good enough to obtain for me living examples of *H. similis*, *H. ventrosa* from Erith, and also the Plumstead form under discussion, and Mr. Crouch, braving the wretchedness of a cold, damp, foggy Sunday morning, procured living specimens of the last-mentioned from the ditches at Beeton.

I kept all of these alive for some time and was able to make drawings and prepare descriptions of their external features. I may state at once that the appearance and habits of the animal of the Plumstead-Beeton variety are perfectly different from those of *H. ventrosa* and it certainly is not a variety of that species. Jeffreys never could have seen the living animal or he would not have considered it a variety of that species. It much more nearly resembles *H. similis* as regards the animal, but is not absolutely the same, and conchologically the two forms are certainly distinct.

The only description of the animal of *H. ventrosa* which I have been able to discover is that given by Jeffreys (Brit. Conch. vol. i, p. 66). It is as follows:—"Body dark grey, almost black

in front ; *head* rather protuberant ; *snout* long and ridged transversely ; *tentacles* filiform, with black and grey rings ; *eyes* on very short stalks, placed a little behind the outer base of the tentacles ; *foot* cleft in front and rounded behind."

This description does not suit the specimens from Erith which I have observed. They were pale grey all over, excepting a slight blackish colour on the sides of the body and on the head in front of the tentacles ; *head* scarcely protruded beyond the anterior margin of the aperture of the shell, finely annulated ; *tentacles* slender, only slightly tapering, not pointed at the tips, uniformly pale, not ringed ; *eyes* black, scarcely raised on protuberances, situated at the outer bases of the tentacles ; *foot* small, short, produced on each side in front, almost forming falcate corners, rounded posteriorly, sole pale, transparent, with a stripe down each side consisting of numerous aggregated whitey-brown specks.

Contrasting this description with that given by Jeffreys a few differences are noticeable. When crawling the specimens which I have observed protruded the proboscis only a very little beyond the shell, and it certainly could not be described as "rather protuberant," nor should I consider the snout "long." I could find no "black and grey rings" on any of the tentacles, and the eyes appeared almost sessile and *not* "on very short stalks."

My notes on the animal of *H. similis* are as follows:—*Foot* pale, produced on each side in front, rounded behind ; *head* and *proboscis* blackish above, finely ringed transversely, considerably protruded beyond the shell ; *tentacles** slender, finely tapering, semi-transparent ; *eyes* on slight cream-coloured prominences or swellings. The latter feature is also noted by Forbes and Hanley in their description of this species.

The animal of *H. jenkinsi* appears to be remarkably similar to that of *H. similis* both in external appearance and habit. The

* The tentacles of all the three species exhibited microscopic lateral processes in a greater or less degree. These may be "vibratile cilia" as described by Jeffreys in connection with *H. ulva*, or "vibrillæ" mentioned by Haldeman (Freshw. Univ. Moll., U. S., Turbidæ p. 6).

tentacles may, however, be just a trifle longer and more slender and the eyes are on *dark-coloured* instead of *pale* prominences.

The animal of both forms have the habit of keeping the tentacles continually moving about very actively, whilst on the contrary, *H. ventrosa* keeps them much more quiescent. The tentacles of both are also longer, more tapering and finer at the points than those of *H. ventrosa*. The latter has the habit of swimming inverted at the surface of the water, a position scarcely ever (as far as I have seen) assumed by *H. similis* or *H. jenkinsi*. They seem to prefer crawling. The distinction between *H. jenkinsi* and the two other species may thus be summarized :— It differs from *H. ventrosa* (1) in habit, (2) length and form of tentacles, (3) colour of the foot and head, and (4) in the greater size and more robust form of the shells. Of the latter, some have simple rounded whorls, others exhibit more or less of an epidermal carination towards the upper part of them (var. *carinata* of Marshall).

From *H. similis* it differs (1) in its greater length, higher spire, (2) less pronounced or unchannelled suture, (3) slighter umbilical chink, (4) its tentacles are perhaps the least trifle longer, and (5) the eyes are set on blackish instead of pale swellings.

The name of *Annicola confusa* has been given by Frauenfeld * to the shell which English conchologists usually regard as the *Hydrobia similis* (Draparnaud). He states that he has examined the original example of Draparnaud's *Cylostoma simile* in the Imperial Museum at Vienna and finds that it belongs to *Bithynia*, having the concentric operculum of that genus.

As I see no just reason for doubting the correctness of Frauenfeld's statement, it appears to me that we are no longer justified in retaining the name of *similis* for this British species, but must employ that suggested by Frauenfeld, as has already been done by Paladilhe. †

* Verhandl. Zool. Botan. Gesell. Wien., vol. xii, p. 1150; vol. xiii, p. 1029; vol. xiv., p. 647.

† Rev. Mag. Zool., 1867, p. 47; 1869, p. 229 note.

MATERIALS FOR A MOLLUSCAN CATALOGUE
OF SUFFOLK.

Can any of the readers of the 'Journal of Conchology' aid me in precisely identifying by any well-known name the following shells mentioned by Rev. Revett Sheppard in his list of Suffolk shells, and by Dr. Leach in his *Mollusca of Great Britain* :

- (1) *Tellina stagnicola*.—This is identified in Turton's 'British Shells' with *Cyclas cornea* var. *stagnicola* but it is not mentioned in Jeffreys'.
- (2) *Mytilus macula*.—This is probably a variety of *Anodonta anatina*, but is not mentioned by Turton or Jeffreys.
- (3) *Helix spirorbis*.—This, one would naturally suppose to be *Planorbis spirorbis*, but there seems to be doubt in Mr. Sheppard's mind, though he identifies it with *Helix spirorbis* of Montagu, which is again identified with *Planorbis spirorbis* by Turton. It is not Linnæus' *Helix spirorbis* which corresponds to *Planorbis albus*. Nor is it Draparnaud's *Planorbis spirorbis*.
- (4) *Cyclas alata* which is found in Leach's *Mollusca of Great Britain*, p. 291.

I am anxious to identify these shells beyond doubt in order to include them in a catalogue of Suffolk shells. Any assistance towards the latter would much oblige.

CARLETON GREENE.

Helix pisana var. **scalariformis**.—While at Tenby last year I took this variety on the downs above Giltar Point, I secured two specimens.—H. MILNES, Winstèr.

Limax agrestis and **Cochlicopa lubrica** at **St. Thomas, Canada**.—On July 8th, 1887, I found *Limax agrestis* (the type unspotted), and *Cochlicopa lubrica* at St. Thomas, in the province of Ontario.—T. D. A. COCKERELL, West Cliff, Colorado.

FURTHER NOTES ON MARINE SHELLS OF SOUTH AFRICA, WITH DESCRIPTIONS OF NEW SPECIES.

BY G. B. SOWERBY, F.L.S., F.Z.S., &c.

Since the publication of my papers on "Marine Shells of South Africa" in the Journal of Conchology of January, 1886, and January, 1889, a considerable number of additional species have come to hand. Among these are some that had already been mentioned by Krauss, Dunker, and others as belonging to the Cape fauna, but were not included in my list, which consisted only of such species as I knew to have been collected in the neighbourhood of Port Elizabeth. There are other well-known species, not hitherto known to inhabit South African waters, while others are altogether new to science.

One thing has struck me as remarkable, and that is the number of British and European species found on the South African coast. Some of these were previously sent me by Mr. Bairstow, but I hesitated to include them in the list, thinking they must have got into that far distant locality by accident. However, so many of them have since been found (some living), that I have no longer any doubt on the subject. The list contains altogether thirty-four species known to inhabit European waters.

Spirula Peroni Lam. This species is abundant throughout the Indian, Pacific and Atlantic Oceans.

Murex mitræformis Sow. A species allied to *M. uncinarius* but of a more slender form and nearly white. It appears to be rare.

Pseudomurex Meyendorfi Cal. Several specimens of this somewhat rare Mediterranean species have been found in the neighbourhood of Port Elizabeth. They are all somewhat worn, but I have no doubt whatever as to their identity.

- Bullia digitalis** Meusch. Upon comparing a considerable number of specimens, varying not so much in form as in colour and style of marking, I am convinced that Reeve's *B. sulcata*, *B. semiflammea*, and *B. semiusta* are simply varieties of this species.
- Nassa arcularia** Linn. Very common in the Indian Ocean and China Sea, but rarely found at the Cape.
- Purpura scobina** Quoy. A small variable species, known chiefly as inhabiting the shores of Australia, Tasmania and New Zealand. The Cape variety identified by the Rev. A. H. Cooke is not so roughly ribbed, and approaches rather more nearly to some of the forms of *P. lapillus* than the prevailing Australian types.
- P. trigona** Reeve. A single specimen in good condition was sent me from Port Elizabeth by Mr. Bairstow. This, like many of the shells of South Africa, is well-known as an Australian species.
- P. livida** Reeve. Mr. Ponsonby shewed me several specimens from Port Elizabeth.
- Melapium lineatum** Lam. (= *Buccinum bulbosus* Wood). Since the publication of my last paper Mr. Edgar A. Smith has clearly shown that the small South African species, and not the large one to which I referred, is the true *Pyrrula lineata* of Lamarck, the large species having been described by Schubert and Wagner under the name of *Pyrrula elata*. Mr. Smith, in an interesting paper (Ann. & Mag. of Nat. Hist., March, 1889), has described the animal of this genus, which proves to have no operculum.
- Tritonidia undosa** var. *minor*. A small form not uncommon at the Cape. The species is common in Australian waters, throughout the Indian Ocean and on the coast of Mauritius. Of the specimens that have come under my notice the smallest are found at the Cape, the Mauritian are somewhat larger, and they increase in size further eastward, those from Singapore, Australia, and the Philippines being the largest.

Pleurotoma platystoma Smith. A small species nearly allied to *P. Metcalfei* and *P. Coxi* of Angas.

P. Grayi Reeve. A small species allied to *P. castanea*, but shorter and broader. There are several specimens labelled "Cape of Good Hope" in the collection of Dr. Gray in the British Museum. Beside these I have only seen a single specimen.

Euthria Ponsonbyi Sow. n. sp. (Pl. iii, fig. 3).

E. testa fusiformis, lutea, aurantio strigata, solidiuscula; anfractus 7, primi 4, spiraliter sulcati, sequentes lævigati, angulati, ad angulum serie tuberculorum coronati, supra angulum concavi; anfr. ultimus pyriformis, infra angulum convexus, spiraliter subobsolete sulcatus, in caudam brevem leviter recurvam desineus. Apertura ovata, utrinque angulata; columella superne arcuata, deinde recurva; labrum arcuatum, intus albidum, subobsolete liratum.

Long. 40 mill.; maj. diam. 20 mill., apert. 17 mill. longa, 8 mill. lata.

Allied to the Mediterranean *E. cornea*, but having compared it with a large number of specimens and various forms of that species, I am convinced that it is distinct. The tuberculated angle is much further removed from the suture, and the broad space between the angle and the suture more decidedly concave.

Pseudoliva ancilla Hanley. (Pl. iii, fig. 2). Proc. Zool. Soc., 1859, p. 429. A very remarkable form, the true generic position of which is doubtful, having characters in common with *Pseudoliva* and *Ancillaria*. The specimen shewn me by Mr. Ponsonby is 51 millimetres (just over two inches) long, and 24 millim. wide in the middle, tapering at each end; of a light reddish-brown colour, with a paler central zone. There was a specimen in the collection of the late Thos. Lombe Taylor, which was acquired by Mr. Melvill, who proposed to give it the sub-generic name of *Mariona*.

Oliva cærulea Bolten. Very common in the Indian Ocean, but rarely found on the South African Coast.

O. bulbosa Bolten. Several varieties of this common well-known Indian species have been collected at Port Elizabeth by Mr. Bairstow.

Ancillaria australis Sow. This common New Zealand species has been found for the first time at South Africa by Mr. Bairstow. The specimens are dead and somewhat discoloured. The species resembles *A. obtusa*, but the spire is much more acute. As far as at present known *A. obtusa* is exclusively South African.

Triton Klenei A. Adams ? (MS.). As the species bearing this name in various collections seems never to have been described I give the following diagnosis :—

T. testa ovato fusiformis, utrinque acuminata, luteo fusca, rufofusco picturata ; spira elongata, gradata ; anfractus 7, valde convexi, angulati, spiraliter granolirati, longitudinaliter plicati ; anfractus penultimus plerumque univaricosus ; ultimus gibbosus, varicibus duabus leviter complanatis et fimbriatis munitus. Apertura ovata, fauce purpureo-fusco tincta, peristoma album, canali breviusculo vix recurvo.

Long. 38 mill. ; maj. diam. 26 mill. ; apert. longa. 15 mill. ; lata. 10 mill. Allied to *T. cutaceus*.

T. cutaceus Linn. In my note on *T. africanus* (J. C., v., Jan., 1886, p. 9), I expressed the opinion that that species was only a modification of *T. doliarius*.* I am now of opinion that both are varieties of the Linnean *T. cutaceus*, so common in the Mediterranean. Mr. Ponsonby has shewn me an undoubted specimen of that species from Port Elizabeth.

Coralliophila nodosa A. Adams (Latiaxis). Several specimens of this somewhat rare Australian species have been collected at Port Elizabeth.

* Kiener (Iconog. Triton, p. 41, 42) says *T. doliarius* is only a variety of *T. cutaceus*. Krauss, p. 114, thinks otherwise.

- Marginella Savignyi** Issel. A minute species hitherto only known to inhabit the Red Sea.
- M. neglecta** Sow. The original type is a worn colourless shell, but the South African specimens are subpellucid and banded with brown. I have had similar specimens from Mauritius.
- M. cylindrica** Sow. The type of this species is also a white worn shell. The South African specimens are subpellucid, and marked with pale brown peculiarly interrupted transverse lines.
- Columbella pulchella** Sow. Only dead specimens of this well-known West Indian species have been found at Port Elizabeth.
- C. cerealis** Menke = *C. Kraussii* Sow.
- C. flava** Brug. Common in the Indian Ocean generally. Only a few worn specimens found at Port Elizabeth.
- Natica didyma** Philippi. This species seems almost universal, extending eastward to Australia, and northward to Japan. I have also seen specimens from the eastern Mediterranean mixed with *N. olla*.
- Nerita sanguinolenta** Menke. This species I have also had from Mauritius, but it does not seem very common either there or at the Cape.
- Terebra pertusa** Born. A young worn specimen is at present the only evidence of this species belonging to the Cape fauna.
- Chemnitzia castanea** Carp. Three specimens fairly perfect.
- Cingulina circinata** A. Adams.
- Syrnola aciculata** A. Adams.
- Rissoa fenestrata** Krauss. This species differs very slightly from the British and European *R. calathus*, of which I am inclined to think it a variety.
- R. pinnæ** Krauss. Several specimens of this rather curious species have been found at Port Elizabeth. I have never seen it from any other locality.
- Solarium cingulum** Kiener. Of this species I have only seen one rather small but richly-coloured specimen.

- Littorina ahenea** Linn. A common species of very extensive distribution.
- Cerithium Kochii** Phil. This species inhabits the Indian Ocean, Red Sea, and China Sea, but is rarely found at the Cape.
- Triforis perversa** Linn. Chiefly known as a British and Mediterranean species. The specimens are in fair condition, and the identification unquestionable.
- Cerithiopsis purpurea** Angas. Mr. Angas' type is Australian, but several specimens have been found at Port Elizabeth.
- Turritella sanguinea** Reeve. A young and somewhat doubtful specimen.
- Siliquaria anguina** Linn. Young specimens, undoubtedly of the Mediterranean species.
- Siphonium nebulosum** Dillwyn.
- Ovulum spelta** Linn. Another well-known Mediterranean species found at the Cape.
- O. birostre** Sow. This species, though nowhere common, is of very wide distribution, specimens having been found in Japan, Hongkong, Singapore, Ceylon, and Mauritius, as well as at Port Elizabeth.
- O. carneum** Poiret. Larger and lighter in colour than the specimens usually found in the Mediterranean.
- Turbo (Collonia) sanguineus** Linn. Minute specimens, but differing only in size from those frequenting the Mediterranean.
- Turbo (Collonia) armillatus** A. Adams (MS?). Sowerby Thes. Conch. This species is described as "perforate," but it is not always so. In some specimens the umbilicus is almost closed, while others exhibit none whatever.
- Turbo (Collonia) minutus** Sow. n. sp., (pl. iii, fig. 9).
T. testa minuta, sub-orbicularis, anguste umbilicata, pallida, spira depressiuscula; anfractus 4, rapide accrescentes, convexi; sutura impressa; anfr. ultimus sub-obliquus, rotundatus;

sulcis spiralibus numerosis sculptus. Apertura subcircularis, obliqua; peristoma simplex; columella crassiuscula, planulata. Operculum calcarium, extus album, complanatum.

Diam. $1\frac{3}{4}$ mill., *alt.* $1\frac{1}{2}$ mill.

A minute species of a pale yellowish colour, of which the spiral grooves are twice as numerous as in *T. sanguineus*.

Trochus (Gibbula) cicer Menke (= *Trochus musivus* Gould; = *Turbo cicer* Sow.). I find that this species is not a *Turbo* (*Collonia*). It was erroneously included in my monograph of that genus in 1886, when I had not seen the operculum, which proves it to be a *Trochus* coming under the section *Gibbula*.

Trochus (Gibbula) roseus Gmel. There is some uncertainty as to the correct identification of this species. A small live shell submitted to me by Mr. Ponsonby seems to agree better with the description than that figured in Philippi's monograph. It is not at all like *T. cicer*, of which Krauss thought it might be a variety.

Trochus (Gibbula) bifurcatus A. Adams. A very characteristic species, not often met with.

Trochus (Calliostoma) Fultoni Sow. n. sp. (Pl. iii, fig. 7.).

T. testa acute conica, elata, anguste umbilicata, pallide fulva, fusco strigata, strigis plerumque duplicatis; anfractus 7—8, planato declives, carina angusta vix elevata marginati, sutura incisa sejuncti, striis irregularibus plus minusve conspicuis aut obsoletis obliquis et spiralibus cancellati; anfractus ultimus infra angulatus; basis convexa, spiraliter sulcata; umbilicus angustus sed profundus; apertura obliqua, subangulata, fauce lævi; peristoma acutum; columella vix callosa.

Long. 13 mill.; *maj. diam.* 10 mill.

The form of this species is similar to that of *T. suarezensis* (Fischer). The umbilicus, although narrow, is sharply defined, so as to bring the species near to the section *Eutrochus*.

- Trochus (Oxystele) tigrinus** Chemn. Nearly allied to *T. merula*, but more elevated, and spotted here and there with white. The base of *T. merula* is usually tinged with red.
- Trochus (Polydonta) nigropunctatus** Reeve. I have only seen a single specimen, and that not adult, from Port Elizabeth.
- Trochus (Solariella) dilectus** A. Adams. This charming little species seems to be rare both in South African and Australian waters. It is included in my father's monograph of the genus *Margarita* in the "Conchologia Iconica."
- Fissurella Sieboldii** Reeve. Resembling *F. calyculata*, but uniformly larger and flatter with a larger orifice.
- F. fimbriata** Reeve. Allied to the European *F. greeca* and *F. neglecta*, but with the principal ribs more raised and foliated.
- F. fumata** Reeve. Somewhat resembling *F. ruppellii* in form. Whitish, with brown or grey flames.
- Patella longicosta** Lam. A well-known characteristic species, tolerably common.
- Bulla ampulla** Linn. The South African specimens are smaller than most of those found in the Eastern seas.
- Bullina zigzac** Muhlfeldt (= *B. lineata* Wood). Also found at Mauritius, Ceylon, Australia, &c. The species is reputed West Indian. *B. lauta* (Pease) from the Sandwich Islands is the same species.
- Cylichna umbilicata** Mont. Scarcely differing from British specimens.
- Chiton marginatus** Penn. Several specimens of this common European species found living at Port Elizabeth.
- Siphonaria concinna** Sow. Probably a var. of *S. variabilis*.
- S. venosa** Reeve.
- Tellina littoralis** Krauss.
- Tellina (Macoma) calcarea** Chem. Scarcely distinguishable from Arctic shells.

Tellina Ponsonbyi Sow. n. sp. (pl. iii, fig. 1).

T. testa subovalis, æquivalvis, æquilateralis, leviter compressa, albida, concentrice irregulariter rugata, ubique densissime radiatim striata; antice rotundata, postice leviter angulata. Umbones parviusculi, conjuncti. Margo dorsalis anticus arcuatus, posticus declivis, leviter arcuatus. Margo ventralis rotunde arcuatus. Ligamentum angustum, longiusculum, immersum. Dentes in utraque valva cardinales 3, laterales duo, remoti. Pagina interna alba.

Diam. antero-post 25 mill.; umbono-marg. 20 mill.

A white shell of ordinary appearance, rayed throughout with very fine close striæ.

Psammobia vespertina Gmel. Scarcely distinguishable from European specimens.

Lucina (Divaricella) liratula Sow. n. sp. (pl. iii, fig. 5).

L. testa suborbicularis, leviter inflata, alba, liris transversis numerosis angustissimis, hic illic undulatis sculpta. Umbones acuti, approximati; lunula parva, profunda. Dentes cardinales in valva sinistra duo, approximati in valva dextra unus, laterales in utraque valva duo vix prominentes. Fossa ligamenti obliqua. Pagina interna radiatim sulcata, margo crenulatus.

Diam. antero-post 12 mill.; umbono-marg. 11¼ mill.

The transverse liræ are so fine as to be scarcely visible to the naked eye.

Lucina (Loripes) lactea Lam. Like British and Arctic specimens. Pretty abundant at the Cape.

Lutraria oblonga Chem. This species, under various names, seems to range from the west coast of Ireland eastward to the Philippine Islands, and southward to the Cape. It is taken for granted by most authors that those found in Australian and Indo-Pacific waters must be specifically distinct from the European, but I can find no reliable character by which to distinguish them.

L. capensis Deshayes. This seems to be a distinct species; it is much broader than *L. oblonga*, and at the same time differs considerably in form and character from *L. elliptica*.

Mactra (*Schizodesma*) *Spengleri* Gmel. This West African species is seldom found so far south as the Cape.

Mactra Adamsoni Phil. The examination of a number of specimens presenting considerable variation in form and colouring has convinced me that this is specifically the same as *M. decora*, of Deshayes.

Thracia capensis Sowerby, sp. nov. (Plate iii, fig. 4.)

T. testa elliptica, subæquilatera, leviter inflata, tenuis, concentricè irregulariter plicata, albida, epidermide pallide straminea induta, antice obscure biangulata. Umbones acuti, depressi, incurvati, approximati. Lunula concavo impressa elongata. Cardo normalis; fovea ligamenti oblique trigona, parva.

Diam. antero-post. 15 mill.; umbono-marg. 12 mill.

A small thin inflated species submitted to me by Mr. Darbishire.

Panopea attenuata Sowerby. A single valve of this rare species.

Crassatella acuminata Sowerby, sp. nov. (Plate iii, fig. 6.)

C. testa valde inæquilateralis, donaciformis, leviter compressa, crassa, rufo-fusca concentricè obscure rugata, antice rotundata, postice producta, acuminata. Umbones parviusculi, vix elevati. Margo dorsalis posticus obscure biangulatus. Cardo normalis. Pagina interna alba, fusca tincta.

Diam. antero-post. 35 mill.; umbono-marg. 22 mill.

An elongated compressed species, remarkably acuminate at the posterior extremity. I have only seen odd valves.

Solen marginatus Pult. Scarcely to be distinguished from British specimens.

Solen regularis Dunker. Several perfect specimens.

- Solen pellucidus** Pennant. The specimens found at Port Elizabeth are larger than any British ones I have seen, but in every other respect they are identical.
- Ceratisolen legumen** Linn. A young shell in perfect condition, exactly similar to the British.
- Kellia rotunda** Deshayes. Nearly allied to the British *K. suborbicularis*.
- Montacuta capensis** Sowerby, nov. sp. (Plate iii, fig. 8.)
M. testa transverse oblonga, subtrigona, leviter inæquilateralis, sub-compressa, tenuiuscula, alba, concentricè irregulariter rugata, epidermide tenuissima straminea induta. Umbones acutiusculi, approximati. Margo dorsalis utrinque declivis, ventralis rectiusculus, utrinque rotundatus. Cardo dentibus duobus elevatis, subremotis, divergentibus munitus. Ligamentum internum bifurcatum.
Diam. antero-post 4½ mill.; umbono-marg. 3 mill.
- Axinus globosus** Forskael.
- Saxicava arctica** Linn.
- Petricola typica** Jonas.
- Venus (Gomphina) undulosa** var.
- Venus (Chione) Kraussii** Deshayes.
- Cytherea (Tivela) compressa** Sowerby.
- Dosinia cretacea** Reeve.
- Dosinia lamellata** Reeve.
- Tapes rugosa** Deshayes.
- Tapes tatrix** Reeve.
- Cardium lima** Gmelin (= *C. asiaticum* Brug.). Only odd valves have at present been found at Port Elizabeth.
- Cardium fasciatum** Mont. Larger than British and Mediterranean specimens.
- Pectunculus arabicus** H. Adams. Common in the Red Sea, but rare at Port Elizabeth.
- Arca scapha** Chemnitz.
- Nucula radiata** Forbes and Hanley. Worn valves. This may possibly prove a species distinct from the British, but

at present I have not been able to discover any distinguishing character.

Modiola lignea Reeve.

Modiola elegans Philippi. Much larger than the Indo-Pacific specimens.

Modiola petagnæ Scacchi.

Modiolaria discors Linn. A common European species.

Mytilus perna Linn. Presenting considerable variation in form.

Mytilus edulis Linn. var. (= *M. meridionalis* Krauss).

Mytilus afer Gmel.

Pinna pernula Chemnitz.

Avicula (Meleagrina) capensis Sowerby nov. sp. (Plate iii, fig. 10).

A. testa solidula, oblonga vel ovata sub-quadrata, plus minusve tortuosa, plano-convexa, ubique concentricè irregulariter laminata, olivacea, nigro-fusco obscure radiata, rostrum latum, prominens; area antica in valva sinistra latisinuata, valide incrassata; cauda lata, brevissima, cum margine postico angulo pæne recto juncta; umbones curvati; area cardinalis recta.

This species has been quoted by Dunker as a variety of *A. margaritifera*, but the form is very distinct and constant. It may be at once recognised by its oblong form, and the remarkable broad sinus under the beak.

Teredo (Hyperotus) nucivora Spengler. Several specimens of this remarkable shell have been found in groups attached one to another.

Ostrea iridescens Gray.

Pecten pusio Linn. In my last paper I noted a white variety of this species. I have since seen several differently coloured specimens from the Cape. I regard the *Pecten tinctus* and *altus* of Reeve as belonging to this species.

Pecten (Vola) capensis Gray. A rare species seemingly confined to South African waters.

Terebratulina abyssicola Adams and Reeve.
Kraussia pisum Val.

EXPLANATION OF PLATE III.

- | | |
|-------------------------------|----------------------------------|
| 1. <i>Tellina</i> Ponsonbyi. | 6. <i>Crassatella</i> acuminata. |
| 2. <i>Pseudoliva</i> ancilla. | 7. <i>Trochus</i> stenomphalus. |
| 3. <i>Euthria</i> Ponsonbyi. | 8. <i>Montacuta</i> capensis. |
| 4. <i>Thracia</i> capensis. | 9. <i>Turbo</i> minutus. |
| 5. <i>Lucina</i> liratula. | 10. <i>Avicula</i> capensis. |

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY.

NOTE.—All communications *intended for the Society* should be sent to the Secretary, Mr. W. DENISON ROEBUCK, F.L.S., Sunny Bank, Leeds.

Meeting

HELD JULY 3RD, 1889, at the Museum, Park Row, Leeds.

Mr. J. W. Taylor, F.L.S., presided.

DONATIONS.

The following donation was laid on the table :—

“*The Naturalist*,” for July ; presented by Yorkshire Naturalists’ Union.

NEW MEMBERS.

The following gentlemen were duly elected Members of the Society :—

Mr. F. L. Siggs, B.A., London ; Rev. Chas. Crawshaw, Shipley ; Jas. J. MacAndrews, Ivy Bridge ; Samuel A. Adamson, F.G.S., Leeds.

SPECIMENS EXHIBITED.

The number of specimens exhibited was very large and varied. Included were specimens sent by Mr. L. E. Adams, B.A. ; Mr. W. Jeffery ; Dr. Von Martens and Mr. W. A. Gain.

Mr. W. D. Roebuck, F.L.S., and the Chairman each exhibited large collections from various localities.

Meeting

HELD AUGUST 7TH, 1889, at the Museum, Leeds.

Mr. J. W. Taylor, F.L.S., occupied the Chair.

DONATIONS.

The following donations were announced :—

“*Proceedings of the Royal Society of Queensland*,” Vol. vi., parts 2 and 3, 1889 ; presented by the Society.

“*Journal and Proceedings of the Royal Society of New South Wales*,” Vol. xxii, part 2., 1888 ; presented by the Society.

“*The Naturalist*,” for August ; presented by the Yorkshire Naturalists’ Union.

“ Note on a New *Ampullaria*, from the La Plata,” by J. W. Williams (Re-print) ; presented by the Author.

Eighteenth Annual Report of the Chester Society of Natural Science and Literature, 1888-9 ; presented by the Society.

“ Feuille des Jeunes Naturalistes,” Nos. 217 to 226.

“ Bulletin de la Societe d’etudes Scientifiques de Paris,” 1878-1887.

“ Catalogue de la Bibliotheque,” Nos. 4 and 5, 1888-9.

NEW MEMBER.

Mr. A. E. Baker, of Leicester, was nominated for Membership.

PAPERS READ.

Note on *Assimineea Littorina*, by E. R. Sykes.

Clausillia rugosa and *Balea perversa* in Haddingtonshire, by W. Evans.

SPECIMENS EXHIBITED.

Mr. W. D. Roebuck showed *Helix fusca* from near Wind Bridge, Teesdale, and several specimens from Leadburn, Peebles-shire.

The Chairman showed *Zonites cellarius* from Lancashire.

Meeting

HELD SEPTEMBER 4TH, 1889.

Mr. J. W. Taylor, F.L.S., presided.

DONATIONS.

The following donations were laid on the table :—

Report of the Smithsonian Institute, 1886, part 1.

“ Proceedings of the Royal Society of Queensland,” 1889, Vol. vi., part 4.

“ The Naturalist,” for September, 1889.

“ Feuille des Jeunes Naturalistes,” No. 227.

NEW MEMBERS.

Mr. A. E. Baker was duly elected a Member of this Society.

Mr. John M. Williams, of Liverpool, was nominated for Membership.

PAPERS READ.

Further Notes on Marine Shells of South Africa, with descriptions of new species, by G. B. Sowerby, F.Z.S.

“ An Excursion to County Donegal,” by R. F. Scharff, B.Sc., Ph.D.

SPECIMENS EXHIBITED.

Dr. Scharff sent a collection of shells from Bundoran, Co. Donegal, and Tullaghan, Co. Leitrim, in illustration of his paper, and presented them to the Society’s Collection.

The Chairman showed collections of shells sent by Mr. G. W. Mellor, who had collected them at Roundstone, Galway, and Westport, Mayo, in August of the present year ; and by Mr. Lionel E. Adams, B.A., from Rowsley.

Mr. W. E. Collinge also showed a number of shells collected in Ireland by Mr. E. R. Waite, of Leeds.

NOTES ON
THE OCCURRENCE OF *ACME LINEATA* DRAP.,
IN LANCASHIRE AND CHESHIRE.

By R. STANDEN.

(Read before the Manchester Branch of the C. S. G. B. and I., Oct. 10th, 1889.)

As far as I can ascertain there are no published records of the occurrence of *Acme lineata* in either Lancashire or Cheshire, but you will see, from the numerous specimens of this rare species now brought before your notice, that it is not absent from either county—though the record from Cheshire is but meagre. It is very noteworthy that it has been taken near to and on opposite sides of Manchester in past years by various well-known collectors, although in but limited numbers, and—I believe from a commendable desire to procure other specimens from each locality, before making its occurrence generally known—they did not proclaim the discovery beyond their own immediate circle of friends. This season it has again been taken in one of its old stations, and has also been discovered to exist in considerable numbers in a new and apparently unlikely locality in West Lancashire.

As it will be interesting and useful to place the few finds of bye-gone days on permanent record, I will give details of the finding, and necessary authentication of each set of specimens exhibited. The first record we have is of one living specimen being taken in Barlow Moor Wood, by Mr. J. Ray Hardy, in June, 1866. When found it was crawling over, and apparently feeding upon, a mass of dead fungi attached to a rotten log in a damp part of the wood, and was kept alive by Mr. Hardy for some time. He has since repeatedly searched this locality, but unsuccessfully, and I have also examined minutely what little portion remains of this once grand hunting ground, without finding *Acme*, although several species generally noticed in its

company, such as *Carychium* and various *Zonites*, are tolerably abundant still, but the place, as a resort for the naturalist, is about to share the fate of many similar pretty spots around Manchester, and will soon be effaced by railway encroachments or otherwise, so that all hopes of ever again finding *Acme* there may be dismissed from our thoughts. About the same date two or three specimens were taken alive in a small wood at Clifton, near Manchester, by Mr. J. R. Hardy and the late Mr. Thomas Morley. These were all in the collection of the latter gentleman at the time of his shells being purchased by Mr. T. Foster of this town, who has, or had very recently, them still. I have myself repeatedly searched the place where Mr. Foster's specimens were obtained, and on the 3rd of August last I was pleased to find one very beautiful specimen alive under the bark of a fallen alder tree. The only other species I have met with in this wood is *Zonites excavatus*, which is abundant. From the character of this place, coupled with the greater experience I have recently acquired as to how and where to search for *Acme*, I am hopeful of securing other specimens from it when I have an opportunity for further search.

In Cheshire, the only locality yet noticed for *Acme* is Marple, where Mr. J. Ray Hardy obtained one living specimen in July, 1866, from a part of the wood on the river-bank in a line with the school-house. This was found on shaking out some moss in search for Coleoptera, and in the following year Mr. James Walkden obtained another living specimen from the same place by similar means. Mr. Walkden's shell is, or should be, now in the Vernon Park Museum, where it was transferred when his collection was purchased by the Stockport Corporation.

On July 26th of the present year Mr. W. H. Heathcote, of Preston, was so fortunate as to discover a station for *Acme* near Fleetwood, where it occurs in considerable numbers. This locality I had the pleasure of visiting in his company on Sept. 14th and was successful in taking with my own hands twenty-three specimens, three of them being lovely examples of var. *alba*

Jeff, whilst Mr. Heathcote obtained on this and his previous visit a total of thirty-seven, nine of them being var. *alba*. With one or two exceptions the shells were alive and in beautiful condition, varying in colour from a pure translucent white, through several shades of yellow, to a rich reddish-brown. The locality is a singular and most noteworthy one, certainly one of the last where many shells of any kind might be hoped for, and especially *Acme*, being a steep "scar" facing the sea; no trees near, and only a low growth of brambles affording cover. The soil is stiff red clay, with a few stones sparsely scattered about, and a constant oozing of water down the slope from the fields above has created a small patch of swampy ground at the base, growing in which are several species of *Carex* and *Equisetum*, together with a dense matted growth of one of the larger scale-mosses (*Jungermannia*). Amongst this moss, which climbs over the dead and low-lying bramble branches in great luxuriance, we find the *Acme* associated with numerous other shells, the list of which is noteworthy, for it comprises *Helix aculeata*, *H. hispida*, *H. pygmæa*, *Vitrina pellucida*, *Zonites glaber*, *Z. alliarius*, *Z. nitidulus*, *Z. purus*, *Z. radiatulus*, *Z. fulvus*, *Z. crystallinus*, *Z. cellarius*, *Cochlicopa lubrica*, *Carychium*, a very small variety of *Succinea putris*, *S. elegans*, some small *Limnæa truncatula*, and *Pisidium nitidum*. There is no standing water near, and the aquatic species seem to live upon the wet ground, which I think will always remain damp even during the heat of summer. It was a pouring wet day when we were there, which may, perhaps, in part account for our obtaining so much. Underneath the few stones before mentioned we took twenty splendid specimens of *Vertigo pygmæa*, and a few *Helix pulchella*, but did not find either of these species amongst the moss.

The Fleetwood *Acme* habitat is very limited in area and a careful search for some distance around did not reveal a similar spot, but it will perhaps serve as a valuable guide to further research in other localities to know the particular kind of habitat affected by this rare species, and it having now been

placed upon a firm footing in our Lancashire list, by Mr. Heathcote's last important discovery, I feel confident that future close and careful search by our members will result in its being taken in other localities, perchance quite as unlikely as the Fleetwood one.

Since writing above I have found that in the British Museum collection there are eight specimens of *Acme* labelled "Preston, Lancashire," but Mr. Edgar A. Smith informs me he can give no satisfactory information respecting these beyond that they were purchased in 1836 from Mr. Sowerby, but whence he obtained them is unknown. The fact may, however, be worth noting, as there is a possibility that they came originally from the collection of the late Mr. Gilbertson, of Preston, which I have been unable to trace satisfactorily; all I can learn being that his shells were sent to London after his death. There is also a record in the Transactions of the Chester Natural Science Society (1884), of its occurrence at Blacon Point, Cheshire. This record, however, seems to require further verification, for Mr. G. W. Shrubsole, who is responsible for it, informs me, in reply to enquiries respecting it, "that the Chester Society for several years offered prizes for local collections of shells, and these lists he afterwards embodied in a paper which was published in the Transactions of the Society. "The collection," he says, "from which the species is recorded is not now available for reference, and he did not examine critically the different species."



Adeorbis subcarinatus at Teignmouth, S. Devon.

—I have the pleasure of recording the occurrence of *Adeorbis subcarinatus* (Mont.) alive on the 28th July, 1888, (fifteen months ago), in this neighbourhood, which, I believe, is the first find in a living state on the English coasts. I hope on a future occasion to furnish some interesting information concerning this species.—L. ST. G. BYNE, Teignmouth, 1st November, 1889.

AN EXCURSION TO CO. DONEGAL.

By R. F. SCHARFF, Ph.D., B.Sc.

BUNDORAN is a little sea-side town on the east side of Donegal Bay. Its native population consists of but a few fishermen ; however, a large number of visitors come there every year from inland towns to enjoy the invigorating breeze of the Atlantic. The accommodation is fairly good, and for any one interested in marine zoology, it is a very suitable place. A flat expanse of carboniferous limestone rocks, just opposite Bundoran, abounds in rock-pools, which contain a great variety of animal and plant life. Of course, a terrestrial conchologist will soon abandon these, as there is more chance of success above high-water mark.

Although the object of my visit was to study the distribution of fishes in that part of the country, I had a few spare hours left to collect land and freshwater shells.

North of Bundoran, a ridge of sand-hills stretches along the coast for a couple of miles. They are covered with high grass, among which may be found an occasional specimen of a species of coltsfoot. To my great surprise, I discovered on these plants hundreds of *Helix nemoralis*, but not a trace of any other land shell. The greater number of the specimens I picked up were (owing to the loss of their epidermis) of a light violet colour without bands, although on some of them indications of such were to be seen. The peristome was dark as a rule. Two specimens, which might be referred to the variety *rubella*, were of an intense brick-red colour. Perfectly white specimens were common. Almost all of the latter had translucent bands.

The limestone cliffs yielded more *H. nemoralis* var. *libellula* with bands, but none of the brilliantly coloured varieties which I had met with on the sands, and also the following:—*Helix rotundata*, *H. hispida*, *Clausilia rugosa*, *Pupa umbilicata*, *P. ringens*, *Cochlicopa lubrica*, and *Zonites alliarius*.

The county Donegal touches the county Leitrim about two miles south of Bundoran. The latter county, however, possesses only a very small slice of sea-coast, for after walking in the same direction for another mile one enters the county Sligo. One of my walks extended into the county Leitrim, from which I believe no authenticated records have ever been made as to the distribution of shells.

In the river Drowes, which separates the two counties (Donegal and Leitrim), I picked up the following among others: *Bythinia tentaculata*, *Planorbis contortus*, *P. complanatus*, *Limnæa peregra* var. *ampullacea* (small), *Sphærium corneum* (young), and *Pisidium pusillum*, near the banks (co. Leitrim) I found:—*Helix rotundata* and var. *turtoni*, *Clausilia rugosa* and some slugs, *H. hispida*, *H. concinna*, *Pupa umbilicata*, *Vitrina pellucida*, *Zonites alliarius*, and *Z. nitidus*.

Assiminea littorina at Weymouth.—Whilst collecting at Weymouth last winter (1888) I turned up two specimens of a shell which has since been identified as *Assiminea littoralis* D.Ch. I then made a further search which has resulted in the discovery of about one hundred live shells of this species. My chief object in writing these notes is to put on record the finding of about a dozen live albinos for which I venture to propose a var. *albida*; this is, as far as I can discover, the first reported occurrence of the variety. A few notes as to the habitat may be interesting. The shells were all found under stones a little below high water mark. In company with them were *Rissoa cingillus* and var. *rupestris*, one specimen of *Odostomia plicata*, *Melampus myosotis*, and var. *ringens*, *Melampus bidentatus*, and *Lasæa rubra* var. *pallida*. It is interesting to note the association of albinos in this one very small spot; there being two species of which white varieties occur without the type, two white species, and two coloured species of which white varieties occur with the type. A further search in the same spot has yielded three live *Truncatella truncatula*.—ERNEST R. SYKES.

CONTRIBUTIONS TOWARDS A LIST OF
IRISH MOLLUSCA.

By J. G. MILNE.

During a walk across Ireland, in August, I collected the undermentioned specimens in the counties of Armagh, Monaghan, Fermanagh, Donegal, Mayo East, Roscommon, Leitrim, and Cavan, and as very little is known conchologically of these parts of the island, the list may be of interest. The walk, proper, only extended from Armagh to Bundoran, in Donegal, as an accident prevented my returning in the same manner, as I had intended; however, I was able to work round Lough Gara from Ballagherreen to Boyle, spend a Sunday at Dromod, in Leitrim, and get three hours at Belturbet Junction.

Sphærium corneum.—Ulster Canal, Drummaconor, Monaghan (250 ft. alt., lime and peat), fairly plentiful in the canal (here cut through the limestone) and peat dykes running down into it. Curragh, Fermanagh (200 ft. alt., peat) a few young specimens in a brook. Rosscole Point, Fermanagh (150 ft. alt., peat), numbers of dead shells in the rejectamenta from Lough Erne.

Pisidium amnicum.—Rosscole Point, Fermanagh (150 ft. alt., peat), in rejectamenta from Lough Erne.

Bythinia tentaculata.—Ballynahone, Armagh (200 ft. alt., peat), plentiful in a tributary of R. Callan. Ardgonnell, Armagh (200 ft. alt., lime and peat), in numbers in the Ulster Canal wherever the sides were banked with stone. Drummaconor, Monaghan (250 ft. alt., lime and peat), in the Ulster Canal and peat dykes connecting with it. Moor Lough, Fermanagh (180 ft. alt., peat), numerous. Rosscole Point, Fermanagh (150 ft. alt., peat), in rejectamenta of Lough Erne. Roosky, Leitrim (130 ft. alt., peat), very numerous (and dirty) in R. Shannon.

- Limnæa peregra*.—Ballynahone, Armagh (200 ft. alt., peat), a few young specimens in tributary of R. Callan.
- L. peregra* var. *ovata*.—Armagh, Armagh (200 ft. alt., lime), several in a cutting from a quarry. Ardgonnell, Armagh (200 ft. alt., lime and peat), in great numbers in the Ulster Canal. Beesbrack, Monaghan (220 ft. alt., lime and peat), in Ulster Canal, in locks.
- L. peregra* var. *ampullacea*.—Moor Lough, Fermanagh (180 ft. alt., peat), plentiful. Rossclare Bay, Fermanagh (150 ft. alt., peat), covering the sandstone boulders in Lough Erne. Roosky, Leitrim (130 ft. alt., peat), very plentiful in R. Shannon.
- L. auricularia* var. *acuta*.—Moor Lough, Fermanagh (180 ft. alt., peat), only one specimen found.
- L. stagnalis*.—Armagh, Armagh (200 ft. alt., lime), numerous in quarry cutting. Beesbrack, Monaghan (220 ft. alt., lime and peat), one young one in lock of Ulster Canal. Moor Lough, Fermanagh (180 ft. alt., peat), several.
- L. stagnalis* var. aff. *fragilis*.—Ardgonnell, Armagh (200 ft. alt., lime and peat), plentiful in Ulster Canal.
- L. stagnalis* var. *fossarina*.—Rossclare Bay, Fermanagh (150 ft. alt., peat), very numerous in Lough Erne.
- L. palustris*.—Armagh, Armagh (200 ft. alt., lime), several in quarry cutting. Rossclare Bay, Fermanagh (150 ft. alt., peat), on shores of Lough Erne; more numerous out of the water than in it.
- L. palustris* var. *minor*.—Ballynahone, Armagh (200 ft. alt., peat), plentiful in tributary of R. Callan.
- L. palustris* var. ?.—Ardgonnell, Armagh (200 ft. alt., lime and peat), a few in Ulster Canal.
- L. truncatula* var. *minor*.—Crom Castle, Fermanagh (180 ft. alt., peat), under stones on shores of Upper Lough Erne; numerous.
- Physa fontinalis*.—Rossclare Bay, Fermanagh (150 ft. alt., peat), several in Lough Erne, clustered on stones.

- Planorbis complanatus.**—Armagh, Armagh (200 ft. alt., lime), plentiful in quarry-cutting.
- P. carinatus.**—Ardgonnell, Armagh (200 ft. alt., lime and peat), a few young ones in Ulster Canal. Drummaconor, Monaghan (250 ft. alt., lime and peat), dead specimens in refuse from Ulster Canal.
- P. vortex.**—Curragh, Fermanagh (200 ft. alt., peat), a few in a brook. Rosscole Point, Fermanagh (150 ft. alt., peat), dead shells from Lough Erne.
- Ancylus fluviatilis.**—Rosscclare Bay, Fermanagh (150 ft. alt., peat), several in Lough Erne.
- Succinea putris.**—Newtownbutler, Fermanagh (200 ft. alt., carboniferous limestone), a few by stream, Drumcru Bridge. Crom Castle, Fermanagh (180 ft. alt., carboniferous limestone with alluvium), plentiful in heaps of quarried limestone by Upper Lough Erne. Dromod, Leitrim (150 ft. alt., carboniferous limestone with peat), a few in a damp hayfield.
- S. elegans.**—Rosscclare Bay, Fermanagh (150 ft. alt., old red sandstone), in great numbers under stones on shore of Lough Erne.
- S. elegans var. minor.**—Carson's Bridge, Monaghan (230 ft. alt., carboniferous limestone), several among flags by Ulster Canal.
- Zonites cellarius.**—Armagh, Armagh (200 ft. alt., carboniferous limestone), plentiful in a quarry. Rossmore Castle, Monaghan (300 ft. alt., carboniferous limestone), plentiful in dead leaves and on mossy walls in the demesne. Carson's Bridge Monaghan (230 ft. alt., carboniferous limestone), a few in heaps of stone by Ulster Canal. Newtownbutler, Fermanagh (200 ft. alt., carboniferous limestone), one or two at Drumcru Bridge. Castlecaldwell, Fermanagh (180 ft. alt., carboniferous limestone), several in Muckcross Wood.
- Z. alliaris.**—Rossharbour, Fermanagh (170 ft. alt., carboniferous limestone), young specimens in ruins of a cabin.

- Z. glaber.**—Smithborough, Monaghan (250 ft. alt., carboniferous limestone), a few in a cutting of the Ulster Canal.
- Z. nitidulus.**—Carson's Bridge, Monaghan (230 ft. alt., carboniferous limestone), one or two by Ulster Canal. Dro-mod, Leitrim (150 ft. alt., carboniferous limestone with peat), one in a ditch.
- Z. nitidulus var. nitens.**—Newtonbutler, Fermanagh (200 ft. alt., carboniferous limestone), a few in nettle bed, Drumcru Bridge.
- Z. nitidus.**—Rossharbour, Fermanagh (170 ft. alt., carboniferous limestone), scarce, under stones by a stream.
- Z. radiatulus.**—Waterfoot, Donegal (200 ft. alt., carboniferous limestone with peat), a few on turf walls.
- Z. radiatulus var. viridescenti-alba.**—Crom Castle, Fermanagh (180 ft. alt., carboniferous limestone), one in a hedge bottom. Milltown, Fermanagh (250 ft. alt., carboniferous limestone), two in cutting by roadside.
- Z. crystallinus.**—Newtownbutler, Fermanagh (200 ft. alt., carboniferous limestone), two at Drumcru Bridge. Milltown, Fermanagh (250 ft. alt., carboniferous limestone), one in a ditch.
- Z. fulvus.**—Rossclare Bay, Fermanagh (150 ft. alt., old red sandstone), plentiful under stones by Lough Erne.
- Helix aspersa.**—Armagh, Armagh (200 ft. alt., carboniferous limestone), several in quarry and on trees. Ballyshannon, Donegal (sea-level, carboniferous limestone), on sea wall, numerous. Belturbet, Cavan (200 ft. alt., carboniferous limestone), one on a wall.
- H. aspersa var. flammea.**—Ballyshannon, Donegal (sea-level, carboniferous limestone), one with type.
- H. aspersa var. undulata.**—Roosky, Leitrim (130 ft. alt., carboniferous limestone), a few on banks of R. Shannon.
- H. nemoralis var. libellula.**—Armagh, Armagh (200 ft. alt., carboniferous limestone), plentiful in quarry; several climbing wild rose bushes: formula 12345. Ballynahone,

Armagh (200 ft. alt., carboniferous limestone), very numerous on mountain ash trees : 12345, (12345). Smithborough, Monaghan (250 ft. alt., carboniferous limestone), numerous in cutting of Ulster Canal : (123)(45), (123345), 12345, (123)(45). Ashfield, Monaghan (250 ft. alt., carboniferous limestone), several among brambles by canal : (12345), 12345. Waterfoot, Donegal (200 ft. alt., carboniferous limestone with peat), a few on turf walls : 12345, (12345). Edmonstown, Mayo East (200 ft. alt., carboniferous limestone), two young ones in the demesne : 12345. Ballymore, Roscommon (400 ft. alt., carboniferous limestone), several under walls of sheep-pastures : 00000, (12345), (12345), shells very strong. Dromod, Leitrim (150 ft. alt., carboniferous limestone, with peat), plentiful in a hayfield ; shells very thin : 00000, 12345, 1(23)45. Roosky, Leitrim (130 ft. alt., carboniferous limestone), one on bank of R. Shannon : (123)(45). Belturbet, Cavan (200 ft. alt., carboniferous limestone), a few in plantations, one climbing a fir-tree : 12345.

H. nemoralis var. **carnea**.—Ballynahone, Armagh (200 ft. alt., carboniferous limestone), on mountain ash trees : 00(345). Waterfoot, Donegal (200 ft. alt., carboniferous limestone with peat), on turf-walls : 12345. Dromod, Leitrim (150 ft. alt., carboniferous limestone with peat), in hayfield : 12345, (12)3(45).

H. nemoralis var. **castanea**.—Newtownbutler, Fermanagh (200 ft. alt., carboniferous limestone), one by roadside : 00000.

H. nemoralis var. **rubella**.—Ballymore, Roscommon (400 ft. alt., carboniferous limestone), one under wall : 12345.

H. caperata.—Roosky, Leitrim (130 ft. alt., carboniferous limestone), plentiful on stone walls by R. Shannon.

H. caperata var. **ornata**.—Roosky, Leitrim (130 ft. alt., carboniferous limestone), two with type.

H. rufescens.—Newtownbutler, Fermanagh (200 ft. alt., carboniferous limestone), a few in nettle beds, Drumcru Bridge.

- Ballyshannon, Donegal (sea-level, carboniferous limestone), very numerous on sea-wall. Dromod, Leitrim (150 ft. alt., carboniferous limestone), numerous in ivy on a bridge. Roosky, Leitrim (130 ft. alt., carboniferous limestone), a few in a hawthorn hedge. Belturbet, Cavan (200 ft. alt., carboniferous limestone), several on stone walls.
- H. hispida.**—Armagh, Armagh (200 ft. alt., carboniferous limestone), plentiful in quarry. Carson's Bridge, Monaghan (230 ft. alt., carboniferous limestone), everywhere on banks of Ulster Canal. Smithborough, Monaghan (250 ft. alt., carboniferous limestone), numerous in cutting of canal. Crom Castle, Fermanagh (180 ft. alt., carboniferous limestone with alluvium), common among debris by Upper Lough Erne. Rossclare Bay, Fermanagh (150 ft. alt., old red sandstone), very common among stones on shore of Lough Erne. Edmondstown, Mayo East (200 ft. alt., carboniferous limestone), plentiful on walls in the demesne. Rathkeery, Roscommon (250 ft. alt., carboniferous limestone), on walls by roadside. Dromod, Leitrim (150 ft. alt., carboniferous limestone with peat), a few among stones in fields. Roosky, Leitrim (130 ft. alt., carboniferous limestone), plentiful by R. Shannon. Belturbet, Cavan (200 ft. alt., carboniferous limestone), a few on walls.
- H. concinna.**—Ballymore, Roscommon (400 ft. alt., carboniferous limestone), several in the fields.
- H. rotundata.**—Armagh, Armagh (200 ft. alt., carboniferous limestone), numerous in quarry. Rossmore Castle, Monaghan (300 ft. alt., carboniferous limestone), one young specimen in demesne. Smithborough, Monaghan (250 ft. alt., carboniferous limestone), a few in cutting of Ulster Canal. Newtownbutler, Fermanagh (200 ft. alt., carboniferous limestone), several, Drumcru Bridge. Rossharbour, Fermanagh (170 ft. alt., carboniferous limestone), plentiful in ruins of a cottage. Edmondstown, Mayo East (200 ft. alt., carboniferous limestone), a few in the demesne.

- H. rupestris.**—Rockville, Donegal (50 ft. alt., carboniferous limestone), swarming on walls by road. Edmondstown, Mayo East (200 ft. alt., carboniferous limestone), plentiful on walls of demesne. Rathkeery, Rosscoinmon (250 ft. alt., carboniferous limestone), numerous on walls.
- H. pulchella.**—Dromod, Leitrim (150 ft. alt., carboniferous limestone with peat), one in hayfield.
- Pupa umbilicata.**—Rossmore Castle, Monaghan (300 ft. alt., carboniferous limestone), plentiful on walls in the demesne. Smithborough, Monaghan (250 ft. alt., carboniferous limestone), several in cutting on the canal. Crom Castle, Fermanagh (180 ft. alt., carboniferous limestone with alluvium), plentiful in ivy on walls by Upper Lough Erne. Bannagh Bridge, Fermanagh (220 ft. alt., carboniferous limestone), a few on walls. Rossharbour, Fermanagh (170 ft. alt., carboniferous limestone), numerous on stones. Waterfoot, Donegal (200 ft. alt., carboniferous limestone), scarce on turf-walls. Edmondstown, Mayo East (200 ft. alt., carboniferous limestone), a few in the demesne. Dromod, Leitrim (150 ft. alt., carboniferous limestone), plentiful in ivy on bridge. Roosky, Leitrim (130 ft. alt., carboniferous limestone), several on walls by R. Shannon. Belturbet, Cavan (200 ft. alt., carboniferous limestone), numerous on walls.
- Vertigo pygmæa.**—Armagh, Armagh (200 ft. alt., carboniferous limestone), one in quarry. Rossharbour, Fermanagh (170 ft. alt., carboniferous limestone), several in ruins of cottage. Edmondstown, Mayo East (200 ft. alt., carboniferous limestone), one in moss on wall. Dromod, Leitrim (150 ft. alt., carboniferous limestone with peat), plentiful on stones in hayfield. Belturbet, Cavan (200 ft. alt., carboniferous limestone), numerous on banks.
- Balea perversa.**—Roosky, Leitrim (130 ft. alt., carboniferous limestone), one on wall by R. Shannon. Belturbet, Cavan (200 ft. alt., carboniferous limestone), one on mossy wall.

Clausilia rugosa.—Armagh, Armagh (200 ft. alt., carboniferous limestone), plentiful in quarry. Rossmore Castle, Monaghan (300 ft. alt., carboniferous limestone), numerous in the demesne. Clontiorin Bridge, Fermanagh (250 ft. alt., carboniferous limestone), several in ivy. Crom Castle, Fermanagh (180 ft. alt., carboniferous limestone), common on ivy-covered walls. Milltown, Fermanagh (250 ft. alt., carboniferous limestone), in ditch and cuttings by road. Castlecaldwell, Fermanagh (180 ft. alt., carboniferous limestone), plentiful in Muckcross Wood. Waterfoot, Donegal (200 ft. alt., carboniferous limestone), common on turf-walls. Edmondstown, Mayo East (200 ft. alt., carboniferous limestone), a few in the demesne. Rathkeery, Roscommon (250 ft. alt., carboniferous limestone), numerous by roadside. Tullaghan, Leitrim (20 ft. alt., carboniferous limestone), a few on walls by the roadside. Dromod, Leitrim (150 ft. alt., carboniferous limestone with peat), several on stones in hayfield. Roosky, Leitrim (130 ft. alt., carboniferous limestone), common on walls by R. Shannon. Belturbet, Cavan (200 ft. alt., carboniferous limestone), common on walls.

Cochlicopa lubrica.—Carson's Bridge, Monaghan (230 ft. alt., carboniferous limestone), a few by Ulster Canal. Newtownbutler, Fermanagh (200 ft. alt., carboniferous limestone), one or two at Drumcru Bridge. Crom Castle, Fermanagh (180 ft. alt., carboniferous limestone with alluvium), several in debris by Upper Lough Erne. Rossclare Bay, Fermanagh (150 ft. alt., old red sandstone), a few under stones by Lough Erne. Edmondstown, Mayo East (200 ft. alt., carboniferous limestone), a few in ditch in demesne. Dromod, Leitrim (150 ft. alt., carboniferous limestone with peat), several in a hayfield. Roosky, Leitrim (130 ft. alt., carboniferous limestone), scarce, by R. Shannon.

C. lubrica var. lubricoides.—Castlecaldwell, Fermanagh (180 ft. alt., carboniferous limestone), a few in Muckcross Wood.

Specimens of all the above have been submitted for inspection and verified for the Conchological Society by Mr. J. W. Taylor.

The general conclusion from the results of my walk seems to be that the limestone district of central Ireland, while offering a fairly good collecting ground, has no remarkable variety of species. The Lough Erne series of lakes would, I think, repay a thorough investigation; but the only means of doing this would be in a boat, as the shores are almost entirely occupied by castles and demesnes, to the exclusion of the pedestrian.

ED. NOTE.—It is difficult to express in type the double method in which the formulæ of *Helix nemoralis*, &c., are expressed by the author in his manuscript; he shows the formulæ for each species both at the mouth and on the body of the shell. The mouth-formula is here shown by parentheses () enclosing bands coalesced; if they coalesce differently on the body of the shell it is shown by the coalesced bands being printed in dotted figures, thus; (12345).

Colorado Mollusca.—In November last year I found *Conulus fulvus*, *Hyalina arborescens* and *Patula cooperi*, near Egeria, Routt Co., in the Bear River Division. Most of the *P. cooperi* belong to a var. nov. *minor* (diam. 14 mill.), which I have not seen elsewhere in Colorado, though Hemphill found a small variety of this species in Utah.—T. D. A. COCKERELL, West Cliff, Colorado, March 8th, 1889.

Sinistral *Helix nemoralis* in Lancashire.—A nice specimen of this monstrosity has been very kindly added to my collection by Mr. F. C. Long, of Burnley. He took it on the 13th of July last, near the 'Tim Bobbin' Inn, Burnley. It is an immature *libellula* 12345, and though in quite fresh condition was unfortunately dead when found, otherwise it might have been fed to maturity. As being probably the first instance noticed of the occurrence of this form in our county, the record may not be without interest.—R. STANDEN.

**Clausilia rugosa and Balea perversa in Had-
dingtonshire.**—While spending a few hours on the sea-braes at Canty Bay, near North Berwick, on the 1st inst., I observed *Clausilia rugosa* in abundance on and about the rocks which here and there protrude through the grassy slopes. I picked a handful, which, on counting, I find consists of 180 specimens, and I could easily have gathered many times that number had I wished. Seeing that Mr McMurtie in his paper on the Land and Freshwater Shells of the neighbourhood of North Berwick makes special mention of the fact that he had not found *Clausilia rugosa* there the record may be of interest. Along with the *Clausiliæ* there were a few examples of *Balea perversa*, a species also absent from Mr. McMurtie's list.—
WILLIAM EVANS, Edinburgh, June 11th, 1889.

**Helix aspersa monst. sinistrorsum Taylor, in
Lancashire.**—At the October meeting of the Manchester Branch I had the pleasure of exhibiting a fine living specimen of this rare form, taken during the visit of the Society to Whalley on Whit-Monday of the present year. It was picked from the wall in Whalley Churchyard by a lad (not one of our party), and obtained from him by my friend Mr. F. C. Long, who had the first chance of it, and who very generously handed it over to me. When taken it was a half-grown shell, of normal colouring, and has since developed into a handsome mature specimen, having, as may be imagined, been cherished and pampered with every conceivable vegetable delicacy likely to tempt its palate. Its generous feeding seems to have influenced the growth and colouration of the shell, which has assumed a more rotund figure than it would probably have attained if it had been allowed to grow up amongst its native nettles, and the completed portion is a rich and uniform black colour, showing a striking contrast to the ordinary mottlings of the apical whorls. As being the first specimen of sinistral form known to have been taken in Lancashire, it of course possesses a peculiar interest to those of us who were, so to speak, in at the capture of it! I purpose allowing it to breed, if it will be so obliging, and, without being too sanguine as to the result of the experiment, I am not unhopeful that some at least of its progeny may prove as contrary as itself.—R. STANDEN, Manchester.

PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY.

NOTE.—Communications to be addressed to the Hon. Secretary,
at the Museum, Park Row, Leeds.

Meeting

HELD OCTOBER 2ND, 1889, AT THE MUSEUM, LEEDS.

Mr. John W. Taylor, F.L.S., vice-president, in the chair.

Donations for the Library announced from the Linnean Society of New South Wales, the Naturalist, the Royal Society of Queensland, the Government of Victoria; and for the collection, from the Rev. Carleton Greene (shells from Great Barford, Beds.), Mr. J. G. Milne (shells from Ireland), and Mr. W. Baillie (shells from Brora).

NEW MEMBERS.

Mr. John M. Williams, Liverpool, was duly elected a member.

The following candidates were nominated for membership:—Mr. Arthur Mayfield, Norwich (proposed by J. W. Taylor and W. Denison Roebuck); Mr. R. Miller Christy, F.L.S., Chignal St. James (by T. W. Bell and J. W. Taylor); and Mr. G. A. F. Knight (by E. A. Smith and A. Somerville).

PAPERS READ.

George Roberts—'Notes on Helices.'

J. Grafton Milne—'Contributions towards a List of Irish Mollusca.'

EXHIBITS.

Mr. Milne sent a large number of shells collected in Ireland, in authentication of his list, and kindly presented them to the Society's collection.

On behalf of the Rev. S. Spencer Pearce, M.A., the chairman showed a fine series of examples of *Limnaea peregra* from numerous localities in the Engadine, from Eastbourne, etc, including var. *elongatissima* Gredl., and numerous other interesting forms.

Mr. William Nelson communicated a note on an excursion made by himself recently near Spofforth, Yorks., and exhibited the shells collected.

Mr. W. Denison Roebuck, F.L.S., showed a large collection of shells made in Lincolnshire during September, including a series of *Clausilia rolphii*, *Helix lapicida* in confirmation of Martin Lister's record, *Vertigo edentula*, *Pupa marginata*, &c. He also showed *Bulimus acutus* and var. *strigata*, and several Helices from Tintagel, East Cornwall, sent by Mr. C. Ashford, the *B. acutus* and *H. caperata* being new records for the vice county. He also showed *Pupa ringens* and other shells collected in county Kilkenny by Mr. G. Barrett-Hamilton; *Zonites radiatulus*, *Z. nitidus*, and other shells collected in Easternness by Mr. W. Evans, F.R.S.E., and a few Cumberland shells.

Meeting

HELD NOVEMBER 6TH, 1889.

Mr. J. W. Taylor, F.L.S., vice-president, in the chair.

Donations for Library announced: The Naturalist and Feuille des Jeunes Naturalistes.

NEW MEMBERS.

Mr. Arthur Mayfield, Norwich; Mr. Robert Miller Christy, F.L.S., Chignal St. James; and Mr. G. A. Frank Knight, Glasgow, were duly elected members.

Mr. Paul Agius, B.A., of Valletta, Malta, was nominated for membership by Messrs. A. C. Gatto and J. S. Galizia.

PAPERS READ.

Loftus St. George Byne—'Note on the occurrence of *Adeorbis subcarinatus* (Mont.) alive in the neighbourhood of Teignmouth.

J. W. Cundall—'Note on the omission of two names from his list of Tenby shells, viz., *Utriculus truncatulus* and *Rissoa costata*.'

R. Standen—'Note on the occurrence of *Acme lineata* Drap. in Lancashire and Cheshire' (sent by the Manchester Branch).

EXHIBITS.

The chairman showed a series of specimens of the var. *minor* of various species of land and freshwater shells.

Mr. W. Denison Roebuck, F.L.S., showed a series of shells collected in county Louth, Ireland, by Miss Sidney Smith, interesting as being from an hitherto totally neglected area.

Shells were also shown on behalf of Mr. Walter W. Strickland, Mr. Geo. W. Mellors, and Mr. William Evans.

Annual Meeting

HELD AT LEEDS, DECEMBER 11TH, 1889.

Mr. John W. Taylor, F.L.S., vice-president, in the chair.

Donations to Library announced: The Naturalist and Feuille des Jennes Naturalistes.

NEW MEMBERS.

Mr. Paul Agius, B.A., of Malta, was duly elected a member.

Mr. J. H. Burkill, of Cheltenham, was nominated for membership by Mr. C. Burkill and Mr. J. T. Marshall.

EXHIBITS.

Mr. Thomas Hey showed a series of Derbyshire examples of *Limnaea stagnalis* and *Helix nemoralis*, with varieties.

The annual meeting business was postponed, and the meeting adjourned to Manchester on the 14th December.

Adjourned Annual Meeting

HELD AT MANCHESTER, AT THE RESIDENCE OF MR. J. COSMO MELVILL, M.A., F.L.S., PRESIDENT, KERSAL COTTAGE, PRESTWICH,

DECEMBER 14TH, 1889.

Mr. James Cosmo Melvill, M.A., F.L.S., president, in the chair.

APPOINTMENT OF SCRUTINEERS AND AUDITORS.

Messrs. W. Denison Roebuck, F.L.S., and Thomas Rogers were appointed auditors, and Messrs. Chas. Oldham and J. G. Milne scrutineers; and they withdrew for the performance of their respective duties.

ANNUAL REPORTS.

The Annual Report [printed at p. 181] was read by Mr. Thos. W. Bell, Secretary, and adopted.

The Report of the Manchester Branch [printed at p. 182] was read by Mr. Robert Standen, Secretary of the Branch, and adopted.

The Report on Records [printed at p. 181] was read by Mr. W. Denison Roebuck, F.L.S., the Recorder, and adopted.

PUBLICATIONS OF THE SOCIETY.

A recommendation from the Council in reference to this matter was submitted, to the effect that they considered it advisable to renew the arrangement made with the publisher of the 'Journal of Conchology' for the publication of the society's papers and proceedings in that journal and ratified by the last annual meeting.

On the motion of Mr. W. E. Hoyle, M.A., this recommendation was adopted.

HONORARY MEMBERS.

Mr. Taylor read on behalf of the Council a recommendation that the seven vacancies in the list of honorary members be filled up by the election of Prof. Dr. Rudolph Bergh, of Copenhagen, Mr. Wm. Geo. Binney, of Burlington, New Jersey, M. E. Cossmann, of Paris, M. Hippolyte Crosse, of Paris, Dr. R. A. Philippi, of Santiago de Chile, Prof. G. Ossian Sars, of Christiania, and Dr. Heinrich Simroth, of Gohlis bei Leipzig. The recommendation was adopted, and the seven conchologists named were duly elected honorary members.

STAFFORDSHIRE MOLLUSCA.

Mr. J. R. B. Masefield, M.A., of Cheadle, gave a brief account of work done towards compiling a list of North Staffordshire shells, and presented a copy of his recently published list.

BALANCE SHEET.

The Auditors having concluded their labours, Mr. T. W. Bell as Treasurer, submitted the Balance Sheet, which had been found correct, and which showed that the income from all sources had been £58 18s. 3d., and the total expenditure £40 4s. 1d., leaving a balance in hand of £18 14s. 2d. The statement was adopted.

ELECTION OF OFFICERS AND COUNCIL.

The Scrutineers now reported that as the result of their examination of the ballot-papers sent in Mr. Edgar A. Smith, F.L.S., F.Z.S., had been elected President, Messrs. J. Cosmo Melvill, M.A., F.L.S., John W. Taylor, F.L.S., W. E. Hoyle, M.A., and Rev. R. Boog Watson, B.A., F.L.S., Vice-Presidents; Mr. W. Denison Roebuck, F.L.S., Hon. Secretary and Treasurer, and also Recorder; Mr. William Nelson, Curator; and Messrs. G. B. Sowerby, F.L.S., F.Z.S., R. D. Darbishire, B.A., F.G.S., Lionel E. Adams, B.A., J. T. Marshall, B. B. Woodward, F.G.S., F.R.M.S., and J. H. Ponsonby, F.Z.S., as Members of Council.

On the result being announced Mr. Roebuck begged leave to decline the office of Treasurer while accepting the offices of Hon. Secretary and Recorder. This was acceded to, and Mr. Lionel E. Adams, B.A., was

appointed Treasurer. This causing a vacancy in the Council, Mr. Thomas W. Bell, the retiring Secretary, was elected as member of Council in lieu of Mr. Adams. The omission of the Office of Librarian from the ballot-paper was pointed out, whereupon Mr. William Nelson was appointed as Librarian.

PRESIDENT'S ADDRESS.

The retiring President, Mr. James Cosmo Melvill, M.A., F.L.S., then delivered his Valedictory Address, taking as his subject 'British Pioneers in Conchological Science during the past two hundred years' [printed at pp. 190 et sequitur].

On the conclusion of the Address, the thanks of the Society were voted to the President, and it was resolved that the Address be printed in full in the Journal of Conchology.

EXHIBITS.

Mr. J. Ray Hardy exhibited a series of *Trochus pharaonis* L., from Lower Egypt. These had been used as ornaments for a mummy of the Twelfth Dynasty, about 2,600 B.C. Besides these were placed a series of recent specimens—*Clanculus puniceus* from the Mediterranean Sea.

Mr. W. H. Heathcote showed a collection including all the species of the genus *Vertigo* and Lancashire specimens of *Bulinus goodallii*, *Achatina acicula* and *Acme lineata*. He also showed an apparatus for sorting rejectamenta.

Mr. John W. Taylor, F.L.S., had on view his album of portraits of Conchologists.

Mr. Thos. F. Burrows exhibited a collection of varieties of *Helix nemoralis*, *H. hortensis* and *H. aspersa*; also specimens of *H. fusca*, *Azeca tridens* var. *nouletiana*, and *Paludina vivipara*, the latter of which he presented to the Society's collection.

The collection of Irish Land and Freshwater shells recently presented by Mr. J. G. Milne, was also on exhibition.

Mr. B. Sturges Dodd exhibited a fine collection of *Rossææ* and *Odostomia*.

The great feature of the evening was however, the inspection by the Members of the whole of Mr. J. Cosmo Melvill's magnificent collection of shells. His cabinets contain, on a rough estimate, about thirteen to fourteen thousand species, besides many varieties. Particular attention was drawn to the large series of specimens included in the genera *Conus*, *Cypræa*, *Voluta* and *Pecten*. In the first of these, *Conus*, about four hundred species were shown. Amongst them was the unique *Conus dusareli* H. Adams, upon which Mr. G. B. Sowerby made a few remarks, it being the most beautifully marked and coloured member of the genus, and the circumstance of its discovery being singular, viz: in the stomach of a fish caught some miles off the North Coast of Mauritius, at 60 fathoms depth. Besides this, the specimens of *C. cervus*, *C. omaicus*, *C. gloria-maris*, *C. racemosus*, *C. moluccensis*, and other rarities, were much admired. Among terrestrial mollusks the genus *Clausilia* was shown, arranged in four drawers in several hundred glass-capped boxes, as were also the *Achatinellæ*, of which there were a great variety.

ANNUAL REPORT.

In presenting the report for the past year the Council have nothing of an extraordinary nature to bring forward, but are pleased to state that steady progress has been made and really good work has been done. There are now 180 names on the Society's Register of Members. Twenty-one Members have been elected and five have resigned during the year. Papers of considerable scientific value and interest have been read by Mr. G. B. Sowerby, F.L.S., Rev. J. McMurtrie, M.A., Rev. S. Spencer Pearce, M.A., Mr. E. D. Marquand, M.A., Mr. R. F. Scharff, Ph.D., B.Sc., Mr. J. G. Milne, and Mr. J. M. B. Taylor, and several Members have communicated short notes.

The Council will recommend to this meeting the renewal of the agreement entered into with Mr. Taylor a year ago for the publication of the Society's proceedings and papers in the *Journal of Conchology*.

It has been thought desirable to elect Honorary Members to the full number allowed by rule, and after full consideration of the question by a sub-committee the Council adopted their report and will submit the names of seven gentlemen, eminent as Conchologists, for your approval.

The exhibits of specimens at the ordinary meetings have, as for several years past, been very numerous, and useful records have been made.

Contributions to the Fund for the purchase of Cabinets for the Society's Collections have been received during the year amounting to £2 10s. 6d. The General Funds of the Society are in a satisfactory condition, there being a balance of £13 5s. 6d. in hand.—THOMAS W. BELL, Treasurer and Secretary.

REPORT ON THE RECORDS

MADE DURING THE YEAR ENDING DECEMBER 10TH, 1889.

During the past twelve months a larger number of records have been made and authenticated by the submission of specimens to the Society's Referees than has been made in any previous year with the exception of 1885. The actual number is 4,789, and the total for the twelve years during which the record-system has been carried on has now reached 28,669.

The averages which have been struck as to the number of species (not records) authenticated for the various counties and vice-counties show that while for the 72 counties of England and Wales the average number of species recorded is 56 per county, it is but 21 for the 41 Scotch counties and only 14 for the 36 Irish counties. These averages, especially the Irish one, show that much attention must be paid to the detailed distribution of Land and Fresh-water Mollusca in Scotland and Ireland before we can pride ourselves on knowing thoroughly the range of the various species which inhabit the British Isles.

The counties for which absolutely no records whatever have been made have been reduced during the year from 12 to 4, the 4 which still remain virgin soil for the conchologist being all Irish, viz. Carlow, Longford, East Galway, and Queen's County. It would be a genuine service to the science if some enterprising conchologist would investigate these particular counties and permit the Society's Referees to see what he might happen to collect, a task which during the past year Mr. J. G. Milne has accomplished in Monaghan, Fermanagh, Cavan, Leitrim, and East Mayo, Mr. G. Barrett-Hamilton in Kilkenny, and Miss Sidney Smith in Louth, all of which counties figured last year on our list of blanks.

It would be well, too, if further attention were paid to the counties for which as yet the species recorded have not reached 10. These are the Welsh county of Radnor, the 11 Scottish counties of Dumfries, Wigton, Stirling, Aberdeen North, Banff, Elgin, Westerness, Ebudes South, Ebudes North, Orkney, and Shetland, and the 15 Irish counties of Armagh, Monaghan, Donegal, Fermanagh, Cavan, Louth, Kildare, Wicklow, Kilkenny, Roscommon, Leitrim, Mayo East, Clare, Tipperary North, and Cork North—27 counties in all.

To further emphasize the need for fuller attention being paid to Scotland and Ireland, we may add that only 2,187 Scottish and 1,158 Irish records have been made, as against 24,210 for England and Wales, and, looking at the fact that resident naturalists, conchologists especially, are not to be found in most of the unworked areas, it is to be hoped that all who wish to co-operate in completing the conchological census should find opportunity to visit such of these neglected areas as may be convenient, even as many of our friends have done in the past.—W. DENISON ROEBUCK, Recorder.

REPORT OF THE MANCHESTER BRANCH.

The Manchester Conchological Society was formed in February, 1888, having as its objects chiefly the careful investigation of the Land and Fresh-water Mollusca of the Manchester District, by means of summer excursions, and meetings during the winter for the exhibition and discussion of specimens and papers, relating thereto; and also the exhibition and discussion of other conchological subjects generally.

In August of the same year the Society was acknowledged as an auxiliary, or Branch, by the Council of the Conchological Society of Great Britain and Ireland.

The Society at present numbers 18 members, Mr. R. D. Darbishire being President; Mr. Thos. Rogers, Referee and Authenticator; Mr. Ed. Collier, Treasurer; and Mr. R. Standen, Honorary Secretary.

It has so far fully answered the objects of its originators in affording pleasant opportunity for the exchange of information and specimens, and for several interesting local investigations attended with very satisfactory results.

The carefully checked results of such united investigations together with the work of individual members, are being regularly tabulated for the use of members in a book which is also open to any members of the Society on application to the Secretary, and we hope in the course of a few years to be in a position to publish a more complete list of the Molluscan Fauna of Lancashire and Cheshire than has hitherto appeared.

Many interesting communications have already been brought forward and discussed at our Monthly Meetings, and the following papers read :

Ed. Collier—'The Shells of Ingleton and District.'

R. D. Darbshire—'On *Helix aperta* reviving after long drought.'

R. Standen—'On the occurrence of *Acme lineata* Drap., in Lancashire and Cheshire.'

These have been duly forwarded to the meetings at Leeds, and recommended by the Council for publication in the Journal of Conchology.—
ROBERT STANDEN, Hon. Sec., Manchester Branch.

CONSTITUTION AND LIST OF MEMBERS OF THE CONCHOLOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.

- 1.—That this Society be called "**The Conchological Society of Great Britain and Ireland.**"
- 2.—That its objects shall be the promotion of the Science of Conchology, by the holding of meetings for the reading and discussion of original papers, by the publication of proceedings, and by the formation of a Library and Collections illustrative of the Science.
- 3.—That it shall consist of Ordinary and Honorary Members.
- 4.—That Ordinary Members shall be proposed by two members at one meeting, and ballotted for at the next. They shall pay, in advance, on the 1st January in each year, a subscription of 5/-, or may compound for life by the payment of Three Guineas. Foreign Members shall pay an annual subscription of 7/6.
- 5.—That composition fees shall be invested in Books, Cabinets, or other permanent property, or in such other manner as the Council may think most conducive to the benefit of the Society.
- 6.—That Members shall have the privilege of appending to their names the initial letters M. C. S. (Member of the Conchological Society).
- 7.—That the number of Honorary Members shall be limited to ten, and they shall be exempt from all payments and have the privileges of Ordinary Members.

- 8.—That it shall be governed by a Council, consisting of a President, four Vice-Presidents, a Treasurer, a Secretary, a Curator, a Recorder, a Librarian, and six other members, who shall be elected annually by ballot ; the voting paper issued to be returned to the Secretary, under cover of sealed envelope, addressed to the Scrutineers.
- 9.—That the Presidency shall not be tenable for more than one year continuously, and that the President be expected to give an address.
- 10.—That the meetings shall be held in Leeds, monthly, at the time and place fixed by the Council, who shall also have power to arrange such additional meetings as they may think desirable.
- 11.—That three shall be a quorum at all meetings.
- 12.—That the Annual Meeting be held in December to receive the Report and Balance Sheets of the out-going Council, and to elect the new Council.
- 13.—That the accounts, before being presented, shall be audited by two members, appointed at a previous meeting.
- 14.—That the proceedings shall be published periodically, under the direction of the Council.
- 15.—That the Capital and Property be vested in two Trustees, elected by the Society.
- 16.—That no alterations in the rules shall be made, unless by a majority of three-fourths of the members present at a meeting which has been specially summoned.

HONORARY MEMBERS

(Limited to ten in number).

- Bergh, Prof. Dr. Rudolph, Vestre Hospital, Stormgade, 19, 2, Copenhagen.
 Binney, William George, Burlington, N.J., U.S.A.
 Bourguignat, J. R., Rue des Ursulines, 6, St. Germain-en-Laye, Seine-et-Oise.
 Cossmann, E., 17, Rue Saint-Vincent-de-Paul, Paris.
 Crosse, Hippolyte, Rue Tronchet, 25, Paris.
 Kobelt, Dr. W., Schwannheim, Frankfort-am-Main.
 Martens, Dr. E. von, C.M.Z.S., 29, Französische Strasse, Berlin, N.W.
 Philippi, Dr. R. A., Director del Museo Nacional, Santiago, Chile.
 Sars, Prof. G. O., Universitat, Christiania, Norway.
 Simroth, Dr. Heinrich, Gohlis, Leipzig.

ORDINARY MEMBERS.

- Adams, Lionel E., B.A., Rose-Hill, Penistone, Yorkshire.
 Adamson, Samuel A., F.G.S., 52, Wellclose Terrace, Leeds.
 Agius, Paul, B.A., 106, Strada Reale, Valletta, Malta.
 Bailey, Rev. George, F.R.M.S., The Manse, Finchingfield, Essex.
 Baillie, William, Brora, Sutherlandshire.
 Baker, Arthur Edwin, 97, Upper Kent Street, Leicester.

- Barnacle, Rev. H. Glanville, M.A., F.R.A.S., The Vicarage, Holmes Chapel, Crewe, R.S.O.
- Beulah, John, Ravensthorpe, Brigg.
- Bell, Alfred, 140, Lower Marsh, Lambeth, London.
- Bell, Thomas William, 2, Carr Lane, Leeds.
- Bell-Cox, Charles A. Stanley, B.A., M.R.C.S., 19, East Cliff, Dover.
- Bendall, Wilfrid, Nottingham Place, London, W.
- Bostock, Edwin D., The Radfords, Stone, Staffordshire.
- Brazier, John, C.M.Z.S., Curacoa House, Windmill Street, Sydney, N.S.W.
- Brockbank, Maria (Mrs. E.), Bond End, Settle.
- Brindley, H. Hulme, B.A., Woodland Hall, Uttoxeter, Staffordshire.
- Brown, Alfred, 7, Bowmont Terrace, Glasgow.
- Burkill, Clifford, Westwood, Scarborough.
- Burkill, Isaac Henry, Caius College, Cambridge; and 3, Royal Parade, Cheltenham.
- Burrows, Thomas F., Daisy Bank, Cheadle, Staffordshire.
- Butterell, J. Darker, 4, Willow Grove, Westwood, Beverley.
- Byne, Loftus St. George, 5, Sea View Terrace, Teignmouth, Devon.
- Cash, Wm., F.L.S., F.G.S., F.R.M.S., 38, Elmfield Terrace, Halifax.
- Chaytor, R. C., Scafton Lodge, Middleham, Bedale, Yorkshire.
- Christy, Robert Miller, F.L.S., Chignal St. James, Chelmsford, Essex.
- Coates, Henry, F.R.P.S., Pitcullen House, Perth.
- Coates, William, 18, Borough Terrace, Middlesbrough.
- Cockerell, Sydney C., 5, Priory Road, Bedford Park, Chiswick, London.
- Cockerell, T. D. A., West Cliff, Custer Co., Colorado, U.S.A.
- Collier, Edwd., 1, Heather Bank, Moss Lane East, Oxford Rd., Manchester.
- Collinge, W. E., 41, Springfield Place, Leeds.
- Cooke, Rev. Alfred Hands, M.A., F.L.S., King's College, Cambridge.
- Coulson, Frank, 6, Montague Terrace, Kelvinside, Glasgow.
- Craven, Alfred E., F.G.S., F.L.S., F.Z.S., 65, St. George's Road, Warwick Square, London, S.W.
- Crawshaw, Rev. Charles, Linden House, Shipley, Yorkshire.
- Crick, Walter D., 7, Alfred Street, Northampton.
- Crouch, Walter, F.Z.S., Grafton House, Wellesley Road, Wanstead, Essex.
- Cundall, J. W., Carville, Alexandra Park, Redland, Bristol.
- DaCosta, S. J., 2, Craven Hill, London.
- Dale, Henry F., A.A., B.Sc., F.R.G.S., F.R.M.S., F.Z.S., F.E.S., &c., Royal London Yacht Club, 2, Saville Row, London, W.
- Dale, (Mrs.) Violet, 2, Saville Row, London, W.
- Dale, (Miss) A. M., Hatherley, Bampfylde Road, Torquay.
- Darbishire, R. D., B.A., F.G.S., Victoria Park, Manchester.
- Davis, James W., F.S.A., F.L.S., F.G.S., Chevinedge, Halifax.
- Dawson, Oswald, Caledonian House, Leeds.
- Deschamps, Emile, Alepo, Syria.
- Dewick, Rev. Edward S., M.A., 26, Oxford Square, London, W.
- Dixon, George, sen., Great Ayton, Northallerton.
- Dodd, B. Sturges, 67, Beech Avenue, New Basford, Nottingham.
- Duncan, Wm., 1, India Street, Montrose.

- Dyer, (Mrs.) A. M., 1, Richmond Villas, Swansea.
 Elliott, Edward J., High Street, Stroud.
 Evans, (Mrs.) A., sen., Brimscombe Court, Thrupp, near Stroud.
 Eyre, Rev. W. L. W., M.A., Swarraton Rectory, Alresford, Hants.
 Fairbrass, (Miss) E. B., Abbey Street, Faversham, Kent.
 Falloon, (Mrs.) B. J., Long Ashton Vicarage, near Clifton, Bristol.
 Fenn, F. G., Syon Lodge, Isleworth, Middlesex.
 Fitzgerald, F. R., F.S.Sc., 26, Great Percy Street, Pentonville, London, W.C.
 Fitzgerald, H. Purefoy, North Hall, Preston Candover, Hants.
 Fitzgerald, (Mrs.) J., 10, West Terrace, Folkestone.
 Fortune, Riley, F.Z.S., Alston House, Harrogate.
 Gain, Wm. Albert, Tuxford, Newark.
 Galizia, Joseph Sylvester, 64, Piazza Celsi, Valletta, Malta.
 Galwey, (Miss) Honoria, 5, Earlsfort Terrace, Dublin.
 Gaskell, Roger, M.A., 5, The Grove, Highgate, London, N.
 Gatto, Alfred Caruana, B.A., 59, Strada Levante, Valletta, Malta.
 Gerland, Conrad, B.Sc., Ph.D., Church Hall, Church, Lancashire.
 Godlee, Theo., Whips Cross, Walthamstow, Essex.
 Gordon, Rev. George, LL.D., The Manse, Birnie, Elgin, N.B.
 Greene, Rev. Carleton, M.A., Great Barford Vicarage, St. Neots.
 Gude, G. K., 5, Giesbach Road, Upper Holloway, London, N.
 Gwatkin, H. M., M.A., Scrope Terrace, Cambridge.
 Hagger, John, Repton School, Burton-on-Trent.
 Halstead, John J., 19, Millholme Terrace, Carlisle.
 Hanley, Sylvanus, F.L.S., Hanley Road, Hornsey Road, London.
 Hargreaves, J. A., 40, Ramskill Road, Scarborough.
 Hartley, Alfred, 8, Cavendish Road, Idle, near Bradford.
 Harvard, T. Mawson, Green Bank, Lingard Road, Lewisham, London.
 Heathcote, Wm. Henry, 54, Frenchwood Street, Preston.
 Hedworth, Thomas H., 1, Railway Terrace, Dunston, Gateshead-on-Tyne.
 Heitland, (Mrs.) M., The Priory, Shrewsbury.
 Hepburn, Frederick, B.A., Sutton, Surrey.
 Hey, Thomas, Bloomfield Street, Derby.
 Hey, Rev. W. C., M.A., St. Olave's Vicarage, York.
 Hillman, Thomas Stanton, Eastgate Street, Lewes, Sussex.
 Hockin, (Miss) S., Phillack Rectory, Hayle, Cornwall.
 Hodgson, (Mrs.) J., Chalgrave Vicarage, Leighton Buzzard, Beds.
 Holmes, W. J. O., F.L.S., Strumpshaw Hall, Norwich.
 Howell, G. O., 3, Ripon Villas, Ripon Road, Plumpstead.
 Hoyle, W. E., M.A., M.R.C.S., F.R.S.E., Keeper of the Manchester
 Museum, Owens College, Manchester.
 Hudson, Baker, 5, Westbourne Grove, Coatham, Redcar.
 James, John H., A.R.I. Cornwall, 3, Truro Veian Terrace, Truro.
 Jeffery, William, Ratham, Chichester.
 Jeffrey, Charles, 15, Warren Street, Tenby.
 Jenkins, A. J., 1, Douglas Terrace, Douglas Street, Deptford.
 Jones, (Miss) L. C., 5, Alexandra Road, Clifton, Bristol.
 Jones, Wm. Jas., jun., 27, Mayton Street, Holloway, London, N.

- Jordan, Henry K., F.G.S., The Knoll, Blytha Park, Newport, Monmouth.
 Kendall, Percy, F.G.S.
 Kew, H. Wallis, F.E.S., 19, Stonenest Street, Tollington Park, London, N.
 Knight, G. A. Frank, Rosenlauri, Bearsden, Glasgow.
 Laver, Henry, M.R.C.S., F.L.S., Trinity Street, Colchester.
 Leicester, Alfred.
 Lightwood, James T., Hope House, Lytham, Lancashire.
 Linter, (Miss) J. E., Arragon Close, Twickenham, Middlesex.
 Lowe, E. J., D.L., J.P., F.R.S., F.L.S., F.G.S., F.R.A.S., F.R.M.S.,
 &c., Shirenewton Hall, Chepstow.
 Luther, S. M., Garrettsville, Ohio, U.S.A.
 MacAndrews, James J., Lukesland, Ivy Bridge, Devonshire.
 McKean, Kenneth, F.L.S., Summerfield, Warham Road, Croydon.
 McMurtrie, Rev. James, M.A., 14, Inverleith Road, Edinburgh.
 Madison, James, 167, Bradford Street, Birmingham.
 Marquand, Ernest D., M.A., Fermain House, Guernsey.
 Marshall, J. T., Sevenoaks, Torquay.
 Martin, Sydney Trice, Hanover Chambers, King Street, Manchester.
 Masefield, J. R. B., M.A., Rosehill, Cheadle, Staffordshire.
 Mason, Phillip B., M.R.C.S., F.L.S., F.Z.S., Burton-on-Trent.
 Mayfield, Arthur, 88, Stafford Street, Norwich.
 Mellors, George W., 7, Second Avenue, Sherwood Rise, Nottingham.
 Melvill, James Cosmo, M.A., F.L.S., Kersal Cottage, Prestwich, Manchester.
 Milne, J. Grafton, Albert Square, Bowdon, Cheshire.
 Milnes, Rev. H., M.A., Winster Vicarage, near Derby.
 Morgan, J. Bickerton, 30, Severn Street, Welshpool.
 Nelson, William, Freehold Street, York Road, Leeds.
 Newstead, A. H. L., Roseacre, Epping; and Christ College, Cambridge.
 North, S. W., M.R.C.S., F.G.S., Micklegate, York.
 Oldham, Charles, Ashlands, Ashton-on-Mersey.
 Paling, Albert, B.A., B.Sc., Middlesex Hospital, London.
 Parke, George H., F.L.S., F.G.S., College Grove Road, Wakefield.
 Parry, Col. G. S., Junior United Service Club, London, S.W.
 Peal, Charles N., F.L.S., Fernhurst, Mattocktam, Ealing, London, W.
 Pearce, Rev. S. Spencer, M.A., Tower Hill, Much Hadham, Ware, Herts.
 Pickard-Cambridge, C. Owen, Bloxworth, Wareham, Dorsetshire.
 Pidgeon, D., Assoc. Inst. C.E., F.G.S., Holmwood, Putney Hill, London.
 Pocock, Thomas W., J.P., Glenridge, Virginia Water, Staines, Middlesex.
 Ponsonby, John H., F.Z.S., 4, Halkin St., Grosvenor Place, London, S.W.
 Quilter, H. E., 4, Cedar Road, Leicester.
 Radcliffe, John, 111, Oxford Street, Ashton-under-Lyne.
 Ramage, John, 20, Hill Street, Dundee.
 Reader, T. W., 171, Hemingford Road, Barnsbury, London, N.
 Redding, J. R., 31, Belvedere Road, Dublin.
 Renton, Robert, Fans Road, Greenlaw, Berwickshire.
 Rhodes, Frederick, 26, East View, Eccleshill, near Bradford.
 Robertson, David, F.L.S., F.G.S., Fernbank, Millport, N.B.
 Roebuck, Wm. Denison, F.L.S., Sunny Bank, Leeds.

- Rogers, Thomas, 27, Oldham Road, Manchester.
 Rope, George Thomas, Blaxhall, Wickham [Market, Suffolk.
 Saunders, Edward, F.L.S., St. Ann's, Mount Hermon, Working.
 Scharff, Robert F., Ph.D., B.Sc., Museum of Science and Art, Dublin.
 Sclater, A. J. R., Bank Street, Teignmouth.
 Scott, Thomas, F.L.S., Fishery Board, Central Laboratory, Edinburgh University.
 Shaw, Alexander, 56, Dover Street, Glasgow.
 Shrubsole, George Wm., Town Hall Square, Chester.
 Siggs, F. L., B.A., Middlesex Hospital, London.
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BRITISH PIONEERS IN RECENT CONCHOLOGICAL
SCIENCE.

J. COSMO MELVILL, M.A., F.L.S.

BEING HIS VALEDICTORY ADDRESS AS PRESIDENT OF THE CONCHOLOGICAL SOCIETY
FOR THE YEAR 1889.

1662—1858.

IT MUST always seem extraordinary that, considering the attractiveness of the Mollusca even to those who have no intention of seriously studying the science, so many cycles of this world's history rolled away before any attempt was made to collect and classify them.

Of course, we grant that some of the more promising regions of research were then *terre* or rather *maria incognita*, but still the Mediterranean and Red Seas afford plenty of striking shells. The probable cause lies in the absolute inutility of so large a proportion to serve either as articles of food, manufacture, or ornament, for if we except a few, e.g., the clam, oyster, mussel, whelk, and cockle, esculent species, and the cameo-shell (*Cassis* and *Turbinella*) and pearl oyster (*Meleagrina* and *Unio*) used in manufacture, and for decorative purposes, hardly one can lay claim to any intrinsic value in the arts and sciences. We must not forget, however, to mention the *Murex*, two Mediterranean species of which, *M. brandaris* and *trunculus*, supplied the famous purple Tyrian dye, and it has been reported that the symmetrical form of *Turritella terebra* suggested to the philosopher Archimedes the idea of the screw.

It is evident, notwithstanding, that shells were not altogether unnoticed, witness the following lines of the poet Lucretius, when, in his grand poem 'De rerum naturâ' he argues about the natures and affinities of matter, and claims

that differentiations must exist in created objects, in order that separate organisms may be distinguished :—

“ Quin intercurrat quædam distantia formis,
Concharumque genus parili ratione videmus
Pingere telluris gremium, quâ mollibus undis
Littoris incurvi bibulam patet æquor harenam.”

Lucr. ii. 374-377.

To Aristotle and C. Plinius Secundus belong the whole merit of successful study amongst the ancients.

The former indeed so admirably planned his system of classification that it may be truly said to have been unsurpassed for nearly 2,000 years, and even now cannot be investigated without the sincerest admiration for his great talents being evoked. His two great families, *Μονοθυρα* and *διθυρα*, univalves and bivalves, are in the former sub-divided into whorled and unwhorled shells, containing (i) the *πορφυροι* and other Gasteropods, and (ii.), *άλιωτις* and *Νηριται*. Whilst among the bivalves he signalizes *κτεναι*=pectines, *σωλην*, *πιννα* and *Τελλινη*, names which will survive to all time in the science. He flourished B.C. 330.

It was not till nearly four hundred years after that Pliny the Elder planned the work of his life, entitled ‘*Historia Naturalis*.’ Born in A.D. 23, this was published in 77, two years before the eruption of Vesuvius which overthrew Pompeii and Herculaneum, and was the cause of his death, having been overtaken in course of flight, by the burning ashes or scorïæ. In the ninth book of this history he treats on shells, but his arrangement was neither so trustworthy or well-planned as that of his predecessor, Aristotle. He introduces many terms, however, which are still in use, making thirty-three families in all, and in many ways his treatise has much to commend it.

I felt it necessary thus to preface the remarks I am about to offer on the occasion of the Annual Meeting of the Conchological Society, being anxious to trace briefly, the progressive part successive generations of our countrymen have taken in furthering our present knowledge of the Mollusca; and, naturally,

the several bases on which they rested their theories, the formulæ of classification, that is to say, that emanated from a few great founders of systems, as Aristotle, Linnæus, Cuvier, and Lamarck must necessarily be mentioned.

I propose to succinctly touch, in chronological order, on the chief writers, travellers, collectors, and students, natives of our islands, who flourished between the latter half of the seventeenth century and the end of 1858, this latter date having been selected for two reasons. Firstly, as the admirable work of Messrs. Henry and Arthur Adams, their 'Recent Mollusca,' was concluded in October of that year, and, secondly, as within three or four years of that time that most indispensable publication, the 'Zoological Record,' published its first volume, which catalogues in order every communication touching on the science, be it large or small.

This period of time seems divisible into four distinct epochs, each either commencing or ending with some radical systematic change leading to a revolution in arrangement.

EPOCH I, 1662—1756.

The earliest Museum of Natural History objects, and the like, amassed in this country, was the famous collection of John Tradescant, father and son, the elder being gardener to Charles I, who was settled at Lambeth, where he established a curious collection called Tradescant's Ark, or the Museum Tradescanti-anum, in which all the natural families and order of Birds, Animals, Fish, were located, special attention being paid to Shells. Tradescant travelled in North America, where he discovered the Spider-wort, named *Tradescantia* after him by Linnæus, and was perhaps better known as a Botanist than Zoologist. His son, inheriting his father's possessions, bequeathed them on his death in 1662 to Mr. Elias Ashmole, founder of the Ashmolean Museum at Oxford, where the large proportion of them are at the present time.

The first book that I can ascertain to have been the production of a writer purely British, containing mention of the Testacea, was that by Merret, published in London in 1677, and entitled "Pinax rerum Naturalium Britannicarum;" the matter however is limited, and not very original, being mostly confined to quotations from Aldrovandus and others.

About the same year Dr. Carleton or Charlton published "Onomasticon Zoïcum," in which three sub-divisions of Shells are made, Turbinata, Univalvia, and Bivalvia, Aldrovandus and Jonston of Amsterdam being largely drawn upon.

Dr. Major next in 1675 re-published the treatise of Fabius Columna, in which all shells are divided into the Univalvia and Plurivalvia, the latter sub-divided into Bivalvia and Plurivalvia, and in 1681 Dr. Nehemiah Grew (1641—1712), published his "Museum Regalis Societatis" in the English language, in which several plates and pages are devoted to the Testaceous molluscs.

Dr. R. Sibbald, in 1684, published a work entitled "Scotia Illustrata," in which for the first time the Land and Aquatic Shells are separated, the latter being divided into (*a*) Freshwater (*b*) Marine. This work was not well carried out, and is full of erroneous theories.

In 1689 Mr. Cole read a paper before the Royal Society, published in their Transactions, on the sources of the Tyrian Dye, obtained from various species of Murex and Buccinum, now Purpura.

At the same time the most celebrated English conchologist of this epoch began to publish his first work, which took seven years (1685—1692) namely Dr. Martin Lister. It was entitled "Historia sive Synopsis Methodica Conchyliorum ad. viv. delin.," four parts and two appendices. The titles of these four divisions were respectively (i) "De Turbinibus terrestribus," (ii) "Aquæ dulcis et bivalvibus aquæ dulcis," (iii) De Bivalvibus marinis et conchis anatifervis, (iv) De patellis Dentalibus, et de Buccinis marinis." About twelve hundred shells are figured in this first class work, in which the author was ably aided by two gifted daughter .

Lister also published nearly forty papers in the Philosophical Transactions. In 1694 appeared his "Exercitatio Anatomica de Cochleis Maximé Terrestribus et Limacibus," and in the following year (1695) "Exercitatio altera de Buccinis fluviatilibus et marinis," and in 1696 "Exercitatio Anatomica tertia Conchyliorum bivalvium." In 1709 Lister was made one of the physicians to Queen Anne, and died three years after receiving the appointment, in 1712, at the age of 74.

Early in the eighteenth century appeared Leigh's "History of Lancashire," in which mention is made of a few British shells. Petiver, also, a most distinguished Naturalist, wrote largely on the same subject in "Philosophical Transactions," flourishing about the year 1692. He was an Apothecary of Aldersgate, and on his death in 1716, bequeathed his Museum to Sir Henry Sloane.

The mention of this latter, the venerated founder of the British Museum, and possessor of the largest collection of Natural History specimens ever brought together, must no longer be delayed. He was born in 1660, and died in January 10th, 1753, at the age of 92. His principal work was the "Natural History of Jamaica," in which the Botany and Zoology of that island are treated of exhaustively, considerable attention being paid to the molluscs. Other West Indian islands were also visited by him. A few years later Dr. P. Browne published a similar work, entitled "The Civil and Natural History of Jamaica" (1756).

About this time also flourished Sir Ashton Lever, of Alkington Hall, near Middleton, Lancashire, son of Sir D'Arcy Lever. His Museum of Natural History was as famous throughout the Northern Counties as that of Sir Henry Sloane in London.

His collections were subsequently removed to London, and were exhibited in Leicester Square, having cost him £30,000 in formation. At his death in 1785, disposed of by public auction, they were purchased by Mr. Parkinson, who erected a suitable building for them near Blackfriars Bridge, on the Surrey side of the Thames.

EPOCH ii. (LINNEAN).—1756—1816.

At the same time that the Duchess of Portland (Margaret Cavendish Harley), in her character as a Mæcenas of natural science, was welcoming all learned men to Bulstrode Park, and was there forming her museum of shells, mainly with the aid of Dr. Solander, Dr. Lightfoot, and her friend Mrs. Delany, the great Linnæus was busily occupied in perfecting his "Systema Naturæ," of which no less than twelve editions were published between the years 1735 and 1767.

The Linnean system of the genera of mollusca is so simple and well-known, that it is hardly necessary for me to do more than briefly allude to it here. All shells are divided into three classes—Multivalves, Bivalves, Univalves. Some very slight attention is drawn to the animal, described in different genera as *Doris*, *Tethys*, *Ascidia*, *Limax*, etc. The Multivalves, contain only the genera *Chiton*, *Lepas*, *Pholas*; the Bivalves, fourteen, viz.: *Mya*, *Solen*, *Tellina*, *Cardium*, *Mactra*, *Donax*, *Venus*, *Spondylus*, *Chama*, *Arca*, *Ostrea*, *Anomia*, *Mytilus*, *Pinna*; the Univalves, nineteen: *Argonauta*, *Nautilus*, *Conus*, *Cypræa*, *Bulla*, *Voluta*, *Buccinum*, *Strombus*, *Murex*, *Trochus*, *Turbo*, *Helix*, *Nerita*, *Haliotis*, *Patella*, *Dentalium*, *Serpula*, *Teredo*, and *Sabella*. Of these, *Lepas*, *Serpula*, and *Sabella* have been since transferred to other branches of Zoology.

Linnæus undoubtedly was not so successful in many ways in his study of the mollusca as in other lines of natural science; his groups, especially in certain univalve genera, e.g., *Voluta*, often embrace strange assortments of widely differing shells, and it must be confessed his system did not tend much to increase the accurate knowledge of the science. His profound knowledge as a botanist far exceeds his powers as a conchologist.

Dr. Daniel Charles Solander, to whom we have just alluded, was intimately connected with the leading naturalists of the time, especially Dr. John Ellis and Sir Joseph Banks, in whose company he voyaged round the world. He was especially

devoted to botany and the study of conchology, many of our most beautiful shells, e.g., *Voluta aulica* and *V. pacifica*, having been described by him from specimens chiefly in the collection of the Duchess of Portland. He died suddenly in 1782 at the early age of forty-six.

In 1768 the famous expedition of Captain Cook, in the "Endeavour," to the Pacific, the object being to witness the transit of Venus, was inaugurated. From Tahiti the party visited New Zealand, and then Australia, which continental island was taken possession of in the name of Great Britain. He then continued the voyage to Java and the Cape of Good Hope, having passed through Torres Straits, and discovered that New Guinea and Australia were different islands. This voyage contributed much to natural science, and not a little to conchology. Capt. Cook's name is immortalized in *Trochus cookii* (Gmelin)=*Cookia sulcata* (Martyn), a native of New Zealand.

Captain Cook undertook a second voyage in two ships, the "Resolution" and "Adventure," in 1772, which returned in 1775, after a three years' navigation of the Pacific and Southern oceans.

In 1776, he sailed again in the "Resolution" and "Discovery," to seek a north-west passage by Behring's Strait. On his return voyage he was massacred by natives at Hawaii in 1779, and so died one of England's greatest navigators, at the age of fifty-one.

We must not omit mention here of Mr. E. M. DaCosta, whose work, entitled, "The Elements of Conchology," was published in 1776. It was followed in 1778 by his "British Conchology," subsequently incorporated with and improved by Donovan in his "Natural History of British Shells." DaCosta was aided by Mr. George Humphrey, familiarly known as "Old Humphrey," the importer of many still extremely rare shells, e.g., *Cypræa valentiana* (Perry), named after one of his patrons Viscount Valentia.

Mr. George Humphrey combined the business of auctioneer with that of dealer in shells and objects of vertu. The principal catalogue he was instrumental in drawing up was that of M. de Calonne, in 1797. In this catalogue a considerable number of generic or specific names are introduced by Humphrey, so it is of importance to students of nomenclature. Amongst his genera are *Eutropia*=*Phasianella* (Lam.), *Galerus*, *Onustus*, and *Elenchus*.

DaCosta was the first to separate *Aporrhais* from *Strombus*.

Mr. Thomas Pennant (1726—1798), of Downing, Flintshire, the ancestor of the present Lord Penrhyn, was an enthusiastic conchologist. In 1750 he commenced a correspondence with Linnæus, to whom he had sent a specimen of *Anomia* from northern seas. Possessed of ample means, he was able to indulge his tastes for travel, and may almost have been said to have introduced Scotland to the people of England, through his published accounts of his travels in that country in 1769. He wrote a treatise on shells in vol. iv. of his "British Zoology." This work threw a good deal of light upon a subject then but imperfectly studied, and showed an advance upon previous attempts of the kind.

In 1784, Martyn published "The Universal Conchologist," part i., in which the plates, as the work proceeded, were much admired, more so than the letterpress, which was too scanty and not free from many errors.

The same year Messrs. W. Boys and G. Walker published a work, entitled "Testacea Minuta Rariora Nuperrimè Detecta in Arenâ Litoris Sandwichensis," dedicated to the late Duchess of Portland. This curious little work is an account of some of the molluscs of Sandwich, in Kent. The Revd. Dr. Lightfoot, author of the "Flora Scotica," also described some minute shells, not before observed on English coasts. Several of these are foraminifera.

In 1797 Mr. J. Adams described a number of minute shells

found on the Pembrokeshire coasts—in the third and fifth volumes of the Linnean Transactions.

The last year of the eighteenth century produced the new edition of “The Natural History of Dorsetshire,” by Mr. Hutchinson, to which Dr. Pulteney contributed “The History of the Mollusca.”

Dr. Richard Pulteney (1730—1801), a distinguished botanist and conchologist, was a physician by profession, resident at Blandford, in Dorsetshire. One of his chief works was “The General View of the Writings of Linnæus,” published in 1782.

Mr. E. Donovan also commenced the publication of his “Natural History of British Shells” about the same time. This was not completed till 1804, and is in five volumes, a first-class work of its time, and a lasting monument to the fame of its author.*

In 1801 Mr. William Wood (1774—1858) commenced his conchological labours by a paper, called “Observations on the Hinges of British Bivalve Shells,” figured by Mr. Henry Boys. He was a publisher in the Strand, and in 1814—15 brought out the first volume of a work, entitled “General Conchology,” which in time gave place to a work we shall more particularly notice during the next epoch.

In 1803 Colonel George Montagu (1751—1815) published his “Testacea Britannica,” and in the following year, 1804, commenced his “Descriptions of Marine Animals (Mollusca, Crustacea, and Vermes), discovered on the south coast of Devonshire. This work was not concluded till 1815. Turton dedicated to him the genus *Montacuta*. Colonel Montagu was the most distinguished British conchologist of the early years of this century. He described a few genera, e.g., *Lamellaria*; and *Cypræa europæa* owes its specific name to him.

* For a full account of the authors of this and preceding period, consult Dr. Maton and Revd. T. Rackett’s “Historical Account of Testaceological Writers.”—“Trans. Linn. Soc.,” vol. vi., 1804.

The next few years do not seem to have been prolific in conchological lore; but we must not forget Mr. George Perry, who, in 1811, published his "Conchology; or, the Natural History of Shells," a folio volume, with sixty-one plates and corresponding letterpress. Owing to the author almost entirely ignoring any priority of nomenclature, both in species and genera, and the fantastic figuring and coloration of his plates, he has been ridiculed and held in contempt by subsequent writers, especially Reeve and Sowerby, the former, indeed, censuring him in language which might almost be called unparliamentary, though we must confess there was some measure of excuse for all that was written. Perry, however, was the first to give appellations to certain *Cypræa*, e.g., *valentiana*, formerly known as *princeps*, and this name of Perry's must stand. *Murex rota* (Sowb.), must yield also to *M. anatomica* (Perry). The genus *Columna*, a curious sinistral land shell, is also duly recognised. Mr. S. Brookes, in 1815, brought out an "Introduction to the Study of Conchology." This work is now almost forgotten, as is Mr. S. Burrows' "Elements of Conchology," published the same year.

EPOCH iii., 1816—1824.

This, though not embracing more than eight years, is perhaps the most important period in the history of the classification of molluscs, for it includes the writings of the illustrious Baron Cuvier, who, in 1815, completed his "Memoire pour servir à l'Histoire de l'Anatomie des Mollusques." This work may justly be said to be the starting point in the right direction of the physiological study of the animals rather than the shelly fabric they inhabit, with a view to their correct classification and systematic position; and almost coeval with this, from 1815—1822, appeared the classical work of the Chevalier Jean Baptiste de Lamarck, his "Histoire des Animaux sans Vertébrés," undoubtedly his greatest work, and one of the most important

that has ever appeared in connection with the subjects on which it treats. Lamarck in this, and his previous work, published in 1799, entitled "Prodrome d'un Nouvelle Classification des Coquilles," re-classified the molluscs, ordaining many new genera, most, if not all, of which survive to the present day, besides describing a host of new species.

The perspicuity of this great man's genius will always be felt and honoured by followers of his favourite science, and the fundamental substructure of the Lamarckian system with but little alteration and improvement, exists at the present day. In 1835 M. Milne Edwards and Deshayes published a second edition of Lamarck's "magnum opus."

Mr. Lewis Weston Dillwyn (1788—1855), a celebrated botanist and conchologist, compiled in 1817, a "Descriptive Catalogue of Recent Shells, arranged according to the Linnæan Method," 2 vols. octavo. This was a work involving much labour, and was dedicated to his friend Sir Joseph Banks. In 1823 he supplied "An Index to the Historia Conchyliorum of M. Lister, with Occasional Remarks," printed at the Clarendon Press, Oxford. Shortly after this time he reported the occurrence of the violet snail (*Ianthina fragilis*) at Swansea, and likewise described a goodly number of species of exotic shells from time to time in various scientific periodicals. He was elected M.P. for Glamorganshire in 1832, after the passing of the Reform Bill, which necessitated a General Election; and as Vice-President of the British Association, which visited Swansea in 1848, took the warmest interest in the meeting. Mr. Dall has recently dedicated to his memory the genus *Dillwynella*.

Dr. W. Elford Leach, in 1814, started the "Zoological Miscellany," which contained descriptions of new and interesting animals. His chief taste was in conchological studies, and he became very famous as an acute observer and describer of new species. Amongst Dr. Leach's genera still recognised are the following: *Bithinia*, *Assiminea (grayana)* Leach, *Zizyphinus*,

Margarita, *Cemoria*, *Alexia*, *Zirphæa*, *Martesia*, *Phorus*, *Lasea*, *Thracia*, and *Macoma*. Born 1790, died 1836.

In 1820 Mr. G. B. Sowerby and Mr. J. Sowerby began a magnificent work entitled "The Genera of Recent and Fossil Shells." This was not completed for four years, and contains upwards of 250 coloured plates. Mr. G. B. Sowerby the same year wrote "Some Remarks on the Genera *Orbicula* and *Crania* of Lamarck."

In 1825 appeared the same author's "Catalogue of the Shells contained in the Collection of the Late Earl of Tankerville," soon to be dispersed by auction. This nobleman had a magnificent collection, containing about 2500 forms, and many rare shells, *e.g.* the specimen of *Conus gloria-maris* purchased at this sale by Mr. Broderip, and passing eventually from him into the British Museum. A collection of shells lately presented intact to the Peel Park Museum, Salford, formerly belonging to Mr. Lincolne, is to a great extent composed of purchases at Lord Tankerville's sale. This catalogue embraced many descriptions of new species, this being one of the most distinguished collections of the time and replete with novelties, and the notoriety of this catalogue has served to keep the memory of the "Museum Tankervillianum" green, even at the present time. Mr. Sowerby died 1854.

Dr. W. Turton in 1822 published his "Conchylia Insularum Britannicarum," a work that was much thought of some years ago, and ran through several editions, edited by Dr. J. E. Gray.

Amongst Turton's genera we still use *Lacuna*, *Xylophaga*, *Pholadidea*, *Ervilleia*, *Sphenia*, *Lyonsia*, *Strigilla*, *Galeomma*, *Montacuta*, *Kellia*, *Goodallia*, *Cryptodon*, and *Lepton*.

Lastly, in 1823, Mr. John Mawe, of 149, Strand, London, the author of "Travels in Brazil," and "Treatises on Diamonds and Precious Stones," etc., gave to the world "The Linnean System of Conchology, Describing the Orders, Genera, and Species of Shells." This work is illustrated with accurately-drawn plates, and a coloured frontispiece in which *Helix* (now

Bulimus papyracea (Mawe) and *Voluta harpa* are delineated for the first time.

EPOCH iv., 1825—1858.

The last period being, as I said, conspicuous for the development of systematic classification, mainly due to the labours of two energetic Frenchmen, this fourth epoch is signalized by the high spirit of British enterprise, exhibited in several successful scientific expeditions and cruises, on the chief of which I shall briefly touch, coupled with the arduous personal explorations of scientific travellers, more especially Mr. Hugh Cuming, whose labours were primarily directed to shells. The number of papers and treatises on Conchological subjects gets larger year by year, and it is impossible in a brief sketch of this kind, to mention more than the leading of them.

It was in 1825 that Dr. John Edward Gray, the enlightened keeper of the Zoological Department at the British Museum for so many years, published one of his earliest, if not his earliest, treatises on Mollusca, 'List and Description of some species of Shells not taken notice of by Lamarck,' 1825. This, with some minor papers, was followed by an important one 'On the Difficulty of distinguishing certain Genera of Testaceous Molluscs by their Shells alone,' 1835, printed in 'Philosophical Transactions.' In 1848 he published 'The structure of Chiton.' From 1842—1857 he was engaged with his wife, Mrs. Maria Emma Gray, who was responsible for the beautifully executed and accurate plates, four hundred in number, in the important work entitled 'Figures of Molluscous Animals selected from various Authors.' Later on, he published several British Museum Catalogues of the Mollusca, including the Pteropoda, Brachiopoda, Volutidæ, and Olividæ, and a valuable treatise on the 'Tongues of the Mollusca.'

He rivalled Messrs. Sowerby, Adams, and Reeve in the number of new species he described. Hardly a genus that does not contain some shell to which he stood godfather.

His connection with the British Museum lasted well-nigh half-a-century. His wife was as accomplished a naturalist as himself, and he has immortalized her name in *Haliotis emma* (Gray) and *Voluta Maria-emma* (Gray), the latter a shell still unique, and of which the only specimen is in the National Collection. Dr. Gray, a man of multifarious attainments, distinguished in nearly every branch of Zoology, yet found time to interest himself in what is now called Philately, the collecting of Postage Stamps, and one of his last works was the publication of a guide to the collection of these articles. He died 1875, aged seventy-four, his widow surviving him one year only.

About 1825-1835, the celebrated naturalist, Dr. W. Macleay, founder of what is called the circular system of classification, published from time to time certain 'Anatomical Observations' on the Mollusca.

E. Crouch in 1827 brought out an Illustrated Introduction to Lamarck's Conchology, with 22 plates, some of which are very beautifully delineated.

Mr. William Wood, of whom brief mention has already been made, commenced in 1818 and concluded in 1828 an important work entitled 'Index Testaceologicus, or a Catalogue of Shells, British and Foreign.' This work supplanted his previously conceived 'General Conchology,' of which the first volume only was published. In this were figured nearly 3,000 specimens of shells, for the most part accurately drawn and figured, although the reduced size of many of them renders them less valuable to science than they would otherwise have been. Mr. Sylvanus Hanley in 1855 published a new and entirely revised edition. Mr. Wood was also known as an entomologist, and published similar works on the Lepidoptera to those we have just mentioned on Conchology. He died May 26th, 1857, aged 84, and was, I believe, related nearly to the late Rev. J. G. Wood, whose popular works on Natural History have done so much good service.

Dr. (afterwards Sir Charles) Lyell in 1829 brought out an

essay 'On some recent and fossil shells from Canada.' This eminent geologist, whilst naturally studying the fossil mollusca more closely, found time to observe many of the recent species in the course of his two expeditions to the United States. He was born 1767, died 1849.

In 1825—1828 the Voyage to the Pacific and Behring's Straits, performed by H.M.S. Blossom, took place. This was under the command of Captain F. W. Beechey, and Lieutenant (afterwards Sir Edward) Belcher assisted him in the collection of the Mollusks. About thirty new species were described by Messrs. Broderip and Sowerby in 'Zoological Journal,' vol. iv. 1829. Amongst these the most interesting undoubtedly is the still rare *Cardium belcheri* (Brod. and Sowb.) of which three specimens were taken in fifteen fathoms in the entrance of the Gulf of California. The task of describing the bulk of the new shells collected in this expedition was, however, undertaken by Dr. J. E. Gray, who incorporated with them at the same time several new species collected on the west coast of America by the Rev. Mr. Hennah, Captain Lord Byron, Mr. Fryer, and other Englishmen.

It was in 1827 that Mr. Hugh Cuming set out on his first great voyage of Conchological discovery. This most successful of all collectors was born in February, 1791, at West Alvington, near Kingsbridge, Devonshire. At first apprenticed to a sail maker, he settled himself in this business at Valparaiso till 1827, when he built himself a yacht and remained for three years exploring the West Coast of America. He took notes of his various dredgings, but owing to his often exchanging specimens which were afterwards insufficiently or erroneously labelled, much doubt and uncertainty has of late years arisen as to his exact localities, this militating against the value of his collections from a geographical point of view. Whenever, for instance, he had a dead specimen, dredged by himself, and had the subsequent opportunity of securing a live and better example of what appeared the same species, he

never scrupled to change one for the other, usually retaining the original label.

About 450 species were described from these gatherings as novelties, of which perhaps the most interesting is the still unique *Columbella pulcherrima* (Sow.). The Proceedings of the Zoological Society from the year 1832 were filled with descriptions of Mr. Cuming's new species, mostly by Reeve, Broderip & Sowerby. After cruising down the West American coasts, he visited the South Pacific, touching at Pitcairn's Island, the Isle of Annaa, and other rich resorts. Three or four years afterwards in 1835-36, through the influence of the then Earl of Derby, a distinguished patron of the Sciences, Mr. Cuming visited the Philippine Islands, where he was treated with the utmost consideration by the authorities, and granted every facility for prosecuting his favourite researches. It is reported that the native children were hired to scour the woods for rare Helices and Bulimi, while divers and others ransacked the rivers and coral reefs. Mr. Cuming collected 2,500 species of marine shells at the Philippine Islands (Woodward), of which 250 were Mitra, 120 Conus, 100 Pleurotoma, 50 Cypræa, and in land shells over 500 species. He also collected 130,000 specimens of plants, both living and dried, including many novelties, and the result was the richest collection of novelties ever amassed by one man, and from the year 1839-40 till his death in August, 1865, he was engaged in arranging and classifying his unexampled stores in Gower Street, London, which, after his death, were sold to the British Museum for the consideration of £6,000. His cabinets of shells are supposed to have contained eighteen thousand species or more, which now are almost entirely incorporated with the National collections.

Gray dedicated to him the genus *Cumingia* (*Tellinidæ*) and hardly a genus but does not have some representative named in honour of this most distinguished of all collectors of shells.

It was in 1830 that Professor (now Sir Richard) Owen gave to the world the results of his investigations on the animal of

Nautilus pompilius. Though this great naturalist has published innumerable papers, all of much scientific value, upon almost every branch of Biology and Geology, there are few groups he has studied with more marked success than the Cephalopoda, both in recent and fossil state. He is still happily amongst us, and we will therefore content ourselves with saying *nihil est quod non tetigit, nihil tetigit quod non ornavit*.

In 1832 the Rev. Leonard Jenyns (now Blomefield), who still happily survives at a very advanced age, as Father of the Linnean Society of London, wrote a "Monograph on the British species of *Cyclas* and *Pisidium*."

Dr. George Johnston the same year gave a short story on "The Natural History of Molluscus Animals."

Rear-Admiral Philip Parker King, R.N. (then Lieutenant), (1793—1856), had in 1817 been entrusted to complete Captain Flinder's survey of the coasts of New Holland, and made four voyages there altogether, first in the "Mermaid" Cutter, and then in the "Bathurst" Sloop. Dr. J. E. Gray described the mollusca of this expedition. In 1825 Captain King was appointed to the command of the Sloop "Adventure," with orders to survey the Southern Coasts of South America, with Tierra del Fuego. In 1830 he returned to England, leaving Captain Fitzroy to complete the remainder of the survey, and to publish the account of the expedition of H.M.S. "Adventure" and "Beagle" between the years 1826 and 1836. Mr. Broderip, to whom we shall soon allude, assisted Admiral King in the conchological portion of this narrative, the Admiral himself publishing in Zool. Jour., v, 332, an article "On the Cirrhipedia, Conchifera, and Mollusca collected by the officers of H.M.S. "Adventure" and "Beagle," 1826—30," as well as some ornithological articles.

The mention of H.M.S. "Beagle" cannot fail to recall that standard work of travel "A Naturalist's Voyage Round the World," by Charles Darwin. This model of what such an account should be, dedicated to Sir Charles Lyell, touches in a graphic manner on all and every subject dear to Naturalists of

all denominations, and Conchologists will find among other interesting details an account of the peculiar shell fauna of the Gallapagos Islands.

The voyage of the "Beagle," so happy in its naturalists and so fruitful of subject matter for theorists and students at home, no doubt paved the way for similar expeditions; and in the year 1836 the voyage of H.M.S. "Sulphur," under command of Sir Edward Belcher, R.N., and Lieut. Comm. Kellett, commanding the "Starling," started on its expedition to West American shores. For seven years the cruise lasted, and it was not till 1844 that Mr. Richard Brinsley Hinds, the surgeon to the expedition, published the account of the Mollusca. This gentleman was one of the best conchologists of the time. Very few of his species have ever been questioned, and his discoveries seem to have been more in the rarer and more choice genera. His accuracy in exactly recording the situation, depth, &c., of each species obtained, either by means of the dredge or at low water, serves as an example for all. The "Sulphur" explored the west coast of Central America and Mexico as far as San Blas, and afterwards from Acapulco to Cerro Azul, having previously visited Callao and Payta, in Peru, and also Panama. Mr. Hinds, unfortunately, did not long survive this expedition.

The Antarctic voyage of the "Erebus" and "Terror," which lasted for seven years (1836—1843), under the command of Captain Sir James C. Ross, who had had full experience under Sir Edward Parry in the Arctic regions ten years previously in the "Hecla," was happy in the scientific officers of the expedition, especially Dr. (now Sir,) John D. Hooker, who wrote the botany of the voyage. Dr. J. E. Gray edited the zoological portion. The mollusca were not very largely collected. Mr. Edgar Smith has within the last fifteen years (1874) published an account of them with four plates.

The late Philip Barker Webb lived almost entirely away from his native country, and his famous collections are, I be-

lieve, now in Florence. He was one of the first collectors both of the botany and zoology of the Atlantic Islands, and of the Iberian Peninsula, likewise the Morocco coasts. He will principally be remembered, in conjunction with M. Berthelot, for the masterly work on the fauna of the Canary Islands: "Histoire Naturelle des Canaries," (1833). The list of shells there given has been enlarged by Mr. R. Macandrew, and now forms one of the British Museum catalogues. He died *circa* 1854.

We have mentioned the name of Mr. Broderip, and now it behoves us to give a short account of his distinguished career. William John Broderip was born November 21st, 1789, and matriculated at Oriel College, Oxford, where he made the acquaintance, among others, of Dean Buckland. In 1817 he was called to the Bar, and practised with success. In 1822 he was appointed by Lord Sidmouth a magistrate at the Thames Police Office. For thirty-four years he continued to hold that position, till the year 1856. He found time to acquire a vast collection of conchological treasures, and before long his cabinets were considered one of the sights of scientific London. Indeed, with Mr. Cuming's, it now forms one of the chief portions of our National Collection, for the British Museum authorities purchased it entire. In company with Mr. Sowerby and Mr. Reeve, he described multitudinous new species from either the Cumingian collection or some of the scientific expeditions, and besides this, with Professor R. Owen, he wrote a treatise 'On the Anatomy of Brachiopoda, with descriptions of new species,' 1834; 'Zoological Recreations,' 1847, and 'The Note Book of a Naturalist,' 1851. He also contributed a 'Table of the Situations and Depths at which recent genera of Marine and Estuary Shells have been observed,' to the Appendix of De La Beche's Researches in Theoretical Geology, and above all, nearly the whole of the scientific Articles in the Penny Cyclopædia, including those on Conchology, which are very extended and lucid, are by his hand. He died suddenly, in the midst of his literary labours, on the 27th February, 1859, in his seventieth year.

It was in 1833 that Dr. J. Gwyn Jeffreys contributed his first conchological article entitled 'The Synopsis of Testaceous Pneumonobranchous Mollusca of Great Britain.' Most of this lamented conchologist's writings are of a later period than we propose to treat of in this address, being mainly written after the year 1860, but we cannot refrain from noticing his great worth here, especially as regards his researches into the Mollusca of British and Northern Seas, and expressing our regret that his collections, so unique and valuable in rare types, should have been suffered to go out of this country, and be purchased by an American Institution. He possessed a more intimate knowledge of the shores of the North Atlantic than has been the lot of any other man. He died at his residence, Ware Priory, Herts., January 24th, 1885, aged 77. His greatest work undoubtedly is 'British Conchology,' in 5 vols., 1862—69.

Thomas Nuttall, born at Settle, 1786, although claimed by the Americans as one of their sons, yet is undoubtedly an Englishman both by parentage, and locality both of birth and death. Most of his life, however, was spent in explorations in North America, and Prof. W. H. Dall has, not long ago, given a resumé of his life and labours, treating him as one of the eighteen most distinguished American conchologists. His greatest passion was for Botany, and Prof. Asa Gray and Torrey have granted him the chief place in having 'contributed more than any other man' to the advancement of the Flora of the U.S.A. At that time hostile tribes of Indians filled the whole country between the Pacific Coasts and the Mississippi, and any journeyings thither were attended with the utmost danger. He collected shells in Upper California and Oregon, and Mr. Conrad described them in *Trans. Am. Phil. Soc.*, vol. vii, pp. 227—268. A great deal of confusion arose in the disposition of these collections. Many, including a few not named by Conrad, were placed in the cabinet of Mr. Jay, of Philadelphia, and Mr. Nuttall, on his return to England, where he settled near Liverpool, sent out specimens of those very shells with new

designations, not having access to Conrad's work, so confusion has become worse confounded. The Rev. P. P. Carpenter has striven, with some success, to elucidate this mass of difficulties. Mr. Nuttall, who was at one time Professor of Natural History in Harvard University, Cambridge, U.S.A., died on September 10th, 1859, aged 73.

In 1834 Mr. R. Grant wrote a paper "On the Anatomy of the *Septioloa vulgaris* (*Loligopsis*) with descriptions of two new species."

Mr. W. Thompson in 1835 gave the results of his studies on the "*Teredo navalis* and *Limnoria terebrans*" on the coasts of the British Islands, followed, a few years later, with the "Catalogue of the Land and Freshwater Mollusca of Ireland," 1840.

Mr. William Swainson, born Oct. 8th, 1789, travelled in early life in the Mediterranean, and explored Sicily for eight years, also visiting Greece and Italy. In 1815 he retired upon half-pay, and devoted the rest of his life to travelling and studying Natural History. The following year he visited Brazil, obtaining from thence a store of treasures which formed the nucleus of the material described in a periodical started by him in 1820, entitled "Zoological Illustrations," and shortly afterwards another called "Exotic Conchology," the plates for which he lithographed himself. He edited the treatise on "Shells and Shell-fish" in "Lardner's Cabinet Cyclopædia," and a few years later the "Elements of Conchology, for the use of Students and Travellers." About 1840 he emigrated to New Zealand, and in 1851 visited Sydney, returning soon afterwards to New Zealand. He died Dec. 7th, 1855, aged 66. He described many species of shells, paying considerable attention to the genus *Mitra*, wrote a monograph of the genus *Ancillaria*, treated of "The characters of *Achatinella*, a new genus of Terrestrial Shells," and "On *Iridina*, a genus of Freshwater Bivalve Shells," besides many papers on Ornithology. His collection formed the principal portion of the old Manchester Museum, the nucleus of that lately transferred to Owens College.

Lady Katherine Wigram (formerly Douglas) collected vigorously in Oregon, and a handsome Chiton (*Katherina douglasia* Gray) was named doubly in her honour. Many specimens were first brought into notice by her collections.

* Mr. J. Fleming published "Molluscous Animals," Edinburgh, 1837. In 1838 Mr. G. B. Sowerby started "The Testaceological and Conchological Magazine," for private distribution only, and but ten parts were issued. It was followed by his "Conchological Magazine" the following year, 1839, which went through four editions, the last being issued in 1852.

In 1842 the same author began a fine work still in process of publication, having been continued by his son, the late Mr. G. B. Sowerby, and now by his grandson, the third of the same name. This work is styled "Thesaurus Conchyliorum," and nearly fifty parts, each mostly containing one or more complete monograph, has appeared. In this magnificent compilation figures and descriptions of every species known at the time of writing the monograph are given with a fidelity rarely, if ever, surpassed.

Among foremost collectors of this period, specimens from whose cabinets extensively aided Mr. Reeve when in 1843 he embarked on his "Conchologia Iconica," was the Revd. Francis J. Stainforth, who was of a Yorkshire family, and on his mother's side related to the Barings. At first he entered the army, and served in India, and on his retirement, having received his Captaincy, took holy orders. For many years he was curate to my uncle, Rev. Canon Henry Melvill, near London. In 1851 he was appointed rector of All Hallows', Staining, in the city of London, which he held to his death in 1869. He was a keen collector, and indeed at times carried the pursuit on almost too enthusiastically, not minding what sums he spent, provided possession was attained. His collection of cones became famous from having been figured so freely in "Reeve's Conchologia Iconica" in 1843; but shortly after the publication of the second volume

* This gentleman instituted the genera *Cingula*, *Skenea*, *Cæcum*, *Segmentina*, and after him was named *Flemingia*.

of this work, the Stainforth collection was sold, and scattered widely. His son, General Stainforth, who has recently died, inherited his tastes to a great extent.

Professor Edward Forbes was born at Douglas, Isle of Man, in February, 1815, and having studied in London and Paris, in the latter place under Geoffrey St. Hilaire, De Blainville, and Jussieu, he started a series of scientific tours, the main features of which were dredging after marine forms in the British, Mediterranean, and Ægean seas. In 1841 he joined the "Beacon" as naturalist of the voyage, and on his return was elected to the chair of botany, in Kings' College, London. In 1851 he was chosen professor of natural history in the School of Mines in Jermyn Street, Piccadilly, then just established: and, finally, in 1853 he was appointed to the vacant chair of natural history in the university of Edinburgh. The circumstances of his short illness and death at the early age of thirty-nine are not yet forgotten by his contemporaries. He died November 18th, 1854. His principal writings on shell-fish are "On the Distribution of Pulmoniferous Mollusca in Europe" (1838); "The Radiata and Mollusca of the Ægean" (1843); "Travels in Lycia," jointly written with Colonel Spratt (1846); Forbes' and Hanley's "British Mollusca" (1853), a magnificent work in four volumes; besides his well-known standard books on other subjects, e.g., "Star-Fishes," published in 1841.

An admirable memoir of this much-regretted naturalist has been published by Messrs. Wilson and Geikie. A better all-round man has rarely lived. He may almost have been said to have *invented* the dredge for scientific purposes.

Professor Forbes also described the mollusca obtained by the surveying voyages of the "Herald" and "Pandora," by Capt. Kellett, R.N. and Lieut. Wood, R.N., in two papers communicated to the Zoological Society of London, in 1850, the first on the terrestrial, the second on the marine shells of the expedition. There was not very much of novelty in these gatherings, the expedition having cruised over well-investigated

ground, viz. :—Southern Californian coasts and the shores of Mazatlan. The Galapagos Islands, however, have produced some interesting terrestrial forms, which were named by Professor Forbes *Bulimus chemnitzoides*, *achatellinus*, *fimbriatus*, and *Succinea cingulata*. Many of his most valuable contributions to science were given through the “Reports of the British Association.”

Lovell Reeve, the well-known publisher of Henrietta Street Covent Garden, one of the most devoted Conchologists that our country has produced, in the year 1841 published two large quarto volumes entitled “Conchologia Systematica,” the 300 coloured plates being by Sowerby. It was probably the success of this work that led him to conceive the far more ambitious project of delineating every known shell by a life-size figure, each genus being separately monographed. This great work began with the genus *Conus* in 1843, Mr. G. B. Sowerby being responsible for the plates, while Reeve supplied the letter-press. Whilst the fifteenth volume was in process of issue, Mr. Reeve, who had long been in failing health, died (1866), leaving Mr. Sowerby to complete the work.

The Conchologia Iconica will live, more on account of the excellence of its plates than its letter-press, the former indeed always excepting the two last volumes, which show traces of undue haste, are in Mr. Sowerby’s best style, and are not to be surpassed, but Mr. Reeve was an accurate observer, and his descriptions of the thousand or more new species he has given to the world are all lucidly given in Latin and English, and the majority must stand the severe light of more modern criticism. Although the late Mr. G. W. Tryon has attempted to cast a slur upon Messrs. Reeve, Adams and Sowerby’s work in differentiation, he has not succeeded very well, often falling himself into grave mistakes in the endeavour. Mr. Tryon’s monograph of the genus *Mitra*, for instance, is full of the most astounding theories and errors, and the Rev. A. H. Cooke has, in the Journal of Conchology, recently exposed his ignorance of the genus *Purpura*. Mr. Reeve was an acute painstaking Conchologist, living in close communication

with Messrs. Cuming, Adams, and Broderip, and he concurred with them in much Conchological work of the greatest benefit to the Science generally. His two subsequent works were "Elements of Conchology," 2 vols., and "The Land and Freshwater Mollusks of Great Britain," 1 vol.

June 29th, 1842, is famous as the date on which the Committee, appointed by the British Association, who met that year at Manchester, completed their report on the "Series of propositions for rendering the nomenclature of Zoology uniform and permanent," the law of priority, dating from xii. ed. of Linnæus' *Systema Naturæ*, being then enforced in all cases, as it was then the bi-nomial system may be said to have commenced. This report was signed by twelve well-known scientific men, including Prof. Owen, C. Darwin, W. J. Broderip, and Rev. L. Jenyns, now Blomefield.

In 1835 the voyage of the "Rattlesnake" started, the narrative of which has been so pleasingly treated of by MacGillivray.

In 1845 Miss Agnes Catlow, a lady who had already published a popular work on "Conchology, or the Shell Cabinet Arranged," joined Mr. Lovell Reeve in preparing a Catalogue of all known Recent Shells. At this time they only numbered about 8000. The synonymy was also given, and the catalogue for a time superseded that of Mr. Dillwyn and Mr. Gray.

Mr. Samuel Stutchbury, the son of a mathematical instrument dealer in London, was, in 1825, engaged as naturalist of an expedition to the Pearl Fisheries of the Pacific Ocean, and soon afterwards became curator of the Bristol Institution, where he had the privilege of instructing, among others, the Rev. P. P. Carpenter. In 1843 he visited New Holland, and made large collections of Natural History. His chief conchological paper was in the Magazine of Natural History, Series 2, p. 114, "On *Cypræcassis*," in which by the form alone, he attempted to prove an intimate connection between *Cypræa* and *Cassis* through *C. testiculus* and *C. rufa*. He died at Bristol, aged 61,

in February, 1859. The establishment of genera *Myochama* and *Cleidothærus* (*Chamostrea*) we owe to him.

It was also in 1844 that Mr. Thomas Brown published "Illustrations of the Recent Conchology of Great Britain and Ireland," (1848), followed by the fossil representatives four years later.

Mr. Sylvanus Hanley, our accomplished President for last year, has during his long life contributed many important papers and treatises on the Mollusca, amongst which are—"Illustrated and Descriptive Catalogue of Recent Bivalve Shells," London, 1842—56, with figures of 960 species. Many of the types of these are in Mr. Hanley's collection. "Ipsa Linnæi Conchyliæ," Linnæus' shell-types, determined from his MSS., London, 1855, and we have already mentioned his "History of British Mollusca" in conjunction with Prof. Forbes.

Mr. J. P. Dalyell produced about this time two large and elaborate works on Scotch Natural History, viz. "Rare and Remarkable Animals of Scotland (Mollusca and Vermes), 2 vols., 1847, 1848, quarto, with 110 coloured plates; and "The Power of the Creator in Ordaining Life among the Humbler Tribes of Animated Nature" (Crustacea, Mollusca, and Vermes of Scotland), 3 vols., 1851—1858, quarto, with 142 coloured plates.

In 1848 Mr. Joshua Alder published a Catalogue of the Mollusca of Northumberland, and, in company with Mr. Albany Hancock, undertook the arduous task of producing that standard work, "Monograph of British Nudibranchiate Mollusca," with figures of all the species, 1845—1855, on which the fame of the authors will chiefly rest, published by the Ray Society.

Contemporary with Mr. Alder was Mr. W. Bean of Scarborough, who amassed an important collection of British Shells, *Rissoa beanii* was named in his honour.

Mr. John Samuel Gaskoin, born in September, 1790, entered the medical profession, and in 1823 was appointed surgeon in ordinary to George IV. at Brighton, and in 1830 the

same appointment was given him in respect to William IV. He chiefly studied Marine Gasteropoda among the molluscs, and his name will always be more particularly associated with the genus *Trivia*, many of the more critical species of which he was the first to differentiate, publishing many descriptions in Proc. Zool. Soc., 1846—48. He died suddenly in Clarges Street, London, Oct. 5th, 1858, aged 68, whilst occupied in writing down some descriptions of shells. Mr. Thomas Lombe Taylor, of Starston Hall, Norfolk, who at the time of his decease, was supposed to have accumulated a store of shells superior even in number and quality to the Cumingian collection, bought the whole of Mr. Gaskoin's shells, including his types of *Columbella*, *Marginella* and *Cypræa*. These were again disposed in 1879-80, when I acquired a great many of the types, and also Mr. Gaskoin's cabinets.

In 1855 Dr. T. Davidson began to publish some anticipatory "Remarks on the Brachiopoda," which ultimately led to his recently concluded magnificent "Monograph on the Recent Brachiopoda" in the last published volume of Trans. Linn. Soc. (Zoology). He died in 1888.

Mr. John Adamson, formerly Under-Sheriff of Newcastle-on-Tyne, and secretary of the Literary and Philosophical Society of Newcastle, was an enthusiastic conchologist. Many of his shells are figured in Reeve's classic works, *Cypræa* and *Mitra adamsonii* and the beautiful *Bulimus adamsonii* will serve to render his name unforgotten. He was born 1787, and died 27th September, 1855, aged 68. He was a distinguished antiquarian, and numismatist, and at one time possessed a very valuable library, but this, in 1849, was unfortunately destroyed by fire.

Dr. Thomas Bridges, (1807—1865), son-in-law to Mr. Hugh Cuming, travelled in South America, as a plant-collector and in search of Mollusca, Mammals, and birds. Many of his specimens are described in Proc. Zool. Soc., 1856. In his honour *Bulimus bridgesii* was named.

Mr. Samuel Porter Woodward, born 1822, son of an eminent Norwich antiquarian, early took interest in geology, and more particularly fossil mollusca. He succeeded Searles Wood in his position at the British Museum, and accepted many important posts, amongst others the Secretaryship of the Geological Society. In 1851 he commenced his "Manual of the Mollusca," which was completed in three parts in 1856. His work was immediately accepted as the best text book for the science, having run through four editions, the latter being augmented, with an appendix by Prof. Ralph Tate. The system of classification followed was that advocated by Prof. Edward Forbes, and the same scheme was employed by Prof. (now Sir Richard) Owen in his articles on "Mollusca," in the viii. ed. *Encyclopædia Britannica*, 1858. M. Paul Fischer's "Manual de Conchyliologie," 1887, may be considered the latest exponent, with many emendations and alterations in systematic arrangement, of Mr. Woodward's treatise. Prof. Woodward died at Herne Bay, at the early age of 44, June 11th, 1865, just two months before Mr. Hugh Cuming.

The principal Indian malacologist of this period was Mr. W. H. Benson, who between 1842 and 1865 described many land and fluviatile shells from that country, Burmah, and Ceylon, also several from Western and Tropical Africa.

To the Rev. Richard T. Lowe is due the differentiation of the land molluscs and marine shells of the Madeiras, Porto Santo, and the Desertas; likewise in company with Mr. Vernon Wollaston of many species of land shells in the Canary Isles and Morocco. He was, unfortunately, lost with all on board on his return to Madeira from England in April 1874, aged 72 years, having left unfinished his "Flora of Madeira," (complete so far as the Solanaceæ) and one other work, "Primitiæ et Novitiæ Faunæ (Malacolog.) et Floræ Maderæ et Portus Sancti" (1851).

In 1855 Mr. W. Clark published "British Marine Tes-

taceous Mollusca." He established the genus *Barleeia*. This work is highly spoken of by Dr. Jeffreys and others.

Mr. Robert James Shuttleworth, an ardent botanist and malacologist, whose botanical collections were acquired by the British Museum some ten years ago, lived mainly in Switzerland or Italy, and published most of his diagnosis of new mollusca in the German language, such as "Diagnosen Neuer Mollusken," (Bern, 1852); "Notitiæ Malacologicæ, Beiträge Z. näh., keorntn. (neuer) Mollusken" (1856—1858).

Mr. Robert Macandrew, born in 1802, near London, removed to Liverpool when commencing business about 1828. He travelled much in Spain and other south European countries, and never lost opportunity of enriching his collection by personal search and trouble. He was one of the first to devote himself to deep sea dredging, and was intimately acquainted with the late Prof. Edward Forbes. He was a staunch upholder of the British Association, and contributed many of the most interesting results of his researches to that body. He scoured the British shores, the Canaries, Madeira, Azores, the Red Sea, and Mediterranean coasts, also the Scandinavian, where he acquired vast stores of material and information. The "Annals and Magazine of Natural History," and the "Proceedings of the Literary and Philosophical Society of Liverpool," are filled with papers and memoirs by him. His collection is in the Museum of the University of Cambridge, and the Revd. A. H. Cooke has lately furnished the "Journal of Conchology" with some interesting notes respecting the British portion of these collections. His list of the "British Marine Invertebrate Fauna" was not published till 1861.

The Rev. Philip Pearsall Carpenter, youngest son of Dr. Lant Carpenter, of Bristol, was born November 4th, 1819. From his earliest child-hood he was devoted to the study of the Mollusca, and worked under Dr. Stutchbury, of the Bristol Institution. At the age of seventeen he was introduced to Dr. Gray, of the British Museum, with whom he maintained a life-long friendship.

He entered the Unitarian Ministry, first being settled at Stand, about seven miles north of Manchester, in 1841, and five years later at Warrington. In 1858 he went to Canada and United States, returning two years later to Warrington, when he finally resigned his charge there in 1865, and returned to Montreal, where he died, aged 57, on 23rd May, 1877. His principal works are as follows (published before 1858):—"Catalogue of Mazatlan Shells, collected by F. Reigen," Warrington, 1855—1857. "Report on the present state of our knowledge with regard to the Mollusca of the West Coast of North America," London, 1858. "First steps towards a Monograph of the Cæcidæ," 1858, and several articles published subsequent to this date.

Mr. Philip H. Gosse (1810—1888) did much to popularise the Fauna and Flora of our southern marine resorts, notably on the Devonshire and Cornish coasts. Many Mollusca are pleasantly written of, and much instructive matter afforded about them in the following works:—"Naturalist's Rambles on the Devonshire Coast," 1853, "Manual of Marine Zoology for the British Isles," 1855—1856, "Tenby, a Seaside Holiday," 1856, "A Year at the Shore," 1865, Mr. Gosse died at an advanced age about a year ago.

Although Mr. George French Angas contributed the bulk of his additions to Conchological Science after the year 1858, it will not be amiss briefly to touch on his career here. Born in April, 1822, he spent his youth at Dawlish, in Devonshire, which place gave him a taste for collecting shells. His first explorations were in Malta and Sicily, an account of which was published. In 1843 he set sail for South Australia, and being a very good draughtsman, sketched the scenery largely, having joined Sir George Grey's exploration party. He then travelled in New Zealand, and on his return published two large folio volumes illustrative of his journeys. He next started for South Africa and then was appointed Naturalist to the Turko-Persian Boundary Commission. About 1851 he was appointed Director of

the Government Museum, Sydney, finally returning to London, where he died, 8th Oct., 1886. His descriptions of new shells were mostly confined to the Australian fauna, also the land shells of the Solomon Isles, Fiji, and other Pacific Islands largely benefited by his experience.

Mr. Arthur Adams in 1850 was selected to describe, in conjunction with Mr. Lovell Reeve, the Mollusca of the 'Samarang' voyage. In 1848 he had published 'Notes from a Journal of Research with the Natural History of the countries visited during the voyage of H.M.S. 'Samarang.' He was the son of an architect at Gosport, Hants., born 1820, and derived his artistic powers from his grandfather, Mr. Wheatley, R.A. and his grandmother, afterwards Mrs. Pope, drawing-mistress to Queen Caroline. He, with his elder brother Henry, born 1813, was educated at the Royal Naval School, afterwards becoming a Surgeon in the Royal Navy. He also visited Japan and the East, and wrote the well-known "Travels of a Naturalist in Manchuria, Japan." His brother followed his father's profession. In 1853 they conjointly undertook the publication of "The Genera of Recent Mollusca, arranged according to their organization." This work contains a description and figure of each genus, and an enumeration of all the species then known. It was completed in 1858, and is in two volumes, octavo, letterpress, and one volume plates, with beautiful figures of the shell and animal, mostly taken from life by Mr. Arthur Adams when on board the 'Samarang.'

Messrs. H. & A. Adams, to use their own words, endeavour to group the genera in accordance with their natural affinities, and the result was what might almost be called a new system of classification, based doubtless on the Lamarckian, with improvements on those of Professor Forbes and Dr. J. E. Gray. This arrangement is in vogue at the present day, and is not likely to be superseded. The genera are subdivided largely, and these subdivisions are in nearly all cases still retained. Some thousands of novelties were described by these energetic observers, either

conjointly, or with Mr. Lovell Reeve. With the publication of so important a contribution to Conchological Science it seems fitting we should close this fourth epoch, a period which perhaps shewed more activity in systematic and descriptive work than any other, and immediately preceded the highest development of literary effort on the subject. Mr. Henry Adams died 1877, his brother 1878.

Before concluding my address, it seems well to review our position at the present time, just ten years before the close of this famous nineteenth century.

The period (thirty one years) that has elapsed since the publication of the "Genera of the Recent Mollusca," has furnished an overwhelming fund of records, essays, and material garnered from all parts of the world. During this time, the Darwinian theories as to the origin of species and natural selection have changed the current of scientific feeling, and the very term "Natural History" is now contemptuously thrust aside, and "Biology" takes its place. Collectors of the old school who believed in the finiteness of species, are considered to belong almost to prehistoric times, and the old-fashioned student, giving a description from the shell alone, has also to take care lest the physiological investigator of his science wrest the laurels from him. The increasing tendency of the age is against mere geographical or systematic research alone, the fact being that the too minute differentiation of species and varieties is bearing the fruit that might have been expected, first having led to useless reduplication of names in many instances, and then to still greater confusion by rendering the cataloguing of the Mollusca an almost impossible task.

There can be no doubt of the enormous strides in our knowledge of the Mollusca when we compare present work with that of previous years. The classic elaborations on the Mollusca of the "Challenger" Expedition, and Mr. W. H. Dall's exhaustive descriptions of the shells of the ss. "Blake" Dredg-

ing Expedition (1879—1880), are cases in point. These both introduce us to the deep sea forms, so strange, so wonderfully sculptured, and so rare, which have for ages lain hid and unrevealed from the world, and which can hardly ever be expected to become the cynosure of many eyes, owing to the difficulty and expense of procuring them from such abysmal depths.

M. Paul Fischer has taken Woodward's Manual, already referred to, as the basis of his last work "Manuel de Conchyliologie," 1887. This will now remain for many years our standard work on classification of the recent and fossil shells, as all the additional genera, and all the discoveries made in the science, both systematic and otherwise, since Woodward's and Adams' time, are duly recorded there. We must also not omit to notice Prof. Ray Lankester's scheme for the rearrangement of the Mollusca in the new edition of the Encyclopædia Britannica.

What requires to be done in the future is best answered by the corresponding question, "What is there that is *not* required to be done?"

We require, first, establishments in likely stations throughout the world similar to those Marine Biological Laboratories recently erected at Plymouth and Prof. A. Dohrn's at Naples. This we deem is only a question of time. Such places as Belligam Bay on the south coast of Ceylon, visited and expatiated upon in such glowing terms by Prof. Hæckel, the island of Keywest, South Florida, which I visited in 1872, and found most prolific in mollusca, animal and vegetable life of all kinds, Sydney Harbour, New South Wales, and Rottenest Island, W. Australia, might be signalised as places admirably adapted naturally for stations of research.

We require, secondly, Museums arranged so as really to become of use to the uninitiated, and competent to be exponents and teachers themselves to the ignorant. The superintendent of the Natural History Museum (Prof. W. H. Flower) is alive to this, as his excellent Presidential Address at the British

Association at Newcastle this year demonstrates, and the Liverpool Museum may be said to be arranged, as regards its types, on the principle he so lucidly expounded.

Thirdly, we require a more intimate acquaintance with the fossil forms and congeners of our recent species of Molluscs—more especially of the later formations, the Eocene, Miocene, Pleiocene, and Pleistocene deposits. No doubt many of our most isolated forms are descended from, and are linked to, other recent species by races once abundant, but now almost obsolete, and in some of the smaller species, e.g., the Pleurotomidæ, there is very often, we are sure, an unintentional synonymy and reduplication of description, some of the fossil and recent kinds being the same.

We should then require an International convention of conchologists to decide finally on the specific or varietal merits of each form in turn, whether a trinomial system be advisable, and other points of importance. To this end, museums, both public and private, must contain large series of specimens, all accurately labelled with exact localities, and so far as is possible, with complete anatomical details also, lingual dentition, etc., and then this question could be definitely settled, once for all.

Our last requirement, upon this end being attained, would be an entire revision of our nomenclature in more exact accordance with the law of priority according to the course laid down by the British Association. Certain neglected authors, as Humphrey, Bolton, Perry, ought to have their titles reimposed. But I should not advocate an undue change of names that are as familiar in our homes as “household words.”

May I be allowed to express the hope, that our Society will not be behindhand in contributing a large share to these desired results. We are every year gaining in increase of Members, and influence, let us hope the work done will be commensurate with the growth of the Society.



FURTHER NOTES ON BRITISH HYDROBIÆ.

BY J. T. MARSHALL.

In Mr. Edgar Smith's "Notes on Hydrobiæ," following mine, in the last number of the Journal, he proposes that the shell hitherto known as *H. ventrosa* var. *ovata* should be raised to the rank of a species as *H. jenkinsi*, on the ground that the animal is "perfectly different" from the type, and that "Jeffreys never could have seen the living animal or he would not have considered it a variety of that species."

Although I have collected the shells, I have taken Jeffreys for granted and have not examined the animal; but I am quite content to consider it either a species (*H. jenkinsi*) or a variety (*H. ventrosa* var. *ovata*).

Before doing so, however, I should like to point out that although Mr. Smith gives four propositions to show its claim to specific rank, three are clearly varietal, one only ("length and form of tentacles") being what I should call specific; and this one would be sufficient for me were it not that Mr. Smith's amended descriptions, both of *H. ventrosa* and *H. similis*, differ from Jeffreys' usually careful and succinct diagnoses, even in some important respects.

There can be no doubt that Jeffreys had this shell before him when he described his var. *ovata*, as the characters of the suggested *H. jenkinsi* are absolutely identical with his detailed description; moreover, with a series of specimens from different localities typical *H. ventrosa* can be graduated with the greatest ease into that of *H. jenkinsi*.

I therefore consider that further examination is desirable before *H. jenkinsi* can be pronounced specific.

With regard to Frauenfeld's statement that our *H. similis* is a Bithynia, there must be some error. The *Cyclostoma simile* of Draparnaud is certainly a synonym of our shell, and if the latter's type in the Vienna Museum has the concentric

operculum of a Bithynia it must be wearing borrowed plumes, for the operculum of *H. similis* is altogether different ; there is no similarity between the two.

Dr. Jeffreys examined Draparnaud's original type of *Cyclostoma simile* in the Montpellier Museum, and pronounced it to be our *H. similis*. (See 'British Conchology,' appendix, vol. i, p. 310).

By a printer's error, the locality Becton (or Beckton) was printed Beeton throughout Mr. Smith's notes.

Sevenoaks, Torquay.



ON THE SPECIES AND VARIETIES
OF THE GENUS *FUSUS*, WHICH INHABIT THE
SEAS SURROUNDING THE BRITISH ISLES.

BY HENRY K. JORDAN, F.G.S.

(Read before the Conchological Society, April 2nd, 1890).

SINCE the publication of the fourth volume of 'British Conchology,' twenty-three years ago, many interesting conchological discoveries and facts have been recorded from time to time, and it is probable that these records possess a greater interest in relation to the genus *Fusus* than to any other.

It has occurred to the writer to draw renewed attention to these records, so as to make them more generally known, and to add new localities and a few other notes as a small contribution to the Conchological Society.

In this paper, I purpose dealing only with the species and varieties of *Fusus* which have been found alive in the seas surrounding the British Isles ; but the question, often debated yet never settled, again crops up with increased emphasis, "Within what limits shall species be considered as British?"

Upon the answer given to this enquiry depends the inclusion or exclusion of a number of interesting species.

Some naturalists have suggested a bathymetrical limit, the 100 fathoms line, but why 100 fathoms more than 50 or 150 fathoms?

In the Mull of Galloway there is a depth of nearly 150 fathoms, and at several localities off the west coast of Scotland there are depths exceeding 100 fathoms, and at one of these, inside the island of Mull, *Emarginula crassa* and other species have been dredged by Messrs. Frank Coulson and Alfred Brown, of Glasgow. To decide that these shells shall not be regarded as British would be most illogical and unsatisfactory.

Again, in the fiords of Norway, many miles away from the open sea, there are depths greatly in excess of 100 fathoms, in which live a rich and varied fauna. The suggested limit is therefore unsuited to other countries as well as to our own. Moreover, a naturalist could dredge across the English Channel, along the coast opposite northwards to Norway, and in the contrary direction along the French coast, and probably around the Bay of Biscay to the Iberian peninsula, and yet not go outside the 100 fathoms line.

If a bathymetrical limit must be adopted the 150 fathoms line would be more satisfactory than 100 fathoms, because it would include nearly all the inter-insular depths; but in my judgment no limit of depth would be satisfactory, for the reasons stated and because mere depth has but little, if any, influence upon the distribution of molluscan life, excepting the littoral and sub-littoral species, and some of these even live at considerable depths.

It has also been suggested that species shall be considered as British only when obtained within sight of the British Isles, but this would exclude all the rare Dogger Bank and Shetland mollusca, and very greatly reduce the number of species now, by general consent, regarded as British. Moreover, the range of visibility is an ever varying quantity depending upon atmospheric conditions, the altitude of the coast, &c.

Dr. John Murray suggests "that further investigations may

show that a temperature limit can be drawn within which the British fauna may be restricted."

The question at once arises: "What isotherm shall be adopted?" The answers given to this question would probably reveal the greatest differences of opinion owing to the varying temperature of the sea bottom near the British Isles.

Off the north coast of Scotland in the Faroe Channel there is probably a greater range of temperature of the sea bottom than can be found in a similar area in any other part of the globe.

At one station the reading was as low as 29.2° Fahr.—nearly three degrees below the freezing point of fresh water. A few miles away at the same depth, 540 fathoms, the temperature was 46.0° Fahr., a difference of nearly seventeen degrees, and about midway between these stations at a depth of 300 fathoms the bottom temperature is 48.0° Fahr. It may be mentioned that the temperature of 29.2° is lower than any reading obtained in the "Valorous" expedition at higher latitudes in the Davis Strait and at double the depth. When we find bottom temperatures varying 19° Fahr. in a few miles, what shall be our guide in fixing a temperature limit? I feel great diffidence in dissenting from the opinion of so great an authority as Dr. Murray, but, nevertheless, I can see no reason for selecting any particular temperature as a limit. If a temperature limit of 33.4° Fahr. were adopted it would carry us across the North Atlantic and a long distance up the Davis Strait.

If 36.5° be taken it would include the whole of the eastern portion of the North Atlantic. If the isotherm of 40.0° Fahr. were adopted it would carry us from off the Faroe Banks southward, at the 900 fathoms line, past Ireland to the west coast of Africa, and the comparatively high bottom temperature of 47° Fahr. is found upwards of 200 miles north-west of the Butt of Lewis, at a depth of 570 fathoms, and about 90 miles off the west coast of Ireland at a depth of 422 fathoms, and where shall we stop? The fact is that the bottom temperatures which are

found around the Shetland Isles also occur off the coasts of Portugal and Africa.

Moreover some species of mollusca accommodate themselves to a great range of temperature; for example, *Fusus islandicus* lives in water of arctic frigidity ($30\cdot0^{\circ}$ Fahr.) in the Faroe Channel and is found living at the entrance of the Bristol Channel in 40—50 fathoms, where the bottom temperature probably is $51\cdot0^{\circ}$ or $52\cdot0^{\circ}$ Fahr., a difference of $22\cdot0^{\circ}$. The same fact applies to *Fusus Berniciensis* which lives in the Faroe Channel in 640 fathoms, with a bottom temperature of $30\cdot0^{\circ}$ Fahr., and in the Bay of Biscay, or rather in the 'Slopes of the Channel,' with a bottom temperature of $50\cdot0^{\circ}$ Fahr.

The facts above stated lead me to the conclusion that the limit suggested many years ago, namely, an imaginary line drawn equidistant from the British Isles and the territories of other states, is—after all—open to less objection than any other, although it involves going half-way across the Atlantic.

I am aware that the late Dr. Gwyn Jeffreys stated that such a limit is neither 'rational nor national,' although at one time it had his support, but with great respect I submit that it is as 'rational' and 'national' as any other. Moreover those Naturalists who, like Dr. Jeffreys, advocate a 'North Atlantic' or 'Oceanic' area will experience just as great a difficulty in defining their limits.

Shall the 'North Atlantic' area include the English and Bristol Channels, the Irish and North Seas, and the Faroe Channel? If not, why not? If it does, how near to our coast lines shall it approach?

No doubt a line must be drawn somewhere, and as Dr. Murray says "We must, if we wish a limit, fix an artificial one."

I venture to suggest that the widest limit should be adopted—so as to include as rich a fauna as possible—provided that that limit is as rational as any other. Adopting this view several species will be included in this paper which hitherto have not appeared in our British lists. Those Naturalists who do not

concur can of course decide for themselves, but I may point out that Dr. Jeffreys in describing *Leda lucida* from 189—650 fathoms, N. of Hebr., says "Some of these localities may be considered British, being much nearer to Scotland than to the Faroe Isles" ('British Conchology,' vol. v, p. 173).

1.—*Fusus antiquus*, Linné.

The most southerly habitat hitherto recorded for this species on our west coast is Fishguard. Within the last two years I have obtained it from the entrance of the Bristol Channel (in 40 fathoms) about twenty miles south of the 'Smalls' lighthouse, and as it has been recorded from the Cornish coast there can be no doubt that it lives all around the British Isles, but it is more abundant on our eastern than on our western coast. When at the Shetland Isles in July, 1886, four specimens came up in one haul of the trawl, each measuring over seven inches in length, one specimen being nearly eight inches. The depth was 70 fathoms, bottom sandy. Large masses of capsules were attached to the back of some examples,—in some instances two clusters were on the back of the shell,—but in every case the capsules were spent.

It may be of interest to note that in *Fusus antiquus* the egg capsules were always on the back of the shell, but in *Buccinopsis Dalei* the capsules are separate and are attached on the *under side* and around the mouth of the shell.

F. antiquus var. *striata*.—Fine cream-colour specimens from 40 fathoms, about 15 to 20 miles off Milford Haven. This variety also occurs on the opposite side of the channel off the Waterford coast, and some examples are so strongly ridged as to approach in form *Fusus despectus*, Linné. I entertain the opinion that if a sufficient number of specimens were obtained the fact would be established that *F. antiquus* and *F. despectus* are one and the same species.

F. antiquus var. *gracilis*.—Northern entrance of the Bristol Channel, soft ground, 40—50 fathoms; also a specimen

from north of Unst. The Bristol Channel specimens are cream-colour and very elegant.

F. antiquus monst. contrarium.—This is now rarer than ever and I am not aware of a fresh example for several years. It has been taken off the coast of Portugal in 220 fathoms, bottom temperature 52°0' Fahr.

2.—**Fusus despectus**, Linné.

Off the west coast of Ireland. 'Porcupine' expedition, 1869. Stations 10 to 17, bottom temperatures 37°8' to 49°6' Fahr. This locality is several hundred miles south of any other record which has come under my notice. The occurrence of this shell so far south renders more probable the opinion which I have expressed under the heading of *F. antiquus* var. *striata*.

3.—**Fusus Norvegicus**, Chemnitz.

A few specimens are yearly obtained by the Dogger Bank fishermen, but not so many as formerly. This species was taken in the Faroe Channel, 'Triton' expedition, station 3, 'Warm area,' 87 fathoms, bottom temperature 48°5'. It also occurred in 109 fathoms about fifty-five miles N.W. off the Butt of Lewis, bottom temperature 49°6'. This is the most westerly locality, in our area, in which this species has been recorded.

4.—**Fusus Turtoni**, Bean.

This continues to be a scarce shell and like the preceding species is found in fewer numbers than formerly. It is remarkable that in all the dredgings of the 'Lightning,' 'Porcupine,' 'Knight Errant,' and 'Triton' Expeditions there is not a record of this species being taken—with a single exception, at an old locality on the East of Shetland. It is a very local species and the only one of the genus which is not found on the west side of the British Isles.

5.—**Fusus Islandicus**, Chemnitz.

In 'British Conchology,' vol. iv, mention is made of two dead specimens from Shetland and of an example from the Wexford Coast. These were the only British specimens known

up to the date of the publication of that vol. and for nearly twenty years after. Five years ago a specimen was taken off the Waterford Coast, where it was trawled, and was secured by the late Dr. Churchill Babington.

The next year a perfect live specimen came from the same locality and it is now in my collection. During the year 1889 some six or eight specimens, with the living animals, were obtained from the north entrance of the Bristol Channel in 40—50 fathoms, soft muddy ground; bottom temperature probably 51° to 52° Fahr. I have obtained in all four living, and several dead, specimens of this rare shell, three of the former are in my collection. The discovery of this new locality is due to the fact that a trawling industry has lately been established, having as its head-quarters Milford Haven, and the shells being of large size do not readily pass through the nets. One of my live specimens was devoid of any epidermis when caught. The following are additional localities:—Faroe Channel, 'cold area,' 640 fathoms, bottom temperature 30° Fahr.; 'warm area,' 530 fathoms, bottom temperature 46.5° Fahr.; on the Wyville-Thomson ridge, 300 fathoms, bottom temperature 48° Fahr.; west coast of Ireland, 85—1230 fathoms, bottom temperatures 49.6° and 37.8° Fahr. respectively.

6.—*Fusus gracilis*, Da Costa.

The typical form is found sparingly off the Devon and Cornwall coasts, and the species has now been found all around the British Isles, also in the Bay of Biscay, 'Travailleur' expedition.

At the Scilly Isles dead specimens have been found, but they partake more of the form of var. *convoluta*.

I have a live specimen, from Wick, N.B., which has no epidermis, the shell has a polished surface and is semi-transparent, this peculiarity occurs also in *F. islandicus* and *F. propinquus*.

I now describe two new varieties of this common but

elegant species; specimens of each variety will be sent to the Natural History Museum at South Kensington for reference.

I.—*F. gracilis* var. *Belliana*, Jordan.—This variety differs from the type in the following particulars:—It attains larger dimensions, two of my specimens being 3·75 inches long and 1·75 inches across the body whorl. The shell is also thinner, the whorls increase in size more rapidly and regularly, and the spiral striæ are somewhat less distinct, canal a little wider and not so straight, occasionally it is considerably twisted; outer lip much expanded, consequently the mouth is unusually large and wide.

Habitat: Off the Wexford and Waterford coasts in 20—30 fathoms, living in company with *F. Islandicus* and *F. Jeffreysianus* on soft muddy ground.

The large size of this variety gives, at first, the impression of its being *F. Islandicus* but the peculiar nucleus, the stronger spiral striæ and the longer and straighter canal of *F. Islandicus* enable it to be readily distinguished from the shell under notice. I named this variety some four years ago as a compliment to Mr. Robert Bell, the well-known authority on the fossils of the 'Red Crag.' Since then this old friend has passed away regretted by all who knew his sterling worth.

II.—*F. gracilis* var. *Coulsoni*, Jordan.—This variety differs from the type in being more slender, the whorls more flattened, the canal rather narrower, and the epidermis of a pale fawn colour.

This variety is as elongated as the var. *convoluta* but the whorls are less tumid and the spiral striæ not so strong as in var. *convoluta*.

Habitat: East and north of Unst in 60—90 fathoms. It is named as a compliment to my friend, Mr. Frank Coulson, in whose company, and yacht, the specimens were dredged on our visit to the Shetland Isles in 1886. Since

then I have obtained it from the long line fishermen from north of Unst., 90 fathoms.

F. gracilis var. **convoluta**.—Massive sub-cylindrical specimens 3.75 inches in length from Wick, N.B.

7.—**Fusus propinquus**, Alder.

This species has a northern range, but it has been taken in the Bay of Biscay, 109—1380 fathoms. Mr. J. T. Marshall dredged a good many specimens on the Dogger Bank off the Yorkshire coast. The localities 'Cork' and 'Dublin Bay' given in "British Conchology" are erroneous. It is a difficult shell to obtain as it so much resembles—to the uninitiated eye—the common *F. gracilis*; consequently the fishermen do not distinguish the shell and throw it away with the 'common herd.'

My collection contains two examples which have no epidermis, the surface of the shells is polished.

F. propinquus var. **turrita**.—A few specimens only, from 70 fms., on the east of Shetland in company with *F. gracilis* var. *coulsoni* with which it agrees closely in shape, but the more turritid form and, above all, the nucleus of *F. propinquus* serve to distinguish it.

8.—**Fusus Jeffreysonianus**, Fischer.

Fine specimens, both in size and condition, have been taken off the Waterford Coast in 20—30 fathoms, soft ground, and several specimens were brought to me from the beach near Wexford, having been cast up by a storm. Also in 40 fathoms 15—20 miles off Milford Haven. The Irish specimens (especially those from the deep water) are thinner and have a paler-coloured epidermis than the South Devon examples. About twenty-four years ago this shell came under my notice and believing it to be an undescribed species I sent the examples to the late Dr. Gwyn Jeffrey, who forwarded them to Dr. Joshua Alder for his opinion: Alder returned the specimens with the expression "not my *propinquus*."

I took no immediate steps to describe and name the shell

and shortly after vol. iv of 'British Conchology' was published and the species was described, erroneously, as *Fusus buccinatus* Lamarck. This mistake originated at the British Museum where I found—in the British section—a tablet with my shell labelled '*Fusus buccinatus*.' In the general collection I came across another tablet also labelled '*Fusus buccinatus*,' but in this case correctly, with Lamarck's species. The learned author of 'British Conchology' had only seen the former specimens, hence the mistake being continued in that work.

The French conchologist, Fischer, almost simultaneously noticed the error and promptly re-named the species '*F. Jeffreysianus*,' which is now the correct designation.

9.—*Fusus Berniciensis*, King.

A somewhat larger number of specimens have come from the Dogger Bank lately. This species has an extensive range. It was taken in the 'cold' and 'warm' areas of the Faroe channel, the bottom temperatures being 30°0' and 45°7' Fahr. respectively. Also in the Bay of Biscay, 'Travailleur' expedition. Slopes of the channel 257—539 fathoms, bottom temperatures, 50°0' and 48°0' Fahr. respectively. Also North Atlantic, lat. 56°1' N., long. 34°42' W., 690 fathoms, bottom temperature, 38°2' Fahr. This locality is about equidistant from the Irish and Labrador coasts.

F. Berniciensis var. *elegans*.—Faroe channel, 'cold area,' 640 fathoms, bottom temperature, 30°0' Fahr., 'warm area,' 530 fathoms, bottom temperature, 46°5' Fahr.

I obtained one specimen of this variety from the long line fishermen, from the north of Unst.

10.—*Fusus fenestratus*, Turton.

This species has a very extensive range and occurs at occasional intermediate localities from Finmark to the coast of Portugal, a distance of thirty degrees of latitude, or about two thousand geographical miles. The late Mr. Stutchbury, of Bristol, more than thirty years ago gave a dredge to a friend of his, the

captain of a sailing vessel, with the request that it should be used when a suitable opportunity arose. The vessel was almost becalmed off Cape Clear, the dredge was lowered, and in that single haul two living examples of this rare species came up. I cannot find any record of its having been dredged in our seas since Stutchbury's time by any private naturalist. The localities about to be mentioned are those of the government expeditions 'Porcupine' and 'Knight Errant.' Faroe channel, 'warm area' 530 fathoms, bottom temperature, 46.5° Fahr. Off Valentia, 85—1230 fathoms, bottom temperatures respectively, 49.6° and 37.8° Fahr. Slopes of the channel, 257—539 fathoms, bottom temperatures, 50.0° and 48.0° respectively. Coast of Portugal, thirty to forty miles off Cape Mondero, 100—220 fathoms, bottom temperature, 52.0° Fahr.

A week's work, off the south-west coast of Ireland, with a small beam trawl—14 or 16 feet—with a fine mesh, would probably be rewarded with this species and other rarities, such as *Buccinopsis Dalei*, *Buccinum Humphreysianum*, *Fusus Islandicus*, *Fusus attenuatus*, &c.

It is much to be regretted that so few of our yacht owners take an interest in marine zoology. It seems that zeal for natural history research is nearly always inversely proportional to opportunity; 'whilst he sits on the cushion of advantages he goes to sleep.'

11.—*Fusus attenuatus*, Jeffreys.

This species was taken in the 'Porcupine' expedition, 1869, about 150 miles off Dursey Island, S.W. of Ireland, 1207 fathoms, bottom temperature, 37.7° Fahr. Also in the 'Valorous' expedition, 1875. North Atlantic, lat. 56°1' N., long., 34°42' W., 690 fathoms, bottom temperature, 38.2° Fahr. This station is about half way between the coasts of Ireland and Labrador.

These localities are the only ones recorded. I have been unable to find any figure or description of this shell, nor could I obtain any information in regard to it on calling at the Natural History Museum, South Kensington, in 1886. But

very few of the shells of the 'Porcupine' expedition are in the National Collection, the bulk has probably gone, with the 'Knight Errant' and 'Triton' shells, to America, with the late Dr. Gwyn Jeffreys' collection. It is very greatly to be regretted that the trustees of the National Museum could not see their way to buy Dr. Jeffreys' collection when it was offered to them, as it contained so many of the types of our British species. The loss is all the greater because Dr. Jeffreys did not live to complete the Report on the Mollusca of the 'Lightning,' 'Porcupine,' and 'Valorous' expeditions.

That Report terminates with the *Cerithiopsidæ*. Had one more part been completed it would have embraced the genus under notice. Dr. Jeffreys, however, says that *F. attenuatus* is not a variety of *Tritonium turritum* of M. Sars, the inference from this is that they resemble each other.

Mention is made in the 'Porcupine' Report, 1869, of "an undescribed species of *Fusus* allied to *F. Sabini*" having been taken off Valentia (stations 2 to 9), 85—808 fathoms, but I am unable to find any further notice or figure or description of the shell.

The following seven species were taken in the Faroe channel in the 'Knight Errant' (1880) and 'Triton' (1882) expeditions, which were under the direction of Dr. John Murray.

Although the very interesting facts recorded by that distinguished Naturalist are well known, it may, nevertheless, be well to mention briefly, that the sea bed lying between the Hebrides and the Faroe Islands—a submarine area now known as the 'Faroe channel'—is traversed by a mountainous submarine ridge 2000 feet (330 fms.) high, named the 'Wyville-Thomson Ridge.' The depths on either side of the ridge are about 600 fathoms and on the ridge 200—300 fathoms. The area on the north-east side of the ridge has been termed the 'cold area,' the bottom temperature at one station, in 540 fathoms, being as low as 29.2° Fahr. On the south-west side of the ridge is the 'warm area,' the bottom temperature, in 570 fathoms, being

45.7° Fahr., a difference of nearly 17.0° Fahr. On the ridge, in 300 fathoms, the bottom temperature is 48.0° Fahr.

The localities in which the species about to be mentioned were obtained are about equidistant from the Hebrides, the Shetland and Faroe Islands; being somewhat nearer to our coasts than to the Faroe Isles. It may also be mentioned that Mollusca obtained from localities further north, south, east and west are, without demur, included in our lists.

12.—*Fusus Sabini*, Gray.

'Triton' expedition, stations 8 and 9, 'cold area,' 640 and 608 fathoms respectively, bottom temperature, 30.0° Fahr.

'Knight Errant' expedition, station 8, 'cold area,' 540 fathoms, bottom temperature, 29.2° Fahr.

I have one specimen of this shell from the above stations. It is very thin and delicate, and of a 'pinched' appearance.

13.—*Fusus delicatus*, Jeffreys.

'Triton' expedition, stations 8 and 9; with the last mentioned species.

'Knight Errant' expedition, station 8, 'cold area'; erroneously named in Dr. Jeffreys' report *F. turritus*, figured in 'P.Z.S.,' 1883, pl. xlv.

14.—*Fusus hirsutus*, Jeffreys.

'Triton' expedition, station 9, 608 fathoms, 'cold area'; one specimen only, figured in 'P.Z.S.,' 1883, pl. xlv.

15.—*Fusus concinnus*, Jeffreys.

'Triton' expedition, station 9, with the above; one specimen only, figured in 'P.Z.S.,' 1883, pl. xlv.

16.—*Fusus turgidulus*, Jeffreys.

'Triton' expedition, station 9, Faroe Channel; Bay of Biscay, 'Travailleur' expedition; fragments only at the latter locality.

'Porcupine' expedition, 1869, 155—345 fathoms; these depths correspond with the stations 84 and 65 respectively.

I am unable to find any figure or description of this species.

17.—*Fusus sarsi*, Jeffreys.

'Knight Errant' expedition, station 5, 515 fathoms, bottom temperature 45.4° Fahr.

Of this species also I have been unable to find any figure or description.

18.—*Fusus lachesis*, Mörch.

'Knight Errant' expedition, station 2, 375 fathoms, bottom temperature 31.0° Fahr.; station 8, 540 fathoms, bottom temperature 29.2° Fahr.; on the ridge, sounding No. 7, 300 fathoms, bottom temperature 48.0° Fahr.

The above affords another illustration of the competency of mollusca to accommodate themselves to a considerable range of temperature. In this case the range is nearly 19.0° Fahr. in comparatively a few miles.

CONCLUDING REMARKS.

The occurrence of *Fusus Islandicus* and *F. fenestratus* off the south-west of Ireland is a very interesting fact, and the question arises:—"Are these Arctic species a survival from the 'glacial epoch,' or have they migrated south subsequently?" This question really forms part of a larger one, for the following Arctic species occur in similar, and even in lower, latitudes:—*Fusus despectus*, *Leda frigida* (this species lives also at Spitzbergen and Finmark), *Verticordia abyssicola* (Finmark), were dredged off Valentia; *Terebratula Spitzbergensis*, 185 miles off Cape Clear; *Terebratula cranium*, *Fusus fenestratus*, *Leda abyssicola*, *Siphonodentalium vitreum*, &c. (all Arctic species), were dredged off the coast of Portugal, near the mouth of the Tagus, 600—1,095 fathoms, the lowest bottom temperature being 39.7° Fahr.

The reason usually assigned for the disappearance—at all events in part—of Arctic forms of life, which we know by their fossil remains lived in the British area during the glacial epoch, is that the higher temperature which set in was inimical and

fatal. But the effect of this higher temperature would be felt much more by littoral and sub-littoral species than by those which live in deep water. It might well be fatal to the former and not to the latter.

If the above-named species are not 'survivals,' but have subsequently migrated south, the inference is that the temperature of the sea bottom, in the areas mentioned, is again lower; but is there any evidence of such a renewed refrigeration? The occurrence of *Cassidaria tyrrhena*, a Mediterranean species, off the south-west of Ireland (dredged by Professor Haddon and party in 1886), lends no countenance to this view.

Our present knowledge of the laws which control the distribution of marine animal life is, however, too limited to justify us in dogmatizing. It will be wiser simply to record the facts and to leave to those who shall follow us—with wider experience and a fuller record—the solution of this and the many other interesting problems which are presented to the mind of every intelligent student of marine zoology.

CONCHOLOGICAL SOCIETY
OF GREAT BRITAIN AND IRELAND.

PROCEEDINGS.

174th MEETING, JAN. 8th, 1890.

Mr. John W. Taylor, F.L.S., Vice-President, in the chair.

New Member Elected: Mr. Isaac Henry Burkill, Cheltenham.

Donations announced and thanks voted: Proceedings of Royal Society of Queensland and of Royal Physical Society of Edinburgh, The Naturalist, Beckett's List of Mollusca of Great Yarmouth, Prodrusus of Zoology of Victoria, and the skins of *Limax maximus* and *Arion bourguignati* which were exhibited for Mr. Adams.

Exhibits.

On behalf of Mr. L. E. Adams, B.A., were shown skins of *Limax maximus* and *Arion bourguignati* from Penistone, which he had mounted upon card and varnished, and which afforded a successful method of displaying the markings.

Mr. William Nelson exhibited a large number of specimens of *Limnea glabra* from numerous localities, and made some most interesting remarks on the species, based upon his very extensive experience of it.

The Secretary showed a collection of shells from Roxburghshire, a county for which very few records had hitherto come under the notice of the Society's referees. These shells were sent by Mr. W. Grant Guthrie, of Hawick, and included *Helix lapicida* from Hawick, its most northern locality, but now extinct there from the extension of the town.

The Secretary also showed a number of land and fresh water shells sent from Cumberland and Westmorland localities by the Rev. Hilderic Friend, F.L.S., amongst which were several shells not hitherto authenticated for Cumberland, *Bulinus acutus* being one. Specimens from Kendal, Westmorland, of *Helix ericetorum* var. *minor* and of *H. virgata* vars. *albescens* and *leucozona* were also included.

Mr. W. Denison Roebuck, F.L.S., exhibited miscellaneous shells, including *Helix pygmaea* from the Pass of Leng, near Callander, West Perthshire, sent by Mr. W. Evans, F.R.S.E., *Helix virgata* var. *albescens* and *Bulinus acutus* in various forms sent from the side of the river Boyne, near Drogheda, co. Louth, by Miss Sidney Smith, and *Bulinus obscurus* from Well Vale, North Lincolnshire, and other shells sent by Mr. J. Eardley Mason.

175th MEETING, FEBRUARY 5th, 1890.

Mr. Jno. W. Taylor, F.L.S., Vice-President, in the chair.

Candidates for Membership Proposed: Mr. C. Owen Pickard-Cambridge, of Bloxworth, Dorset; Mr. G. K. Gude, of London; and Mr. Arthur Stubbs, of Nottingham.

Donations announced and thanks voted: Research, Naturalist, Feuille des Jeunes Naturalistes, Proceedings of Linnean Society of New South Wales, W. H. Dall's Preliminary Catalogue of the Shell-bearing Marine Mollusks and Brachiopods of the S.E. coast of United States., R. Tate on some New or Little-known Genera of Australian Mollusca, and R. Tate's Descriptions of some New Species of Marine Mollusca from South Australia and Victoria.

Exhibits.

Mr. William Nelson showed a large series of specimens of *Limnea peregra* from numerous localities. Mr. Nelson made some most interesting remarks on the species, its variation, habits, life history, etc.

Mr. J. W. Taylor, F.L.S., exhibited a series of specimens of *Limnea peregra* to illustrate the range of its variation in size, colour, form, etc.

The Secretary, on behalf of Mr. Fred. Rhodes, showed a most interesting sectional preparation of *Clausilia rugosa*, showing the internal structure of the shell.

Mr. W. Denison Roebuck, F.L.S., exhibited *Limax arborum*, a very black example of *Amalia marginata*, *Arion subfuscus*, etc., all sent from Piperstown, co. Louth, by Miss Sidney Smith; and numerous shells from Notts., Cumberland, Lincolnshire, South-West Yorkshire, Lanarkshire, Dumbartonshire, and Edinburghshire, all sent by Rev. Hilderic Friend, F.L.S.

176th MEETING, MARCH 5th, 1890.

Mr. Jno. W. Taylor, F.L.S., Vice-President, in the chair.

New Members Elected: Mr. C. Owen Pickard-Cambridge, of Bloxworth; Mr. G. K. Gude, of London; and Mr. Arthur Stubbs, of Nottingham.

Candidates Proposed for Membership: Mr. Leonard Oakley Grocock, of Charlton, Kent (proposed by Messrs. A. J. Jenkins and J. W. Taylor); and Mr. John Nicholson, of Pudsey, Yorks. (proposed by Messrs. W. Nelson and W. E. Collinge).

Letter Read: From Prof. Dr. Rudolph Bergh, Copenhagen, thanking the Society for his election as an Honorary Member.

The Death of Mr. T. W. Pocock was announced.

Donations to Library announced and thanks voted: Proceedings of Linnean Society of New South Wales, Naturalist, Feuille des Jeunes Naturalistes, and copy of Taylor and Roebuck's Authenticated Materials towards a Land and Freshwater Molluscan Fauna of Ireland.

Papers Read.

Mr. Lionel E. Adams, B.A.: A few Notes on Derbyshire from a Conchologist's point of view.

Mr. Thomas F. Burrows: Re-discovery of *Helix fusca* and *Helix lamellata* in Staffordshire.

Mr. Henry Byne: A Note that he had found in a portion of the Rev. R. W. J. Smart's Menavawr dredgings (Scilly Islands) of Oct. 10th, 1882, a specimen of *Rissoa striatula* Mont. var. *varicosa* Marshall. It was imperfect and showed a single varix on the body-whorl in addition to that of the mouth on which it rests, constituting the varietal distinction. Mr. Byne's first acquaintance with this variety was an example with some type shells from Falmouth drift, presented to him by Mr. Clifford Burkill, M.C.S., in May 1887. On the 9th June, 1887, Mr. J. T. Marshall gave him another from Guernsey, and he is indebted to him for unpublished particulars of the variety in a letter dated 19th July following. Mr. Byne has met with many examples with two varices, and a second Cornish shell with three varices close together on the centre of the body-whorl. It was remarked in course of discussion that Jeffreys (B.C., iii, 6) had mentioned the varix of the body-whorl, and that, judging from the Jersey specimens in the collection of the Rev. R. Boog Watson, it must be very common. A multiplication of them may always be looked for.

Exhibits.

Mr. W. Nelson exhibited a fine series of examples of *Planorbis nautileus* from various Yorkshire and other localities.

Mr. E. R. Sykes showed a full set of Dorsetshire shells—about seventy-five in number, including twenty-five or more new county records, being species never before seen from Dorset by the Society's referees. Among these were *Vertigo moulinsiana* from Morden, *Helix pisana* from an inland locality at Muston Down, *Pisidium roseum* from Bloxworth, *Achatina*

from Lulworth, some interesting deformities of *Clausilia rugosa* from Portland, *Helix virgata* var. *nigrescens* from Portland, *Helix fusca* from Bloxworth, and *Testacella scutulium* from Chickereil, Weymouth, which is the furthest western point from which it has been yet recorded in England.

Mr. Thomas F. Burrows also exhibited various Staffordshire shells, including *Helix lamellata* and *H. fusca* in illustration of his paper, *Sphærium ovale* from various localities, *Balea* from Caldou Lowe, *Achatina* from Grindon, *Pisidium fontinale* from Cheadle, etc.

Mrs. B. J. Falloon showed *Helix pisana* and a large number of interesting forms of *Anodonta cygnea* from Pembrokeshire, the latter being presented to the Society's collections.

Mr. W. Denison Roebuck, F.L.S., exhibited *Testacella scutulium* sent from county Louth (Piperstown) by Miss Sidney Smith.

The Chairman showed *Limnæa glutinosa* from Skidby Drain, near Hull, discovered by Mr. F. W. Fierke, also *Bythinia leachii* and *Succinea putris* with varieties, all from Hull, sent by Mr. E. Collier.

177th MEETING, APRIL 2nd, 1890.

Mr. Jno. W. Taylor, F.L.S., Vice-President, in the chair.

New Members Elected: Mr. L. O. Grocock, of Charlton, Kent; Mr. John Nicholson, of Pudsey, Yorkshire.

Letters Read: From Dr. Heinrich Simroth, of Leipzig; M. M. Cossmann, of Paris; and M. Hippolyte Crosse, of Paris, thanking the Society for their election as Honorary Members.

Donations to Library announced and thanks voted: Proceedings of Royal Society of New South Wales, Catalogue of its Library, Bulletin de la Société d'Etudes Scientifiques de Paris, Naturalist, Feuille des Jeunes Naturalistes, paper by E. A. Smith and B. B. Woodward on the Nomenclature of the Oral Folds in Clausilia, and several reprints from M. Cossmann of his Palæontological Papers.

Donations to Collection announced and thanks voted: Eight tablets of examples of all the British *Hydrobia*, including *H. ventrosa* and *H. jenkinsi* (presented by Mr. A. J. Jenkins, M.C.S.).

Papers Read.

Mr. T. D. A. Cockerell: Critical Notes on some Land and Freshwater Mollusca.

Mr. F. W. Fierke: Discovery of *Limnæa glutinosa* near Hull.

Mr. A. J. Jenkins: On the difference in habits of the Plumstead-Beckton Hydrobia (*H. jenkinsi* Smith) and *H. ventrosa* Mont.

Mr. Henry K. Jordan, F.G.S., M.C.S.: On the Species and Varieties of the Genus *Fusus* inhabiting the British Seas.

Exhibits.

Mr. John W. Taylor, F.L.S., and Mr. W. Nelson, M.C.S., exhibited specimens of *Zonites glaber* and its allied forms—British and Continental.

Mr. William Nelson also exhibited *Limnaea stagnalis* var. *expansilabris* from Osmondthorpe, near Leeds.

Mr. R. D. Gardner showed various shells from Ackworth, South-West Yorkshire.

Mr. W. Denison Roebuck, F.L.S., showed *Helix pisana* from a new county, Louth, where it was found recently by Miss Sidney Smith; *Limax flavus* from Black Rock Lighthouse, co. Mayo, sent by Mr. R. Widdicombe; and numerous Scottish shells sent by Mr. W. Evans, F.R.S.E., including *Pisidium roseum*, *P. nitidum*, *Limnaea palustris*, &c., all taken from the stomachs of Shoveller Ducks (*Spatula clypeata*) shot at Loch Leven.

178th MEETING, 7th MAY, 1890.

Mr. J. W. Taylor, F.L.S., Vice-President, in the chair.

Donations to Library announced and thanks voted: Naturalist, Feuille des Jeunes Naturalistes, Proceedings of Linnean Society of New South Wales and of Nova Scotian Institute, all in exchange, and from their respective authors, R. Bergh on Die Cladohepatischen Nudibranchien, and W. E. Collinge on the Land and Freshwater Mollusca of Ingleton.

Exhibits.

Mr. C. W. Young showed a fine series of marine and freshwater shells of North America and the Eastern Seas, collected by the late Dr. P. P. Carpenter; these included *Unio complanatus* from the river Potomac, *U. spatulatus* from Fox River, Illinois, *U. gibbosus* from Green River, Kentucky, *Cyclas striatina* from the Erie Canal, and an interesting specimen of *Yoldia portlandica* (semi-fossil) from Portland, Maine.

Mr. John Nicholson exhibited a number of shells collected by himself in the Indian and Australian regions—mostly of marine forms.

The Chairman showed two examples of *Limax cinereo-niger* sent from Mentone by the Rev. J. E. Somerville, B.D., both of the black form, var. *maura*. He also exhibited *Planorbis lineatus* from Scotter Common, North Lincolnshire, sent by Mr. F. W. Fierke, of Hull, and *Testacella maugei* from Bridgewater, Somerset, sent by Mr. Corder, in whose garden the species is abundant. He also brought a number of Sutherlandshire shells sent by Mr. W. Baillie, of Brora.

Mr. W. Nelson, M.C.S., exhibited a very large example of *Limnaea glutinosa*, also *Planorbis corneus*, *Limnaea ovata*, *Spherium corneum*, and *Valvata piscinalis*, all from the Skidby Drain, near Hull, and *Helix nemoralis* from Primrose Valley, Leeds.

Various Linnæidæ from Scotland were exhibited on behalf of Mr. Thos. Scott, F.L.S., of Edinburgh.

The Chairman exhibited a book in which he had tabulated the mathematically theoretical variations caused by suppression, coalition, and interruption of the bands in *Helix nemoralis*, 1,227 in number, all of which may occur in every shade of ground colour, with every colour of lip, and concurrently with every other kind of variation to which the species is liable, whether of form, size, texture, etc., so that it will readily be seen that the range of possible variation is practically infinite.

A REPLY TO MR. J. T. MARSHALL'S "FURTHER
NOTES ON BRITISH HYDROBIÆ." *

BY EDGAR A. SMITH, F.Z.S.

(Read before the Conchological Society, July 2nd, 1890.)

I beg to offer a few words in answer to Mr. Marshall's observations.

In the first place, the author states that three of the four characteristics I have enumerated as separating *H. jenkinsi* from *H. ventrosa* are "*clearly varietal*".

1. It seems to me that differences of habit are extremely important, and are not likely to be caused by circumstances which may affect size or colour, such as scarcity of food, or the quality of the water inhabited. They may rather be regarded as inherited characters, not affected by local surroundings. That *H. ventrosa* habitually swims at the surface and *H. jenkinsi* scarcely ever, indicates a transmitted difference of nature, which, in my opinion, should be regarded as more than *varietal*.

2. I fail to comprehend why differences in the colour of the foot and head, and in the greater size and more robust form of the shells, should not in *this* instance be considered specific. If *H. jenkinsi* were found in localities where *H. ventrosa* did not exist, I recognise that the *varietal* view might be admissible; but, as both forms occur together, in the same ditches, and consequently subject to the same conditions, these differences have quite another significance. That Mr. Marshall admits the difference in "length and form of tentacles" to be specific, is satisfactory, if not very intelligible. He observes "there can be no doubt that Jeffreys had this shell before him when he described his var. *ovata*, as the characters of the suggested *H. jenkinsi* are absolutely identical with his detailed description."

To this I may answer:—

(a.) If Jeffreys had seen the shell in question, would he not have quoted Plumstead or Beckton as localities, and *not*

* Mr. Marshall kindly sent me a proof of his paper.

“Oxwich Marsh, near Swansea,” where, in all probability, it is not found.

(b.) He would not have stated that it consisted “of only four whorls,” as in *H. jenkinsi* there are at least six.

(c.) He certainly would not have overlooked the carination of the last and penultimate volutions—a feature existing in the majority of specimens.

(d.) He would have mentioned its superior size.

My opinion of Jeffreys’ var. *ovata* of *H. ventrosa*, judging by the description and locality, is that it is a short stumpy form of that species.

In conclusion I would point out that Frauenfeld does not state that our *H. similis* is a *Bithynia*: it is the shell described by Draparnaud he refers to.

Mr. Marshall observes that “the *Cyclostoma simile* of Draparnaud is certainly a synonym of our shell.” From the original brief description and figure it is quite impossible to identify his species. It is merely tradition which has handed down to us the shell which we know as *Hydrobia similis* as the true *Cyclostoma simile* of Draparnaud. Surely Frauenfeld would not have given another name to the *similis* of authors, if Draparnaud’s type had been identical in all respects, excepting the operculum? Would he not have suspected that a wrong operculum had been introduced into the specimen, although, in shells of such small size, it is not likely to have occurred.

The synonymy of *H. confusa* is as follows:—

Hydrobia confusa (Frauenfeld).

1821 ? *Valvata similis* Hartmann, Syst. Erd. and Sussw.

Gaster. Europ., p. 57 (in Sturm’s Deutsch. Fauna Abtheil. vi.). (Name only).

1830 ? *Paludina similis* Menke, Synopsis, p. 42 (name only).

1831 ? *P. similis* Turton, Man. Land and Freshwater Shells Brit. Is., p. 135, f. 121.

1838 ? *P. similis* Potiez & Michaud, Gal. Douai, vol. i, p. 254.

1840. *Littorina anatina* (Drap. ?) Gray, Man. Land and Freshwater Shells Brit. Is., p. 87.
1851. *Hydrobia similis* Dupuy, Hist. Nat. Moll. terr. France, p. 552, pl. xxvii, f. 9 (shell).
1852. *Paludina similis* Küster, Con. Cab., p. 55, pl. 10, f. 25-6 (probably).
1853. *Rissoa anatina* (Drap. ?) Forbes & Hanley, Brit. Moll., vol. iii, p. 134, pl. lxxxvii, f. 3, 4 (shell and animal).
1855. *Bythinia* (*Bythinella*) *similis* Moquin-Tandon, Hist. Nat. Moll. France, vol. ii, p. 526, pl. xxxix, f. 18, 19 (shell).
1859. *Hydrobia similis* Sowerby, Ill. Index Brit. Shells, pl. xiv, f. 5 (shell).
1862. *H. similis* Jeffreys, Brit. Conch., vol. i, p. 64, pl. iii, f. 10-12; vol. v, pl. 4, f. 6 (shell and animal).
- 1862-4. *Amnicola confusa* Frauenfeld, Verhandl. Zool.-Botan. Gesell. Wien., vol. xii., p. 1150; vol. xiii, p. 1029; vol. xiv, p. 647.
1863. *Bythinia similis* Reeve, Land and Freshwater Moll. Brit. Is., p. 188 (shell).
1864. *Amnicola similis* Bourguignat, Malac. Alger., vol. ii, p. 238, pl. xiv, f. 28-30.
1867. *A. confusa* Paladilhe, Rev. & Mag. Zool., p. 47: 1869, p. 229, note.
1873. *Hydrobia* (*Amnicola*) *similis* Westerlund, Fauna Moll. terr. et fluv. Suec. Norveg. et Daniæ, p. 470 (shell).
1879. *Bythinia similis* Locard, Fauna Moll. terr. quatern. Lyon., p. 124 (shell).
1881. *Hydrobia* (*Amnicola*) *similis* Kobelt, Cat. Europ. Binnen. Conch., p. 144 (name only).
1882. *Amnicola similis* Locard, Cat. général Moll. France, p. 224 (name only).
1886. *Paludinella* (*Pseudamnicola*) *similis* Westerlund, Fauna Paläarctisch. Region, vi, p. 69 (shell).
1890. *Hydrobia confusa* Smith, Journ. Conch., vol. vi, p. 145.

DERBYSHIRE
FROM A CONCHOLOGIST'S POINT OF VIEW.

BY LIONEL E. ADAMS, B.A., Treas. C. S.

(Read before the Conchological Society, March 5th, 1890.)

THINKING that it may interest some collectors, especially tyros, I send a few notes on a partial and very inadequate study of Derbyshire as a 'happy hunting ground.'

I do not intend to waste valuable space with descriptions of scenery, nor to detail my captures, but to show how such a district may be advantageously dealt with. When working a district I have found it convenient to choose a suitable headquarters, and each day, armed with an Ordnance map, to explore a sector of a circle, with the headquarters as centre, and with a radius of five or six miles. When the circle is completed another headquarters should be found, so that a similar circle surrounding it is contiguous to the one completed. When such a circle has been explored the explorer should by no means flatter himself that its resources are exhausted. In many a limited area that I have worked almost daily for three or four years fresh species and varieties have continually appeared.

Having made myself acquainted with the leading geological features of the county I divided it into four districts as follows:—

(1) *The Peak or Grit and Heather District*, consisting of the N.W. corner cut off by a line from Hathersage, through Castleton, Chapel-en-le-Frith to Whaley Bridge. This district promised almost *nil*, and the promise has been realised, for with the exception of a very few of the commonest slugs I found nothing, though I should mention that my work was done here during intermittent frosts. There is one little spot, however, which may yield something, between Hayfield and New Mills, where there are two small woods and a few hedges.

(2) *The Limestone District*, of oblong form with Hathersage, Chapel-en-le-Frith, Ashbourne, and Derby at the corners. Here I expected to reap, and have reaped, an abundant harvest. *Helix rupestris*, which I have never taken anywhere but on the limestone, is found along the stone walls from Chapel half way to Castleton, and from here it spreads southwards over all the district. This road forms a sharp line of demarcation between the grit and the limestone, and the complete manner in which molluscan life is bounded by the former is very marked. At Castleton there is a patch of limestone—the Winnats—where, in one small spot, several forms of *Zonites* are to be found, and *H. arbustorum* with many varieties flourishes, also here and there *H. lapicida*. The region of Peak Forest (which I hardly need mention is not a tract all covered with trees—the word retaining its original meaning) should be worked for *Zonites*. The neighbourhood round Buxton is noteworthy for the abundance of *Z. alliarius* var. *viridula* which is more common than the type in the proportion of three to one. I made an interesting capture here of a specimen of the type *in cop.* with the variety. By the way, I have noticed that this variety nearly always differs from the type in its coarser sculpture and more elevated spire. Ashwood Dale and Miller's Dale were disappointing, the former locality only producing *H. pygmaea* as worthy of mention, though here, too, I have only collected in winter. The line of the High Peak Railway should be searched for *Bulinus obscurus*, *Pupa umbilicata*, &c. Deepdale abounds in *Zonites purus*, fine *Helix nemoralis* var. *libellula* ooooo, &c., and in the stream at the bottom of the gorge is *L. truncatula*. The valley of the Derwent is a good field, especially from Bakewell to Matlock. In the neighbourhood of the latter *Clausilia laminata* and *Helix lapicida* swarm over the tors after a shower of summer rain, and *Bulinus obscurus* and *Cochlicopa tridens* may be scraped out of the mossy niches. Around Bakewell the hedges are studded with *Helix arbustorum* and its pale varieties. The valley of the Dove, in spite of its limestone

character and south-west aspect is unproductive, perhaps on account of its scanty vegetation. The woods and tors of lovely Dovedale have, as yet not yielded much, though I shall be surprised if a summer visit does not reward me. From Winster to Ashbourne by Mappleton is a fine track, after the High Peak railway is crossed, about a mile past which the road descends between some disused quarries and continues with old stone walls on each side, to within two miles of Ashbourne, where hedges take their place. These quarries and walls yielded, amongst other things, white varieties of *Helix hispida*, *H. concinna*, *H. rotundata*, two specimens of albino *Clausilia laminata*, and nearer to Ashbourne colonies of *Cochlicopa tridens*. The four *Arions* and *Limaces agrestis*, *arborum*, and *maximus*, with some of their varieties occur throughout the district.

(3, 4) *The Red Marl and Sandstone Districts.* The southern district, though enriched in some places by luxuriant vegetation, is a poor one conchologically. One specimen of *Vertigo edentula* found adhering to the underside of a bracken frond is the most noteworthy capture; noteworthy because molluscs have a well-known antipathy for bracken, or, at any rate, for the gritty soil on which it flourishes. Round Clifton I have taken occasionally specimens of *Zonites excavatus*, which, I may remark, I have never taken on the limestone. The aquatic species are more numerous in this district than further north, though they are few.

The fourth or Eastern District I have not worked, and for this I refer to Mr. T. Hey's interesting list in the July number of the *Journal of Conchology* for 1889.*

The rivers of Derbyshire are particularly unfruitful. I may mention that I have never taken a single shell in any one, and

* With reference to Mr. Hey's list, I trust he will pardon me for reminding him that the term 'Peak District,' as generally used, applies to the whole of North Derbyshire as far as Buxton. He evidently meant the 'Peak Forest District' only when speaking of *Helix rupestris* and *H. lapicida*. I am surprised, though much interested to hear that *Pupa umbilicata* occurs near Kinderscout.

I see all Mr. Hey's aquatic species have been taken from canals, ponds, or brooks. This poverty of molluscan life may be owing to the scanty weed supply, the swiftness of the currents, and the coldness of the water due to the melted snow from the hills.

If what I have said deals rather with negative results, let it be remembered that something may be learnt even so. The tabulation of the products of such districts, marked off according to geological formation, will show the young collector what to expect in similar localities, and lead to the more extensive generalisations which are the ends of every science.



Dredging off Connemara.—Mr. B. Sturges Dodd has submitted to me the results of a short dredging cruise he made last August, in company with Mr. Mellors, in Birterbuy and Roundstone Bays, on the west coast of Ireland, in about ten fathoms; and some of them, on account of their rarity and their not being hitherto recorded from the district, are worth publishing. These are *Lepton clarkiae*, fine specimens and not uncommon. Jeffreys gives the depth of this species as from eighteen to twenty fathoms, but I have found it living at low water in several places, and downwards to thirty fathoms. Also *Rissoa proxima*, *Aclis gulsonæ*, *Odostomia minima*, *O. clavula*, *O. lukisi*, *O. diaphana*, and *O. clathrata*. Two specimens only of the latter were obtained in Birterbuy Bay, on the same ground whence Dr. Jeffreys recorded his two original specimens. All being well, Mr. Dodd intends visiting the district again next August for further dredging.—J. T. MARSHALL.

Tenby Shells.—By an oversight I find the names of two species were omitted from the list published in the number for July, 1889, viz:—*Utriculus truncatulus*, one specimen only; and *Rissoa costata*. They were found among broken shells and sand.—J. W. CUNDALL, *October 30th, 1889.*

NOTES ON THE DISCOVERY OF *LIMNÆA*
GLUTINOSA NEAR HULL.

BY F. W. FIERKE.

(Read before the Conchological Society, April 2nd, 1890).

This highly interesting mollusc was first discovered in Skidby Drain, about a mile from Hull, in the month of September, 1889, by Mr. F. W. Robinson, president of the Hull Scientific Club. Strange to say, it was found on the common bladderwort (*Utricularia vulgaris*), a plant which had not been previously met with in the locality. Subsequently, the mollusc appeared in great numbers on the mud at the bottom of the drain, where, at a cursory glance, it would have been mistaken for *L. peregra*; but no sooner was it taken from its habitat, and placed in the hand, than its viscid properties became manifest and disclosed one of the most peculiar characteristics of *L. glutinosa*; for the mantle of the animal is often completely turned over the exterior of the shell, producing an effect strikingly different to anything we see among the molluscan life of our tarns and ditches. When the shell is not entirely enveloped, a portion of the mantle is still retained over the spire and partially over the body whorl, and it is on such occasions that the colour of the animal, as it appears through the shell, may be determined. It has a yellowish ground with irregular black blotches which enclose about the centre of the body whorl almost circular spots of yellow. At times, the animal appears very gaudily coloured when the yellow takes the bright shiny hue which is particularly noticeable on a sunny day.

L. glutinosa is evidently a prolific mollusc, as on continuing our researches we found that its distribution, though limited to the drain, was a considerable one, and might extend, as far as we could tell, for miles. The drain takes a westerly course from

Stoneferry alongside Green Lane until it reaches the high road to Beverley, where it winds round and skirts the road to Haworth Hall. Through the whole of the district just described the drain cuts into the boulder clay of Holderness. During the winter months I have visited the drain frequently, and sometimes when the weather was bright and calm (and this has usually been before noon) the shell could be identified in the mud quite distinctly; at other times, especially on a dull windy day (and this has usually occurred in the afternoon as on Saturday last) not one would be seen, but on thrusting our scoop further out and amongst the weeds numbers would be secured. I have always been able to take the greatest haul when the shells could be distinguished in the mud and we were bound to collect them one by one, as I discovered that to work the scoop or net indiscriminately generally ended in getting none at all. One of the most common weeds in the drain is *Callitriche*, and on this we have usually found them.

Although the mollusc in its natural habitat is so often found crawling on the mud, on being removed into a glass jar with a deposit of mud laid over the bottom, I have found it either feeding on the plants or attached to the side of the jar in an apparently settled position, and in the latter instance, often with its triangular-shaped tentacles fully expanded. Unlike other *Limnææ* it is of a rather sluggish disposition and loves to remain stationary. Sometimes they are found floating on the top of the water with the foot fully spread out just under the surface and the shell hanging down.

They do not appear very particular as to what plants they feed on. I have now one jar containing a quantity of the ivy-leaved duckweed (*Lemna trisulca*) on which the molluscs therein confined appear quite at home, clinging to it most tenaciously, and from the operations going on it is evident they most thoroughly enjoy their repast. When the animal is fully expanded it closely resembles its surroundings, and the delicate

tentacles might easily be mistaken for fragments of the little weed on which it feeds. The eyes appear at the base of the tentacles in the form of two tiny black specks. The mantle sometimes entirely overlaps the shell, the edges meeting about the middle of the body whorl. When found on the side of the jar the animal has the mantle drawn in a bit, leaving the shell about the centre of the body whorl uncovered.

The mollusc appears very sensitive of touch and the slightest irritation caused to the mantle will produce the withdrawal of the latter more or less. It seems extremely light in the water, and often floats about at random and if disturbed instead of quickly sinking like *L. peregra* I have seen it gently rise to the top. Another characteristic of this mollusc is the power it possesses of emitting a sticky glutinous matter similar to the slime of the slugs. Mucous threads are seen in the jar connecting weed to weed, and sometimes even decorating the shells of other molluscs with which *L. glutinosa* had evidently come in contact. Lastly, as regards the shell itself, so far as we have been able to observe, there seems but little variation; nevertheless, seeing that the mollusc is fairly common in the locality, and evidently living under very favourable conditions, I think there is much probability of our occasionally meeting with departures from the actual type. The shell is of an exquisitely beautiful amber colour, transparent, and exceedingly fragile.

In concluding these few remarks on *L. glutinosa*, as discovered in Skidby Drain, we are sure there are few molluscs which become more interesting as a study of their life history, or worthy of greater admiration for the pretty shell it possesses, and, certainly, it was a most desirable addition to the molluscan fauna of the East Riding of Yorkshire.

HULL. March 11th, 1890.

RE-DISCOVERY OF
HELIX FUSCA AND *HELIX LAMELLATA*
 IN NORTH STAFFORDSHIRE.

BY THOS. F. BURROWS, M.C.S.

(Read before the Conchological Society, March 5th, 1890).

I have recently been fortunate enough to find both these species in North Staffordshire: *Helix fusca* (Mont.) in a small wood at the foot of the Weaver Hills near Ramsor, on the 1st of December, whilst searching for Zonites. The food plant here appears to be the Common Campion (*Lychnis dioica*). All the specimens taken were found on the leaves of the Campion or upon the Dead-Nettle stalks lying over them. I may also mention the remarkable similarity between the shells of this species and the dead seed-capsules of the Campion when wet. Mr. J. R. B. Masefield (of Cheadle) has also noticed the same likeness, often mistaking the empty capsules for the shells.

On February 8th I accidentally found *Helix lamellata* Jeff. in Cotton Dale (the locality mentioned by Mr. Garner in his Natural History of Staffordshire) by picking up a handful of beech leaves, as I was walking through the dale with Mr. Masefield. The first handful yielded two specimens; two hours' work only produced two more. My friend had only just remarked that we must give up all hope of finding *H. lamellata*, both of us having spent days in a fruitless search for it. I have since taken fourteen specimens in the same locality.

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Helix lamellata at Stafford.—On looking over my collection the other day I found a specimen of this species (recently re-discovered in Staffordshire by Mr. Burrows, of Cheadle), which I must have taken at Stafford. It is an immature, dead, and worn specimen, which I had mistaken for *H. pygmaea*. It must have been taken in 1886 or 1887, either in the high hedge banks of Burford Lane, or by the road-side in a wood at Tillington. Both localities are within a mile of Stafford, and should be searched for more specimens.—LIONEL E. ADAMS, Penistone, *May 19th, 1890.*

(Read before Conchological Society, *July 2nd, 1890.*

CRITICAL NOTES ON SOME LAND AND
FRESHWATER MOLLUSCA.

By T. D. A. COCKERELL, M.C.S.

(Read before the Conchological Society, April 2nd, 1890).

THROUGH the kindness of Mr. J. A. Singley, of Texas, I have been enabled to examine a large series of shells, most of which are not well known to British Conchologists. I have thought, therefore, that a few notes on some of these specimens might be of interest, especially in relation to synonymy. The German shells were mostly collected by Mr. Jetschin, and there is reason to suppose that with a few possible exceptions they are correctly named. I give the names and localities as received, and follow with my own notes.

Zonites nitens var. **albina** Kob. Hochwald, Austria. The greenish-white form of *nitens*; max. diam., 10 mill.

Z. nitens var. **beryllus** West. Patschkau, Germany. A distinct var., small (max. diam., 7 mill.) more compact and rounder; colour, transparent white. Agrees with *nitidulus* rather than *nitens*.

Z. glaber var. **striaria** West. Hochwald. A fine shell, certainly *glabra* Jeff. Max. diam., 11½ mill.; yellowish horn, semitransparent, very shiny; flattish. Aperture more semilunar than usual; umbilical region hardly whitish. Resembles the Cheshire form of *H. glabra* more than the south of England form.

Z. crystallinus var. **subterranea** Bgt. Rudesdorf, Germany. Seems to differ only in not being so flat, shell altogether rounder.

Vitrina nivalis Charp. Weissenbach, Tyrol, Austria. So far as the shell goes, this is a good deal like *Vitrinozonites* of America. *V. kochii* Andr., from Patschkau, seems hardly more than a variety of *nivalis*.

Helix pomatia var. **compacta** Hazay. Tirchova, Hungary.

A rather ordinary-looking *pomatia*, rather more compact than usual.

- H. arbustorum** var. **rudis** Muhl. Pusterthal, Tyrol, Austria. Yellowish and brownish, rather thin; bands nearly obsolete. The ochry markings are partly as in type, but there are numerous transverse ribbed lines of growth, which are ochre. Lip, white. Max. diam., 24 mill. The ochre ribbed transverse lines are the only special feature. One specimen is mostly ochry.
- H. arbustorum** var. **jetschini** Kob. Weisskirchen, Moravia. Subtranslucent shiny shells, brownish with a few ochre specks and a brown band. Max. diam., $23\frac{1}{2}$ mill.
- Cionella lubrica** var. **lubricella** Zgl. Bredow, Germany. A small pale variety, 5 mill. long.
- C. lubrica** var. **nitens** Kok. Trepstow, Germany. Rather broad, highly coloured, very shiny.
- Clausilia dubia** var. **trencsiniensis** Brancs. Trencsin, Teplitz, Hungary. Ordinary-looking *dubia*; long., $13\frac{1}{2}$ mill.; columellar tooth becoming double.
- C. dubia** var. **manina** Brancs. Maninschlucht, Hungary. A rather smooth, highly-coloured, and shiny form of *dubia*. Columellar tooth becoming double. Long., $13\frac{1}{2}$ mill.
- C. dubia** var. **costata** Brancs. Lictava, North Hungary. A small very costate form, 10 mill. long. The shell is purplish-brown, and the white ribs have a very pretty effect. Apparently a good species, distinct from *dubia*.
- Clausilia biplicata** var. **albina** Friv. Lowenberg, Germany. The yellowish-white variety, a very pretty shell.
- C. laminata** var. **jetschini** Haz. Mehadia, Hungary. Ordinary-looking *laminata*, 16 mill. long, rather pale.
- Pupa sempronii** Charp. Tyrol, Austria. Ordinary-looking *umbilicata*; 3 mill. long or less. Tooth present.
- Hyalinia opalista** Bgt. Algiers. Very near to *crystallina*, but differs in lacking an umbilicus and in its narrower aperture. No doubt a good species.

- Physa cooperi** Tryon. California (T. H. Aldrich). Seems specifically identical with *elliptica* Lea.
- P. fontinalis** var. **bullata** Müll. Patschkau. A pale form with a very short spire; rather inflated; columella white. One specimen has white linear marking.
- Limnæa distorta** Rossm. Petersburg, Mich. (Jerome Trombley). Large and elongate *palustris*, belong with *corvus* Gmel. Aperture tending to be reflected below. Shell long., $30\frac{1}{2}$; lat., 11 mill.
- L. stagnalis** var. **palustriformis** Kob. Weidenau, Silesia. These shells are certainly var. *compressa* Ckll., but they may not be *palustriformis*. Before *compressa* was named, Mr. Ponsonby sent examples to Dr. Kobelt, who seemed to regard them as new, and said nothing about their being *palustriformis*. Of course *palustriformis* is the name to be adopted before *compressa* if the two are really synonymous.
- Bulinus hypnorum** var. **tryoni** Curr. Grand Rapids, Mich. $17\frac{1}{2}$ mill. long, rather broad than otherwise, very shiny, fawn colour. Aperture, 10 mill. long. Very near to var. *major* Charp.
- Limnæa peregra** var. **microstoma** Kob. Heinzendorf, East Germany (Jetschin). $14\frac{1}{3}$ mill. long; apert., $8\frac{1}{4}$ mill. long.; whorls rather convex, horn colour, shiny. Shell rather thick, spire long. This is a form of var. *intermedia* Fér.
- L. umbrosa** Say. Erie Canal, New York. A form of *palustris*, distinguished by its palish colour and deepish suture.
- L. palustris** var. **fusca** C. Pfr. Patschkau, Silesia. Small (15 mill. long), brown *palustris*. In texture and form rather approaching *glabra*.
- L. pallida** Ad. Onondaga Lake, New York. Much like the white var. of *palustris*. Certainly NOT *truncatula* var. *elegans* which it has been referred to.
- L. glabra** var. **subula** Kics. Vegesack, Germany. Small rather broad *glabra*, 7 mill. long. Shape reminds one of a

Bulinulus, but more regularly conical. Colour, greyish-horn.

- L. traskii** Tryon. Oakland, Calif. (E. A. Enos), Berkeley, Calif. Near to *truncatula*, but apparently a good species.
- L. ovata** var. **baltica** L. Stockholm, Sweden. Small, pale, opaque, thick *peregra* var. *ovata*; $9\frac{1}{2}$ mill. long.
- Planorbis corneus** var. **elophila** Bgt. Patschkau. Merely rather large specimens (max. diam., 31 mill.), encrusted with black. Inside of outer lip tinged purple-brown.
- P. corneus** var. **stenostoma** Bgt. Patschkau. Smallish *corneus* (max. diam., $24\frac{1}{3}$ mill.) with rather large mouth. In *elophila* the mouth is obtuse-pyriform; in *stenostoma* it is roundish-reniform.
- P. contortus** var. **ingens** Jetsch. Biersthal, Germany. Large, with a very narrow aperture; max. diam., 6 mill.; nearly flat above.
- Pisidium roseum** Sch. Hirschberg, Silesia (Jetschin). This is not *roseum* of British authors. It is shaped like *pusillum*; pale yellowish-horn, shiny; striate, like *pulchellum*; beaks rounded, not prominent.
- P. intermedium** Gass. Laibach, Carniola, Austria. Lat., 5; long., 4; crass., $2\frac{2}{4}$ mill. Shiny, rather smooth, grey-ochry. A form of *pusillum* approaching *fontinale*.
- P. pallidum** Gass. Glatz, Silesia. Grey rather dull *fontinale*. Lat., $4\frac{1}{3}$; long., $3\frac{1}{2}$; crass., $2\frac{1}{2}$ mill.
- P. fossarinum** Cless. Patschkau. Appears to be typical *nitidum* Jen.! Grey, very shiny, much swollen; lat., 3; crass., 2 mill. Perhaps not genuine *fossarinum*.
- Sphærium scaldianum** Norm. River Stober, Creuzberg, Germany. Ordinary-looking *corneum*, rather globose, with prominent umbones. Margin of valves yellowish; lat., $11\frac{1}{2}$; long., $9\frac{1}{2}$; crass., 7 mill.
- S. lacustre** var. **steini** A. Schm. Glatz. A whitish, shiny var., with beaks less distinct than usual, but still very distinct. Lat., $8\frac{1}{2}$; long., $6\frac{2}{3}$; crass., $4\frac{2}{3}$ mill.

- S. duplicatum** Cless. Königs-Wusterhausen, Germany. Subglobular *corneum*, apparently var. *nucleus*. Grey, shiny, striate, edge of valves yellowish. Long., $9\frac{3}{4}$; lat., $11\frac{1}{4}$; crass., 8 mill.
- S. ryckholtii** Norm. Nauen, near Berlin, Germany. Small, white, shiny, of the characteristic *ryckholtii* form.
- Unio athesinus** Adami. Mattarello Lake, Mattarello, Tyrol. A form of *pictorum*. Lat., $76\frac{1}{2}$; crass., 22; long., 33 mill. Colour yellowish with brown zones.
- U. arcuatus** Bgt. River Rhone, France. A form of *pictorum*, but shorter, and rather more *tumidus*-shaped. Olive, with brown ill-defined zones. Lat., $61\frac{1}{2}$; long., $28\frac{1}{4}$; crass., 19 mill. Nacre white. This is very close to, and perhaps identical with, some of the forms found in the Thames, near London.
- U. pictorum** var. **limosa** Nilss. Neisse River, Patschkau. Lat., about 90 mill.; long., 34; crass., 24 mill. A long greenish-olive var. of *pictorum*. Nacre white, iridescent.
- U. rostrata** C. Pfr. Hunte River, Oldenburg. Apparently a var. of *pictorum*. Lat., 61; long., 26; crass., $18\frac{1}{3}$ mill. Outlines, rounded; colour, olive; beaks, eroded. Nacre white.
- U. tumidus** var. **lacustris** Rssm. Hunte River, Oldenburg. Lat., 58; long. 29; crass., $19\frac{2}{3}$ mill. A small dark *tumidus*.
- U. piscinalis* Rsm., Neisse River, Patschkau; *U. ater* Nilss., Neisse River, Patschkau; *U. ater* var. *consentanea* Rossm., Moschganzen, Austria; *U. rivularis* Rsm., Krebsbach River, Patschkau; *U. batavus* Nilss., Lohe River, Strehlen, Germany; and *U. amnicus* Zgl., Wied River, Neuwied, Germany, seem all to be distinct from any species found in Britain. *U. amnicus* and *U. rivularis* seem to be varieties of *U. ater*; while *ater* itself is perhaps not specifically distinct from *U. piscinalis*.

NEW BRITISH MARINE SHELLS.

By J. T. MARSHALL.

(Read before the Conchological Society Oct. 8th, 1890.)

Sundry British specimens of *Eulima* coming into my possession during the last ten years having been put aside as doubtful, and left undetermined for want of leisure, it is only recently, on looking over the 'Challenger' report, with its excellent figures, that I detected the close resemblance of some of them to the *E. ephamilla* of Watson†—a species found during the 'Challenger' expedition 'off Pernambuco, in lat. 9°5' S., long. 34° 50' W., in 350 fathoms, red mud.'

Being doubtful as to the identity of a species from such a locality and depth with one from the British coasts, I sent a specimen to the Rev. Boog Watson for his opinion and verification, to which he replied:—'I have checked your shell with my description, which fits it very well indeed, and the measurements come very close. . . . I am very strongly inclined to believe your shell is *E. ephamilla*; but I have no specimen, the only one obtained being preserved in the British Museum . . . and as to locality, depth harmonises many things.'

Mr. Edgar Smith was then kind enough to compare it with the 'Challenger' specimen in the Museum, and wrote me:—'I have carefully compared your *Eulima* with *E. ephamilla* (of which only one specimen in bad condition is known), and cannot see any reason for separating it.'

As the 'Challenger' report is not, or ever likely to be, readily available for general collectors, I append the Rev. Boog Watson's description and remarks, with a few interpolations which could not be determined from the 'Challenger' example:—

† Prelim. Report, part 17, Journ. Linn. Soc. Lond., vol. xvii., p. 116, sp. 6. Also 'Challenger' Report, pp. 511—12, pl. xxxv., fig. 6.

'Shell.—High and narrow, very symmetrical, with a very fine linear suture, flat-sided and very-little-oblique whorls, a tapering, scarcely convex base, and a small pear-shaped mouth. Sculpture—none. Colour—the specimen is dead and discoloured [pale yellowish white]. Apex slightly broken, but seemingly small [blunt, perfectly rounded]. Spire high, quite straight, and with profile-lines most symmetrical. Whorls, 12 or 13, quite flat on the sides; the last whorl is a little long but narrow, tapering very gradually, scarcely convex, and very regularly rounded in front, where the lip hardly projects. Suture linear, fine and hardly impressed, and very little oblique. Mouth not oval, but regularly pear-shaped, and slightly oblique. Outer lip quite straight in its direction; its edge is deeply sinuated above, a little prominent in the middle, and then it retreats very slightly to the shallow open gutter in front. Inner lip, a thin glaze with defined edge crosses the body and runs out on the short, narrow, slightly-twisted pillar, with a very minute furrow behind it. [Operculum filmy, very pale yellow, with micro-flexuous striæ in the line of growth.] Height, 0·33in.; breadth, 0·06in.

'This species very much resembles *E. subulata* Don., but is slightly slimmer in form, and the base in particular is more symmetrical; the suture is less oblique; the mouth is unmistakably different, being smaller, more drawn in towards the axis of the shell, and the inner lip has no curve on the body and no angulation at the junction of body and pillar, but runs quite straight from the angle of the mouth to the point of the pillar.'

Mr. Watson's figure shows 11 whorls, though his text gives 12-13, and the length as about one-third of an inch. My largest specimen is exactly a quarter of an inch long, and has 13 whorls. They have been obtained at various times in six different localities, and a few are live shells. The following is a list of these localities:—

Aberdeen, 50 miles from land, in 56 fathoms ('Triton' cruise, July, 1882).

The Minch, in about 65 fathoms.

Sound of Sleat, 80—90 fathoms.

Arran, 31 fathoms.

Hebrides, 20 fathoms (precise locality unrecorded).

Milford Haven, 11 fathoms.

The shell is not keeled at any stage. Two specimens are slightly curved, and another has the apical whorls only curved.

Ephamilla signifies like unto or resembling *E. subulata*. The latter is of course a larger shell, and has coloured bands; but comparing one of the same size with *E. ephamilla* it will be seen that it is nearly twice as broad at the base, the mouth is considerably larger, and the whorls are not so compressed. From *E. distorta* var. *gracilis* this differs in being longer and more slender, with a narrower base, a much smaller mouth, a blunt and rounded, instead of a pointed apex, and the first whorls compact, instead of being loosely coiled. There is a slender form of the var. *gracilis* that comes close to it in outline, but its pointed apex and larger mouth will always distinguish it from *E. ephamilla*. It also differs from that rare and slender shell *E. intermedia* var. *rubrotincta* in the same particulars.

The Milford Haven locality is remarkable on account of its shallow depth, occurring there with quite the ordinary common species usually found at that depth. The Aberdeen locality may be considered special, as also that of the Sound of Sleat, where two specimens were dredged by Mr. A. Somerville, off Glenelg, in 1889. The current there is very strong, and it is not easy to keep the dredge down.

In Boog Watson's remarks on this species in the 'Challenger' report, p. 511, line 4 from bottom, the word 'sculpture' should read 'suture.'

The next new species is also a Eulima, and also one of those obtained in the 'Challenger' expedition—the *E. latipes* of Watson.‡ Only one adult and two immature examples

‡ Prelim. Report, part 17, Journ. Linn. Soc. Lond., vol. xvii., p. 120, sp. 11. Also 'Challenger' Report, p. 515, pl. xxxvi., fig. 3.

occurred in that expedition, the former being rubbed and chipped, so that the species is not very well represented in the British Museum; and they were taken in Torres Straits, the gulf dividing New Guinea from Australia, in seven fathoms. The following is the description taken from the 'Challenger' Report:—

'Shell.—Squat, with a broad flat base, a rapidly-contracting bent spire, a small tip, convex whorls, an impressed suture, and a small pear-shaped mouth. Sculpture, none. Colour, glassy white. Apex, very small, acuminately symmetrically rounded. Spire, small and bent above, enlarging very rapidly in breadth, with concave profile lines. Whorls 9, short, broad, of slow increase, slightly convex. Suture slight, a little impressed, scarcely oblique. Mouth, small, pear-shaped. Outer lip, arched; its edge retreats above, is rounded in the middle, and is patulous throughout. Inner lip, continuously arched across the body and down the short broad pillar. Height, 0·093in.; breadth, 0·045in.

'September 8, 1874. Flinders Passage, Torres Straits, 7 fathoms. This species is remarkable for the breadth of its base and the smallness of its tip. Unfortunately, the specimen which I regard as full grown is rubbed and chipped, and the two which are perfect are young and imperfectly developed, especially about the mouth.'

I have this shell from the Land's End, and from Scilly in about 35 fathoms, where Mr. Clifford Burkill dredged it in 1888, and also in this year. The 'Challenger' example is slightly under a line in length; my Land's End specimens are slightly over, and the Scilly ones a line and a half.

It would appear to be a shallow water species. I had given it a MS. name in my collection as *E. distorta* var. *tumidosa*, as there is a squat form of *E. distorta* with a broad base leading up to it; but on further observation it is seen that the aperture in *E. latipes* is smaller, the spire is stouter, the whorls slightly convex, the apex blunt, the base much wider,

and the upper whorls only are curved, instead of being, as in *E. distorta*, curved throughout. Its nearest ally is the *E. microstoma* of Brusina, but that is manifestly different.

Mr. Edgar Smith has compared my shell with the 'Challenger' one, and thinks they are not identical; that '*E. latipes* is less curved towards the apex, the mouth is shorter, and the body-whorl more angled in the middle.' But one of my specimens has the spire much less curved than Mr. Watson's figure, in fact almost straight, and the measurements of the body-whorl are mathematically exact. Rev. Boog Watson, writing from memory only, having no specimen of *E. latipes* before him, thinks 'it is distinct—but what?'

With all due deference to the opinions of these gentlemen, however, and much as I value them, I feel great reluctance to describe as absolutely new a shell so extremely like *E. latipes* as this Cornish one, and accordingly launch it forth under that designation.

In using the name of *Eulima distorta* in the foregoing pages, I am well aware that that name properly belongs to another species, and that it must give place to the *E. philippii* of Weinkauff; but until another edition or revision of 'British Conchology' is published, and the latter name established, I have thought it best to use the name long known to English collectors.

SEVENOAKS, TORQUAY,
August 23rd, 1890.

Otina otis var. **candida** in Pembrokeshire.—I took last Autumn in South Pembrokeshire several specimens of *Otina otis* var. *candida*, from caves near the Eligug Stack Rocks. I believe it has not been recorded from that locality before.—BEATRICE J. FALLOON.

LONG ASHTON VICARAGE,
BRISTOL. Oct. 25, 1890.

Z. glaber var. **viridula** at Penistone.—On the 10th of last April I found a dead specimen at Guenthwaite, a mile and a half from Penistone, of *Z. glaber*, which subsequent examination proved to be an Albino. Since Albinism in this species has not, I believe, been hitherto recorded, I would suggest the varietal name *viridula*, as it is of a greenish colour. At the risk of raising a storm from the ‘lumpers,’ I would suggest, in the event of the threatened general revision and correction of names, that the terms *alba*, *albida*, *candida*, etc., be applied strictly to white coloured albinos, and that where the white and green albinos exist in the same species, as in the case of *H. rotundata*, different names be given to the green and white varieties; and, moreover, that the terms *alba*, *candida*, etc., be *correctly* applied, as also *ater* and *niger*, etc.—LIONEL E. ADAMS.

PENISTONE, *May 19, 1890.*

Pupa ringens in Pembrokeshire.—This autumn I took *Pupa ringens* in South Pembrokeshire from the hill forming the east bank of Milford Haven. I believe this has not been recorded for this county before.—BEATRICE J. FALLOON.

LONG ASHTON VICARAGE,
BRISTOL, *Oct. 25, 1890.*

A LIST OF SHELLS FROM THE TIZARD BANK, CHINA SEA.

BY EDGAR A. SMITH, F.Z.S., &c.,
President of the Conchological Society.

(Read before the Conchological Society).

DURING the recent survey of the Macclesfield and Tizard Banks by H.M.S. ‘Rambler,’ a few shells were obtained by Mr. P. W. Bassett-Smith, Surgeon, R.N. As special localities are valuable for our knowledge of distribution, I thought it might be useful to publish the following list, although only a very short one.

- I.—*GASTROPODA*.
1. *Conus striatus* Linn.
 2. *C. minimus* Linn.
 3. *Terebra dimidiata* Linn.
 4. *T. chlorata* Lamarck.
 5. *Murex banksii* Sow.
 G 6. *M. löbbeckei* Kobelt.
 C 7. *M. laciniatus* var. Sow.
 A 8. *M. aculeatus* var. Lamk.
 9. *Sistrum undatum* var.
 10. *S. hystrix* Lamk.
 11. *Nassa papillosa* Linn.
 12. *N. granifera* Kiener.
 G 13. *Latiaxis de burghiae* Rv.
 B 14. *Coralliophila pagoda*
 A. Ad.
 15. *Oliva cruenta* Dillwyn.
 F 16. *Oliva* sp.
 17. *Cassis nodulosa* Gmel.
 18. *Dolium perdix* Lamk.
 19. *Ranella granifera* Lmk.
 20. *Triton anus* Lamk.
 B 21. *T. (Epidromus)*
 nitidulus Sow.
 22. *Natica (Mamilla)*
 melanostoma Lamk.
 23. *N. (Polinices) mamilla*
 Lamk.
 24. *Cypræa tigris* Linn.
 25. *C. carneola* Linn.
 26. *C. arabica* Linn.
 27. *C. vitellus* Linn.
 28. *C. helvola* Linn.
 29. *C. moueta* Linn.
 30. *C. annulus* Linn.
 31. *C. fimbriata* var.
 32. *Cerithium nodulosum*
 Brug.
 33. *C. obeliscus* Brug.
 34. *C. articulatum* Ad. and
 Reeve.
 35. *Strombus lentiginosus*
 Linn.
 36. *S. gibberulus* Linn.
 37. *S. samarensis* Chemn.
 38. *Pterocera lambis* Linn.
 39. *P. aurantia* Lamk.
 40. *Turritella* sp.
 41. *Xenophora solarioides*
 Reeve.
 42. *Tenagodes muricatus*
 Born.
 43. *Nerita polita* Linn.
 44. *N. plicata* Linn.
 45. *Turbo petholatus* Linn.
 A 46. *Delphinula sphaerula*
 Kiener.
 47. *Bulla ampulla* Linn.
- II.—*PELECYPODA*.
- E 48. *Tellina squammulosa*
 A. Ad.
 49. *Isocardia cumingii* A. Ad.
 D 50. *Cardium fornicatum*
 Reeve.
 E 51. *Cardium* sp.
 D 52. *Avicula castanea* Reeve?

A, dredged at a depth of twenty fathoms; B, twenty-eight fathoms; C, thirty fathoms; D, thirty-five fathoms; E, forty-one fathoms; F, forty-five fathoms; G, fifty fathoms. The rest of the species were picked up upon the shore, thrown up by the waves.

With a few exceptions all the above species are common well-known forms, the distribution of which has already been recorded. Most of them occur in many parts of the Indian Ocean. Only two of the species are new to the collection of the British Museum, namely, *Murex löbbeckei* and *Latiaxis de burghiaë*. The single specimen of the former is a most lovely shell and a very beautiful addition to the national collection. It is, I believe, the second known example. The specimen of *Latiaxis de burghiaë* is only about half grown, but shows, I think, the distinctness of this species from *L. mawæ*, with which it has been united by Tryon.

I would also call attention to two examples of *Delphinula spherula* of Kiener, which is said to be the same as *D. arion* of Meuschen. They differ from the typical form as figured by Kiener (Coq. Viv., pl. 3, fig. 3) in having both the upper and lower surfaces much more finely spirally ridged, so that they have a considerably smoother appearance than usual.

No special locality has been previously assigned to this very rare and beautiful shell, although Roeters van Lennep* suggested the Moluccas.



ARION MINIMUS (Simroth) A BRITISH SLUG.

BY R. F. SCHARFF, PH.D., B.SC., M.R.I.A.,
CURATOR OF THE NATURAL HISTORY MUSEUM, DUBLIN.

(Read before the Conchological Society, Oct. 8th, 1890).

THE Slug which I am about to describe agrees in every respect with the description given by Simroth in his admirable treatise on German Slugs (feitschrift für Wiss. Zool., vol. xlii., p. 289). It is probably no other than the *Limax flavus* of Müller (Hist. Vermium Terr. et Fluv., 1774), which subsequently found a place among the doubtful species in Moquin-Tandon's

* Journ. de Conch., 1870, vol. xviii, p. 381.

Hist. Moll. Terr. et Fluv., vol. ii., p. 16). Alder's description of *Arion flavus* (Catal. of the Moll. of Northum. and Durham, p. 30), is too short, and his figure, which was published in Forbes and Hanley's History of British Mollusca, so differs from *Arion minimus* that I am rather doubtful whether it was this species he found. These and other papers give only most meagre descriptions of a few external characters which make it impossible to identify a species which is so easily mistaken for the young of some other Arion.

According to Simroth, *Arion minimus* belongs to the Ariunculus group, which was created by Lessona and Pollonera (Monografia dei Limacidi Italiani) to include a number of small Arions in which the genital opening lies somewhat more in front of the pulmonary aperture than it does in the others. I shall not here attempt to describe the internal anatomy of *Arion miuimus*, as I intend shortly to publish a more detailed paper on the anatomy of Slugs.

I discovered this small species for the first time last August in a hay-field at Raheny near Dublin, under a heap of decayed weeds. After keeping several specimens in confinement for some days, a few clusters of eggs were deposited, so that there was no doubt that the slugs were full grown.

During the recent British Association meeting I also met with this species in England, viz:—in Lister Park, Bradford; and in Bolton Woods, near Ilkley.

Adult specimens vary in length from 20 to 23 mills.; that is to say they are almost an inch long when fully extended, and about half an inch when at rest. The typical form is of a very light grey colour, almost white, tinged with lemon yellow. The foot also is lemon coloured. Some of the Bolton Wood specimens were more like *Arion bourguignati* in colour, that is of a darker grey, than the Irish ones or those met with in Bradford. The mantle in these forms, however, was of the same light colour as in the typical forms. The head and tentacles are dark grey. Along each side of the body runs the usual lateral

band, but instead of being well defined and strongly marked—as in other Arions—it is of a diffuse character, delicately grey in tint, while in some cases it is absent altogether.

The wrinkles on the body form the chief characteristic of this interesting little slug. These, when examined by a lens, are found to possess pointed projections, which cause a peculiar glittering appearance when the light falls on them. These little spikes, which I have not noticed in any other form, are only seen when the animal is at rest. The body is then generally drawn up in the semi-circular position, which is so often assumed by *Arion ater* or *empiricorum*, but never seen in other slugs. The slime is yellowish.

The eggs are remarkably large for the size of the slug, measuring $2\frac{1}{2}$ mills. long by 2 mills. broad. They are semi-transparent and intimately attached to each other by a sticky mucus. There were generally from 10 to 13 eggs in a cluster, but never more than 16.

As regards its habitat, *Arion minimus* is peculiar to the open country, and I believe it will be found commonly everywhere in fields and woods where fungi abound, which appear to be their natural diet. In captivity they did not despise the leaves of a species of *Campanula*, on which they were fed.



The form to which Dr. Scharff calls attention in the above paper is a not uncommon one in the British Islands, and is one which I have long ago discriminated from its congeners, but without venturing to accord to it specific rank or to regard it as more than a young stage of one of the other species. Pending its further study and a confirmatory examination of its anatomical structure, I may say that I find among my records some for the following counties in or from which I have seen it, the form not being a difficult one to recognize when once known:—N.E., N.W., Mid W., and S.W. Yorkshire, North Lincoln, Cheshire, Notts., Norfolk East, Pembroke, Linlithgow, Ayr, Main Argyle, Berwick, Edinburgh, Haddington, Clyde Isles, North Perth, and Westmorland.—W. DENISON ROEBUCK.

PHYSA ACUTA (DRP.) IN SCOTLAND.

BY A. J. JENKINS, M.C.S.

(Read before the Conchological Society, Nov. 5th, 1890).

MR. J. W. Williams has described this continental species in 'Land and Freshwater Shells,' p. 69, as inhabiting 'one of the lily tanks in Kew Gardens.'

Having lately discovered that *Physa acuta* Drp. may be taken from two other localities in Britain, perhaps a few notes respecting them may interest members of the Society.

In March of the present year, my friend Mr. L. O. Grocock, M.C.S., and myself, had the good fortune to obtain several *P. acuta* from tanks in hot-houses at the gardens of the Royal Botanical Society in Regents Park.

We first noticed them in the hot-house devoted to the propagation of the young seedlings of *Victoria regia*, crawling about the sides and edge of the tank containing them, and upon the under-side of the leaves of the young plants. We also found them rather abundant in glass vessels and tanks of growing *Vallisneria spiralis* and other aquatic plants in two other hot-houses.

Early in September I had the opportunity of seeing a number of shells of *P. acuta* in the possession of my friend, Mr. W. D. Rae, who is an ardent conchologist. They had been collected by Mr. Rae from mill ponds at Aberdeen some time before. Being interested in the discovery of what I believed to be a new locality for this introduced species, I asked for further information respecting them. Mr. Rae assured me that he first collected this species about July, 1887, from three or four ponds situated in grounds belonging to the Banner Mills Co., at Aberdeen. The mill, which is a substantial granite structure,

seven or eight stories high, is built upon a piece of ground, formerly a marsh. It is some two hundred yards from the sea, and rises from the sea-level. The ponds contain warm water which has originally been heated in the interior of the mill. They contain numerous gold fish and various aquatic plants. The Physæ are found inhabiting these ponds in company with *L. peregra*. The shells of the former species have also been taken from a kind of dry subway proceeding under the mill.

I have just lately seen at the house of Mr. Rae a number of living *L. peregra* and *P. acuta*, which have just arrived from these ponds at Aberdeen, thus proving conclusively that the species still continue to exist in that locality in water of a warm temperature, but in the open air. How they came there may always remain a mystery. That they have been introduced is certain. They may have been brought from the continent with the gold fish; or with aquatic plants, as is probably the case at the Botanical Gardens at Regents Park, and Kew. Certain it is that species like *P. acuta* and *B. goodalli*, living under such artificial conditions, can only be ranked as British shells by courtesy.

NEW CROSS, 1890.



CONCHOLOGICAL SOCIETY
OF GREAT BRITAIN AND IRELAND.

PROCEEDINGS.

179th MEETING, JUNE 4th, 1890,

Held at the Philosophical Hall, Leeds.

Mr. John W. Taylor, F.L.S., Vice-President, in the chair.

Candidates Proposed for Membership: Messrs. Frank Turton, Penistone (nominated by Messrs. L. E. Adams, B.A., and William Nelson); and Albert Wood, Sutton Coldfield (by Rev. Herbert Milnes and Mr. C. Jefferys).

Donations to Library announced and thanks voted:—The Naturalist; The Nautilus (Mr. T. D. A. Cockerell); Proceedings of the Linnean Society

of New South Wales; Feuille des Jeunes Naturalistes; Transactions of Yorkshire Naturalists' Union; W. H. Dall on the Dynamic Theory of Evolution; and J. W. Williams on a Tumour in the Freshwater Mussel.

Donations to Collection announced and thanks voted: *Testacella haliotidea* from Kirkcudbrightshire (Mr. W. Evans, F.R.S.E.); various Yorkshire shells (Mr. W. Denison Roebuck, F.L.S.).

Exhibits.

Mr. W. H. Heathcote sent for exhibition several examples of *Acme lineata* from Luccombe Chine, Isle of Wight, making a fresh county record.

Mr. W. E. Collinge showed *Cyclostoma elegans* from Thorparch, Yorkshire, where it occurs in very large numbers at nearly the northern limit of its range in Britain.

The Secretary showed *Zonites fulvus* and other shells from Alford, North Lincolnshire, sent by Mr. J. Eardley Mason.

Mr. W. Denison Roebuck, F.L.S., showed *Bulimus obscurus* from Ruston Parva (York S.E.) and other Yorkshire captures.

On behalf of Mr. Robert Standen were exhibited *Pisidium fontinale* from Birkenhead, var. *cinerea* from Liverpool, var. *pulchella* from Cheadle, *P. roseum* from Birkenhead, *Sphaerium corneum* var. *complanata* from Gass Canal, Hollinwood, and var. *nucleus* of large size from Askham Bog, very oblong and flattish specimens of *S. ovale* from canal at Hollinwood, and several varieties of *Helix arbustorum* from Pocklington.

On behalf of Mr. H. E. Craven were shown *Planorbis nitidus*, *Pisidium henslowianum*, and *Sphaerium corneum* var. *flavescens* from Sutton Coldfield, *Neritina fluviatilis* with vars. *cerina* and *trifasciata* from the River Blythe near Whitacre, *Ancylus fluviatilis* var. *alba* from Gateshead, etc.

On behalf of the Rev. S. Spencer Pearce, M.A., was shown *Testacella haliotidea* from Hitchin, Herts., where it was found by Mr. Phillips.

An interesting collection of shells collected in Sutherlandshire, by Mr. W. Baillie, of Brora, including *Helix lamellata*, *Bulimus acutus*, *Vertigo substriata*, *Planorbis albus*, and others, and presented by him to the Society's collection, was on exhibition.

The Chairman exhibited and explained a manuscript index to the synonyms of British Land and Freshwater Mollusca, which he had prepared for his own use and found of considerable value and utility.

180th MEETING, JULY 2nd, 1890.

At the Philosophical Hall, Leeds.

Mr. John W. Taylor, F.L.S., Vice-President, in the chair.

New Members Elected: Mr. Frank Turton, Penistone; and Mr. Albert Wood, Sutton Coldfield.

Donations to Library announced and thanks voted:—Records of the Australian Museum, vol. i., no. 2; Mr. H. K. Jordan on the Species and Varieties of the Genus *Fusus* which inhabit the British Seas.

Donations to Collections announced and thanks voted :—*Hydrobia jenkinsi* (carinated form) and its var. *tumida*, and *H. ulvæ* from Tilbury Marshes, from Mr. A. J. Jenkins; *Anodonta cygnea* from Gosford, East Lothian, from Mr. Evans, F.R.S.E.; and a very large example of the same species found on cleaning out an old pond at Mereworth, West Kent, presented by the Rev. R. A. Summerfield, B.A.

Papers Read.

A paper by the President, Mr. Edgar A. Smith, F.Z.S., entitled "A Reply to Mr. J. T. Marshall's 'Further Notes on British Hydrobiæ'" [printed in 'J.C.', July, 1890, vol. vi., p. 244].

A note by the Treasurer, Mr. Lionel E. Adams, B.A., on *Zonites glaber* var. *viridula* at Penistone, was read [printed in 'J.C.', Oct., 1890, p. 265].

Exhibits.

The Chairman exhibited and commented upon a numerous and highly interesting series of specimens of *Helix nemoralis*, in illustration of the variation to which it is subject. He also showed a series of varieties of that species which forms part of the Museum at Leeds.

Mr. W. Nelson gave an account of a recent expedition to the neighbourhood of Howden and Hemingbrough (Yorks. S.E.) and exhibited the specimens he had collected.

On behalf of Mr. J. Ray Hardy were shown some of the results of a successful field-day in Darley Dale, Derbyshire, by the Manchester Branch, amongst which were *Zonites fulvus* var. *mortoni*, *Vertigo denticulata*, *Helix aculeata*, *H. lamellata*, etc., the last-named appearing to be a new species for Derbyshire.

On behalf of Mr. J. A. Hargreaves were shown examples of *Vertigo pusilla*, from Forge Valley, near Scarborough.

On behalf of Mr. Thomas Scott, F.L.S., were exhibited *Pisidium roseum*, *P. fontinale*, *Planorbis nitidus*, and *Valvata cristata* from Loch Achnacloch, near Invergordon (East Ross-shire).

On behalf of Mr. R. D. Darbishire, B.A., F.G.S., were shown *Limax flavus*, *L. maximus* var. *ferussaci* and *Amalia gagates* from Cannes.

On behalf of the Rev. S. Spencer Pearce, M.A., a number of living slugs, *Limax maximus*, *L. cinereo-niger*, *Amalia marginata*, etc., from Cadenabbia, Lago di Como.

Mr. W. Denison Roebuck, F.L.S., showed various specimens, including *Helix aculeata* from Dalmahoy and Gorebridge (Edinburghshire), *H. sericea* and *H. fusca* from the latter place, all collected by Mr. W. Evans; *Pisidium amnicum*, &c., collected at Drumshallon, co. Louth, by Miss Sydney Smith; *Arion ater* var. *bicolor* collected at Howth, Ireland, by Mr. W. F. de Vismes Kane, M.A., M.R.I.A.; and *Clausilia rolphii* collected (along with *Cyclostoma* and *Helix lapicida*) at Well Vale, near Alford, by Mr. J. Burt Davy; the locality being a new one for *Cl. rolphii*.

181st MEETING, 6th AUGUST, 1890,

Held at the Philosophical Hall, Leeds.

Mr. J. W. Taylor, F.L.S., Vice-President, in the chair.

Candidate for Membership Proposed: Mr. James Crawford, of Port Elizabeth, South Africa (proposed by Mr. J. H. Ponsoy and Mr. J. Cosmo Melvill).

Donations to Library announced and thanks voted: Weitere Beiträge zur Kenn'niss der Pleurophyllidien, 1890, and Report on Nudi-branchs dredged by the Blake in the Gulf of Mexico and the Caribbean Sea, 1890 (both from the author, Dr. Rudolph Bergh); The Naturalist.

Donations to Collections announced and thanks voted: Varieties *Pecten opercularis* from Mount's Bay, Cornwall, dredged at 30 fathoms; and of *P. varius*, dredged at 15 fathoms, Falmouth Harbour; *Cypræa europæa*, fresh specimens from beneath stones at low water in Falmouth Bay; and *Cyp. moneta*, gathered upon the beach at Seascale, Cumberland (all sent by the Rev. Charles Crawshaw); *Pecten islandicus* and *Fusus propinquus* from Scotland (sent by Mrs. Brockbank); and numerous British marine shells sent by Mr. B. Sturges Dodd; these included *Barleeia rubra* from Sennen Cove, *Hydrobia ulvæ* var. *albida* from Chapel, Lincolnshire, *Cyamium minutum* from St. Ives, Cornwall, *Mya truncata* from Mablethorpe, *Mytilus edulis* var. *pallida*, *Mactra stultorum* var. *cinerea*, and *Scrobicularia alba* from Sutton-on-Sea, *Turritella terebra* from Roundstone Bay, Connemara, *Loripes lactea* from St. Aubin's Bay, Jersey, *Cardium edule* var. *fasciatum* from Mablethorpe, *Lasæa rubra* from Deer Island, Connemara, *Rissoa costata*, *R. reticulata*, *R. inconspicua* var. *variegata*, *R. cingillus*, *R. striata*, and *Cæcum trachæa* from Roundstone, *R. parva* from Jersey, the last also from Cornwall, *Cæcum glabrum* from Guernsey (10—18 fathoms), and *Utriculus obtusus* from near Burnham, Somerset.

Letters Read: From Dr. R. A. Philippi, of Santiago, Chili, thanking the Society for his election as one of the ten honorary members.

From Dr. Heinrich Simroth, intimating his purpose to communicate to the Society accounts of the results of his future researches into the natural history of the Limacidae.

Exhibits.

On behalf of Mr. Henry Laver, F.L.S., Colchester, a small sinistral specimen of *Buccinum undatum*, which was taken off Harwich in April of this year, by a fisherman who catches whelks for bait, and also for sale as food; another sinistral example was taken by the same fisherman.

Mr. William Nelson showed *Sphærium lacustre* from a pond between Seacroft and Scarcroft, Yorkshire.

On behalf of Mr. J. Madison were shown a couple of specimens of *Dreissena polymorpha* from the Oakford Canal, near Brinklaw. They were very beautifully marked specimens, having a broad white band running from the apex to the front margin.

The Chairman showed numerous shells sent by Mr. Thomas Scott, F.L.S., the Rev. W. L. W. Eyre, M.A., and Rev. S. Spencer Pearce, M.A.

Mr. W. Denison Roebuck, F.L.S., exhibited a number of Scottish captures by Mr. Wm. Evans, including *Pisidium roseum* and *Valvata cristata* from Otterston Loch, Fife, *Sphaerium lacustre* from Burntisland, Fife, *Helix rupestris* from Duddingston, near Edinburgh, etc.; and a number of Lincolnshire shells collected by Mr. J. Burt Davy, including caddis-cases from the Foss Dyke near Pyewipe House (North Lincs), which bore numerous examples of *Bythinia leachii*, *B. tentaculata*, *Valvata piscinalis*, *Sphaerium corneum*, *Physa fontinalis*, *Planorbis vortex*, *Pl. albus*, a *Succinea*, and one *Helix hispida*; also *H. virgata* vars. *subdeleta* and *alba* from Driby, Linc. N., the last-named attached to the inside of a broken pheasant's egg; and an example of *Clausilia rugosa* var. *erasa* from a tree trunk near Hardraw Foss, North-West Yorkshire.

182nd MEETING, 8TH OCTOBER, 1890,

Held at the Philosophical Hall, Leeds.

Mr. John W. Taylor, F.L.S., Vice-President, in the chair.

New Member Elected: Mr. James Crawford, Port Elizabeth, South Africa.

Candidates Proposed for Membership: Mr. James Howard, Lee, London, S.E. (by Messrs. Edgar A. Smith and W. Denison Roebuck); and Mr. Frederick Wm. Fierke, Hull (by Messrs. W. Denison Roebuck and J. Darker Butterell).

Donations to Library announced and thanks voted:—The Naturalist; Rules of the American Association of Conchologists; Records of the Australian Museum, vol. i., no. 3.

Donations to Collections announced and thanks voted:—From Mrs. Edward Passavant, a numerous miscellaneous collection of shells, recent and fossil; from Mr. J. H. Rowntree, *Helix lapicida*, Thun, Switzerland; from Mr. W. West, F.L.S., *Balea* and *Bulimus obscurus* from between Scarborough and Seamer; from Mr. T. D. A. Cockerell, *H. virgata* and var. *subdeleta* from Leigh, Essex, *H. caperata* and var. *ornata* from Shoeburyness, and *Bulimus obscurus*, *Clausilia laminata* and var. *albinus* from Headley Lane, Surrey.

Papers Read.

'A List of Shells from the Tizard Bank, China Seas,' by Edgar A. Smith, F.Z.S., Pres. Conch. Soc. [printed in Journal of Conchology, Oct., p. 265].

'Notes on the Food of some of the British Mollusks,' by W. A. Gain, M.C.S.

'*Arion minimus* (Simroth) a British slug,' by Robert F. Scharff, Ph.D., B.Sc., M.R.I.A. [printed in the Journal of Conchology, Oct., p. 267].

'New British Marine Shells,' by J. T. Marshall [printed in the Journal of Conchology, Oct., p. 260].

Exhibits.

On behalf of Mr. J. Madison, were shown a number of specimens of *Cyclostoma elegans*, *Sphaerium lacustre*, and *S. ovale*, from various localities.

On behalf of the Rev. W. L. W. Fyre, M.A., a large series of the varieties of *Helix nemoralis* and *H. hortensis* which occur about Swarraton, Hants. N., and about Idmiston, Wilts. S., were exhibited; also from the last-named locality a *Helix aspersa* with distorted spire and deep sutures, *H. arborum*, type and var. *marmorata*, and a number of *Bythinia tentaculata*, one of which had a spiral band of distorted epidermis.

For Mr. Charles Oldham were shown some examples of *Helix arborum* v. *cincta* from Castleton, Derbyshire, the bands on which were as sharply and distinctly defined as those *H. nemoralis* usually are.

Mr. J. Beanland showed shells collected at Wressle, South-East Yorkshire, which included varieties of *Helix cantiana*, *H. arborum*, etc.

Mr. W. Denison Roebuck, F.L.S., showed *Arion subfuscus* var. *brunnea* from Skiddaw Forest, and *Limax arborum* from Brundholme Wood, near Keswick, collected by Rev. John Hawell, M.A.

On behalf of Mr. Alexander Shaw were exhibited a large collection of shells collected by him about Skelmorlie, Largs, and Ardrossan, Ayrshire, Ettrick Bay in Bute, and Loch Ranza in Arran, including *Aeme lineata*, *Pupa ringens*, *Helix lamellata*, *H. fusca*, *H. pygmaea*, etc., from the first-named locality.

The Chairman exhibited a large number of shells from Sligo and Mayo, sent him by Miss Amy Warren. These included *Pupa ringens* from Moyview, *Vertigo substriata*, *V. angustior*, *V. edentula*, and *V. antivertigo*, all from Killanley, Sligo, with many others.

On behalf of Mr. B. Sturges Dodd were shown *Vertigo pygmaea*, *Pupa ringens*, *Pisidium roseum*, *Clausilia rugosa* var. *everetti*, *Physa hypnorum*, and numerous other species collected about Roundstone, in Connemara.

Mr. W. Denison Roebuck, F.L.S., showed *Zua lubrica*, *Balea perversa*, *Helix sericca*, and *Zonites alliarius*, collected on Cromaglaun Mountain, near Killarney, by Mr. W. West, F.L.S.

Attention was drawn to the Society's collections, and to a circular which had been issued inviting members to contribute specimens of British Marine Shells, with the view of rendering a collection for public inspection in the Leeds Museum more complete.

This circular had been so far effectual that contributions had been received from Mr. Dodd, Rev. Mr. Crawshaw, and Mrs. Brockbank, which had materially enhanced the importance of the Society's collection, but the Curator expressed regret that there had not been a more general response from those members who possess duplicates.

It was further explained in the absence of Mr. Nelson, the Curator, that with regard to the land and freshwater shells in the Society's collection, it was his intention to form a series of county collections, in the execution of which task he wished to enlist the co-operation of the members of the Society at large. The foreign shells, too, he proposed to arrange geographically.

A FEW NOTES ON THE EASTERN COUNTIES.

BY LIONEL E. ADAMS, B.A.

(Read before the Conchological Society, Nov. 5th, 1890).

THE following notes on a most delightful walking tour last August (1890) must be understood to refer only to the actual route, which was as follows:—Cambridge, Haverhill, Halstead, Tey, Colchester, Ipswich, Woodbridge, Saxmundham, Yoxford, Dunwich, Southwold, Lowestoft, Yarmouth, Acle, Norwich, Long Stratton, Diss, Thetford, Brandon, Ely, St. Ives, Huntingdon, and Bedford.

At Cambridge the ubiquitous *L. peregra* was the only species I observed in the Cam, but my search was hurried and confined to the space between the locks at each end of the town.

From Cambridge through Haverhill to Halstead, the weather being hot, and the roads dry and dusty, shells had not a fair chance to show themselves, but *H. cantiana* was plentiful all the way; *H. aspersa* not so plentiful. *H. ericetorum* was fairly common as far as the border of Cambridgeshire, where it ceased. *H. virgata* was abundant in this county, and occurred at intervals on the way. The var. *monozona* was as common as the type. Var. *albicans* and var. *subdeleta* not uncommon. One species of var. *subcarinata* occurred. Ponds were very scarce and devoid of interest to any conchologists except those indefatigable collectors—the ducks and geese. One specimen of *S. putris* var. *alba* turned up near Haverhill.

Near Yeldham, along the tall hedges of hazel, *H. hortensis* var. *arenicola* was very abundant (far more so than the type) chiefly preferring the topmost boughs, often eight or ten feet from the ground. This propensity for climbing I have not often noticed in England, though in Alsace during similar dry weather

I once observed *H. nemoralis* ten and fifteen feet from the ground on the trunks of small trees.

At Sible Hedingham I met with the only specimens of *H. lapicida* that I record for the eastern counties. About this neighbourhood the albino form of *H. rufescens* was almost universal.

A pond at Little Tey furnished, besides other things, a specimen of *S. lacustre*, *B. leachii*, one specimen of *A. lacustris* var. *moquiniana*, and a specimen of *P. hypnorum*. *A. lacustris*, with the exception of a single dead specimen of the typical form in the Little Ouse at Brandon, I did not meet with again; indeed, the genus does not seem extensively represented in these parts, as I have only one record of *A. fluviatilis* in the whole excursion in the Wensum near Norwich, though several likely streams were crossed. *P. hypnorum* is often found associated with *P. spirorbis* and *L. glabra*, as Mr. Nelson has pointed out in the Journal of Conchology, vol. iii, p. 115, but in this instance I found neither. I think this is the only occasion that I have taken *B. leachii* in a pond.

In the Colne at Halstead *B. leachii* deserves mention, and *L. lævis* which was found on flags by the water.

At Colchester *H. cantiana* appeared more deeply coloured than I remember to have seen it. In the neighbourhood the white variety is not uncommon.

From Ipswich to Saxmundham *H. nemoralis* and *H. hortensis* became gradually scarcer in spite of rain which had fallen.

Near Woodbridge, one spot—a depression in a hedgebank full of damp leaves and a decaying nettle—afforded *V. pygmæa*, *V. pusilla*, *H. aculeata*, and *H. pygmæa*.

Along the coast from Dunwich to Southwold there is a succession of salt dykes and marshes, where *H. ventrosa* and *L. rudis* var. *tenebrosa* swarm amongst the weed in countless thousands. Only three specimens of *M. myosotis* rewarded my expectant search.

From Yarmouth to Acle runs a long straight road with a terrible resemblance to the interminable roads of the low countries, and along each side of the road is a broad dyke almost choked with weed; for about two miles from Yarmouth the water is brackish, but *S. elegans* flourishes and *S. putris* is found, though in less numbers. In one spot, about three miles from Yarmouth, I took several white banded specimens of *B. tentaculata* var. *zonata*.

At Cringleford in the Wensum, near Norwich, *L. glutinosa* is said to be found, but a careful search was unproductive. I have since, however, had several specimens sent me from Colney, a short distance higher up the river. At Cringleford there were swarms of fine *S. elegans*, some fine *P. connecta*, and a few *B. leachii*, with many common species. Here, too, *L. lævis* and some fine *Z. nitidus* were found in their usual damp habitats.

Thence to Long Stratton, *H. rufescens*, dark coloured, became very common, while *H. cantiana* decreased in numbers. Near here I took a single dead specimen of *H. carthusiana*, which is, as far as I know, quite new to this part of the country.

Near the curious little town of Diss, *H. virgata* was very common with its variety *bifasciata*.

About a mile from Garboldisham, in a lane through a wood leading to the 'common,' there is a very abundant harvest for anyone with time to work it. In a single spot among decaying leaves I took *V. pusilla*, *V. substriata*, *H. aculeata*, and *H. pygmæa*, with others. On the 'common' (a sandy heath) between Garboldisham and Thetford, *P. marginata* appeared for the only time. This species, as far as my limited experience goes, is only to be found on sandy soil.

At Ely *H. virgata* and *H. caperata* were to be seen crawling some four feet up the trunks of the old trees near the Minster.

With regard to Huntingdon and Bedfordshire my records

are few and commonplace, with the exception of some very deeply coloured *H. ericetorum* var. *deleta* at Roxton, Beds.

All along the route the comparative scarcity of *H. rotundata* particularly struck me.

Most of the country traversed being arable land, cattle ponds, so plentiful and fruitful in some counties, Cheshire and Lancashire to wit, were very scarce, and as the subsoil was almost universally gravel and flint the dearth of roadside stones to overturn is not surprising.

The eastern counties should, I think, produce an abundance of slugs, but owing to the dry weather during my search my records are comparatively uninteresting.



Guernsey Dredging.—Among some interesting shells dredged off Guernsey last summer by Mr. Clifford Burkill was a very fine *Chiton hanleyi*, in about eighteen fathoms, off the south-east point of that island. This is a northern species, but has been once recorded from Plymouth by Mr. H. K. Jordan. In company with this *Chiton*, were several perfect, but dead, examples of *Argiope decollata*, which has not, I believe, been taken since Dr. Jeffreys dredged it in the same spot nearly thirty years ago, although Mr. Burkill found it also at the Scilly Isles in 1888, and recorded it in the 'Journal of Conchology' at the time. Among other notable species existing on the same ground were *Argiope cistellula*, some very fine *Adis gulsone*, *Odostomia minima*, *O. lukisi*, *O. diaphana*, and *O. conspicua*, an exceedingly fine *O. obliqua* and *Cerithiopsis metaxa*, with many things of lesser note. Collecting on the shore at Herm corroborated my experience of the previous year, that *Galeomma turtoni* are being exterminated, not only by over-collecting, but also by the persistent and indiscriminate stone-turning of the ormer-gatherers, which gives the *Galeomma* a poor chance of arriving at maturity.—J. T. MARSHALL.

HELIX PISANA VAR. *TENUIS*, A NEW VARIETY
FROM TENBY.

By JOHN W. TAYLOR, F.L.S.,
Membre Honoraire de la Société Malacologique de France, &c.

(Read before the Conchological Society, Dec. 10th, 1890).

AMONGST some specimens of *Helix pisana*, found at Tenby during the past summer and kindly sent to me for examination by Mr. J. W. Storey, B.A., of Cardiff, was one which differed so remarkably from any I have before seen that I have applied to it the name *tenuis*, aiming thereby to express its thinness and translucency. The type shell, which has been generously presented to me by Mr. Storey, may be described as of an almost uniformly translucent horn colour, somewhat resembling *Zonites nitidulus* in colour and consistency; the pillar is visible through the shell by reflected light, and by transmitted light the whole shell seems almost colourless and very transparent; towards the mouth—which shows no trace of its usual pinkiness—there is some approach to a whitish opacity, in which traces of two translucent bands are faintly visible in the positions occupied by the first and third bands in the *Pentatenia*. The nucleus is of the same horny texture and aspect as the rest of the shell, and is not of the blackish tint as is usual in this species. The specimen is 16 mills. in diameter, weighs $3\frac{1}{2}$ grains, and is altogether so very unusual in appearance and so different in its general character from ordinary individuals that I venture to think it would not on a cursory examination be referred to the present species by even experienced conchologists.

Another variety from the same locality sent me by Miss F. M. Hele is worthy of remark, as simulating by its depressed form and general aspect the dull-white unicolorous variety of *Helix ericetorum*. I have not yet been able to ascertain whether this deviation from the normal form has received a distinctive name.

THE NEGLECTED COUNTIES OF IRELAND.

BY W. DENISON ROEBUCK, F.L.S.,
Recorder to the Conchological Society.

(Read before the Conchological Society, Dec. 10th, 1890).

THE record-books of the Conchological Society for the past year show an immense improvement in the number of records authenticated for Scotland, thanks to the willingness with which Scottish naturalists have co-operated in a special effort to complete the molluscan census of that country, and more particularly to the energy with which Mr. William Evans, F.R.S.E., of Edinburgh, has co-operated with the Recorder and Referees of the Society to this end.

It is desired to make an effort to improve in like manner the position which Ireland holds in the record-books of the Society, and with the view of indicating the directions in which assistance is at the present time most wanted, we give below the names of the species which are actually on record for the neglected Irish counties, beginning with the most neglected.

There are, first of all, four Irish counties from which no species whatever have been seen by the Society's referees; these are:—

Carlow.—None.	Longford.—None.
Queen's Co.—None.	Galway East.—None.

From ROSCOMMON, three species only have been seen:—*Helix nemoralis*, *Bulinus acutus*, and *Clausilia rugosa*.

From TIPPERARY NORTH, four species only:—*Zonites nitidus*, *Helix ericetorum*, *Vertigo antivertigo*, and *V. substriata*.

From KILDARE, five species only:—*Helix nemoralis*, *H. hortensis*, *H. sericea*, *H. virgata*, and *Planorbis corneus*.

From KILKENNY, six species only, all sent by Mr. G. A. Barrett-Hamilton:—*Helix nemoralis*, *Pupa ringens*, *Clausilia rugosa*, *Zua lubrica*, *Planorbis nitidus*, and *Limnæa peregra*.

From CLARE, six species, all seen in the collection of Mr. Thomas Rogers:—*Zonites alliarius*, *Helix nemoralis*, *H. hispida*, *H. ericetorum*, *Limnæa peregra*, and *L. truncatula*.

From CORK NORTH, seven species:—*Arion ater*, *Helix rufescens*, *H. rupestris*, *Pupa umbilicata*, *Clausilia rugosa*, *Zua lubrica*, and *Physa hypnorum*.

From MAYO EAST, eight species only:—*Helix nemoralis*, *H. hispida*, *H. rotundata*, *H. rupestris*, *Pupa umbilicata*, *Vertigo pygmæa*, *Clausilia rugosa*; all sent by Mr. J. G. Milne.

From CAVAN, eight species only:—*Helix aspersa*, *H. nemoralis*, *H. rufescens*, *H. hispida*, *Pupa umbilicata*, *Vertigo pygmæa*, *Balea*, *Clausilia rugosa*; all sent by Mr. J. G. Milne.

From WICKLOW, eight species, sent by Mr. W. F. de Vismes Kane and Dr. R. F. Scharff:—*Arion subfuscus*, *Limax agrestis*, *L. cinereo-niger*, *Zonites cellarius*, *Helix rotundata*, *Clausilia rugosa*, *Carychium*, and *Unio margaritifera*.

From DONEGAL, ten species, sent by Mr. J. G. Milne, Mr. W. F. de V. Kane, and Mr. R. M. Christy:—*Limax agrestis*, *Zonites radiatulus*, *Helix aspersa*, *H. nemoralis*, *H. rufescens*, *H. ericetorum*, *H. rupestris*, *Bulimus acutus*, *Pupa umbilicata*, and *Clausilia rugosa*.

From TYRONE, fourteen species, all sent by Mr. W. F. de Vismes Kane:—*Arion ater*, *Limax arborum*, *L. cinereo-niger*, *Zonites cellarius*, *Z. nitidulus*, *Z. crystallinus*, *Z. fulvus*, *Helix nemoralis*, *H. hortensis*, *H. concinna*, *H. fusca*, *H. rotundata*, *Valvata piscinalis*, and *Planorbis albus*.

From WESTMEATH, fifteen species, all sent by Mr. W. F. de Vismes Kane:—*Limax maximus*, *Vitrina*, *Zonites cellarius*, *Z. nitidulus*, *Z. purus*, *Z. crystallinus*, *Helix nemoralis*, *H. hortensis*, *H. hispida*, *H. rotundata*, *H. rupestris*, *Bulimus acutus*, *Pupa umbilicata*, *Clausilia rugosa*, and *Zua lubrica*; no water shells seen.

From LEITRIM, fifteen species, all sent by Mr. J. G. Milne:—*Succinea putris*, *Zonites nitidulus*, *Helix aspersa*, *H. nemoralis*, *H. caperata*, *H. rufescens*, *H. hispida*, *H. pulchella*,

Pupa umbilicata, *Vertigo pygmæa*, *Balca*, *Clausilia rugosa*, *Zua lubrica*, *Bythinia tentaculata*, and *Limnæa peregra*; but no slugs.

From MONAGHAN, sixteen species, sent by Mr. J. G. Milne and Mr. W. F. de Vismes Kane:—*Succinea putris*, *S. elegans*, *Zonites cellarius*, *Z. glaber*, *Z. nitidulus*, *Helix nemoralis*, *H. hispida*, *H. rotundata*, *Pupa umbilicata*, *Clausilia rugosa*, *Zua lubrica*, *Sphærium cerneum*, *Bythinia tentaculata*, *Limnæa peregra*, *L. stagnalis*, and *Planorbis carinatus*.

From ARMAGH, seventeen species, all sent by Mr. J. G. Milne and Rev. H. W. Lett:—*Arion ater*, *A. subfuscus*, *Limax agrestis*, *L. maximus*, *Zonites cellarius*, *Helix aspersa*, *H. nemoralis*, *H. hispida*, *H. rotundata*, *Vertigo pygmæa*, *Clausilia rugosa*, *Bythinia tentaculata*, *Limnæa peregra*, *L. stagnalis*, *L. palustris*, *Planorbis carinatus*, and *P. complanatus*.



THE VARIATION OF LIMNÆA PEREGRA (Müll.).

By JOHN W. TAYLOR, F.L.S.,

Membre Honoraire de la Société Malacologique de France, &c.

(Read before the Conchological Society, Nov. 5th, 1890.)

This species is perhaps the most variable of our fresh-water shells, and also one of the most widely dispersed, being found not only in the British Isles, but inhabiting according to some authorities almost every other part of the globe; it is, however, interesting and somewhat remarkable that it has not yet been satisfactorily shown to inhabit the continent of America. Dr. Gwyn Jeffreys in "The Mollusca of Europe, compared with those of Eastern North America" published in 1872, expressed the opinion that *Limnæa columella* Say was identical with the present species, and other conchologists have referred *Limnæa catascopium* and other forms also to *Limnæa peregra* either as synonyms or varieties. These views are how-

ever not generally accepted, and in this paper I propose to regard the American forms as specifically different from our shell.

Some years ago *Limnæa peregra* was recorded under several new specific names from Tasmania, but the correctness of the view which regards the Tasmanian shells as forms of *L. peregra* has recently been seriously called in question. But leaving these countries out of account altogether, the undoubted range of the species is exceedingly great, its ability to adapt itself to such widely different conditions as are afforded by turbulent streams or the most tranquil pools, the margin of the water, or immersion in its most profound depths, brackish water or streams and pools loaded with impurities, altitudes up to 18,000 ft.—assuming Reeve to be correct in referring *Limnæa hookeri* to our species, I however regard *L. hookeri* as much more closely related to the American *L. catascopium*, which in the present paper I have considered to be a distinct species—and temperatures varying from near 100° Fahr., to the icy-cold waters of the elevated Pyrenean lakes, would lead us naturally to expect the great modifications in size, form, substance and sculpture, which actually do occur, and which are but a reflex of the widely different environments to which the animals are subjected.

In this country the life-term of this animal would seem to be about one year, the adults dying off usually during the early summer, but on the other hand some European conchologists regard the continental individuals as requiring 2 or 3 years to arrive at full growth, and figures have been actually published showing the annual stages in the progress towards maturity.

The causes promoting the evolution of any particular type of variation are not definitely established, but it is hoped that precise and accurate observations may bring to light some of the factors governing or influencing varietal differentiation.

Brot has shown how in all probability some of the lowest organisms may affect the forms of the shells of mollusks, instancing how nine-tenths of the *Limnæa peregra* found during

one season in a pool near Geneva, had a curious malformation of the base of the columella, and that this peculiarity was coincident with an extraordinary abundance of *Hydra viridis* in the same pond, and that the disappearance of the *Hydra* the following year, was also concurrent with the disappearance of the peculiarity in the shell.

Generally speaking, it is believed by most conchologists that lakes or pools favour the relative increase in breadth and decrease in length of the shell, owing to the more rapid enlargement of the whorls increasing the comparative size of the body-whorl and diminishing that of the spire, the highest development in this line of variation is *Limnæa burnetti* of Alder, in which the apex is actually intorted or sunk within the succeeding whorls. *Limnæa involuta* Thompson is a still more striking instance of this peculiarity, but though it is probable that *L. involuta* is like *L. burnetti* only an extreme variety of *L. peregrina*, the fact has not yet been fully and satisfactorily demonstrated.

The opposite condition, comparative increase in length and decrease in breadth, caused by the elongation of the spire and the more slowly enlarging character of the whorls, thus approaching in form *L. palustris* and *L. truncatula* and exemplified by the varieties *microstoma*, *elongata*, &c., is said to be most usually found in flowing waters, and though this is generally the case so many exceptions occur that it is obvious that other less evident and as yet unascertained causes in this as in other circumstances, exercise great influence in modifying the contour of the shells, and what would perhaps be the result of the prominent features of the environment if not counteracted by other less obvious conditions.

The strong-shelled forms appear from published observations to inhabit the margins of turbulent streams or rivers, and the shores of large bodies of water, where the wave commotion necessitates a robust shell to withstand its force and violence, the varieties *lutea*, *fluminensis*, *solida*, &c., serving to typify this line of variation.

The opposite extreme—the attenuation of the substance of the shell—is one of the effects ascribed to the inhabited water being either much warmer or much colder than the ordinary temperature, the variety *thermalis*, which is very thin and transparent, living in the warm springs of France, which are said to attain a temperature of 95° Fahr. The var. *glacialis* exhibits as regards the tenuity of its shell substance the same peculiarities as var. *thermalis*, but lives habitually in water but little removed from the freezing point even in summer. Thus both these extreme conditions seem to have equally the effect of retarding the development in size of the shell.

Deep water is said to have a similar effect judging from Nilsson's description of the *L. balthica*, which is said to live at a depth of from 24 to 36 feet in the brackish-water of the Baltic, and Mr. W. Thompson, the able Irish naturalist, ascribed the peculiar delicacy of the specimens of the var. *lacustris* from Lough Neagh, to the circumstance that they habitually lived in the still depths of that lake, and were only to be found on or near the shores owing to fortuitous circumstances.

It is, however, conceivable that causes other than those mentioned here, such as a scarcity or abundance of calcic carbonate may produce the same attenuation or thickening of the shell substance; but the more usual result of such conditions are the erosion or the incrustation of the shells, according to the deficiency or excess of the calcareous salts in the inhabited water.

Many of the specimens which are recorded from time to time in the scientific journals as Jeffreys' var. *picta*, only show markings which are the effect of slight injuries to the mantle margin, resulting in a defective or thinner secretion of epidermis or perhaps a total failure to secrete it in the injured portions, so that the calcareous portion of the shell is more or less exposed in a spiral line or lines. The Rev. Dr. Norman, however, assures me that the var. *picta* from the original locality do not owe their peculiarity to this cause.

There has been much speculation and conjecture upon the probable causes of sinistrorsity, reflection of the outer lip, malleation of the whorls, and other divergences from the normal shell, but these variations have not yet received sufficient attention to enable us to accept with any confidence the various theories that have been propounded to account for them.

The two best known forms, *L. peregræ* and *L. ovata*, are recognised by European conchologists generally as distinct species but in this country are considered to be mere modifications of the same specific type, and Herr Julius Hazay, a leading continental conchologist, has lately accepted the same view, and states that he has verified by actual experiment that these two so-called species are merely biological varieties, which may be produced at will by simply placing the ova under suitable conditions—thus typical *L. peregræ* is produced from ova of *L. ovata* if placed in “hard” running water, and that *L. ovata* may be developed from the ova of *L. peregræ* by an opposite treatment.

In dealing with the different forms, I propose to place them in sections, based upon the proportion the length of the aperture bears to that of the whole shell. This plan is not quite satisfactory, but is the one most generally followed when any arrangement of the varieties of the *Limnææ* is attempted.

Under the heads of the varieties described and figured, I shall attempt to group together those named forms which appear to have the greatest affinity for each other, and thus endeavour to reduce to some extent the inordinate number of specialized forms. In doing this I do not wish to disparage or depreciate the careful and accurate work of the learned European conchologists, whose views as to specific limits are so different from those held in this country, but only aim to point out the actual affinities and differences which do exist and to give accurate outlines of the more interesting forms, especially those that have not hitherto been figured. In the present paper I shall only describe and figure varieties in my own col-

lection, and therefore must not be understood to under-rate the value or interest of specimens in the collections of my friends.

As the **type of the species** I propose to adopt the form considered by Dr. Jeffreys as typical, and figured by him in Brit. Conch., v., pl. 7, f. 3, which agrees with the types of many other authors, and also fairly conforms with the figure given by Draparnaud when separating from it his *L. ovata*. The form, therefore, understood by me to be typical *L. peregrina* Müll., and figured here has the

Shell obliquely-ovate, thin, moderately glossy, yellowish-horn colour. Irregularly striate by the lines of growth, and closely and microscopically striate spirally, with a few indistinct spiral ridges, epidermis rather thin, whorls $4\frac{1}{2}$ to 5, convex, the last occupying nearly the whole of the shell, spire produced and pointed, suture rather deep, mouth large, $\frac{3}{4}$ ths of the total length, oval and very little contracted by the penultimate whorl, outer lip thin, inner lip folded on the columella, forming a slight umbilical cleft, fold rather prominent and curved.—Total length, $18\frac{1}{2}$ mill., diam. $14\frac{1}{2}$ mill.; length of aperture 14 mill., diam. 8 mill.



The outlines given above are an exact representation of shells collected at Ackholme, near Doncaster, in April, 1883.

Before commencing to describe and figure the various varieties it will be well to remind the student that almost innumerable minor modifications or sub-variations of every variety may and probably do exist, and that strictly characteristic specimens, with all peculiarities exactly as in the original shells for which the name was instituted, are often exceedingly rare.

I have, therefore, endeavoured in compiling the descriptions of the various varieties to give the essential feature and to eliminate such details as appeared to me to be individual peculiarities, which might or might not be present in specimens otherwise possessing the primary characters. In illustration of the necessity of this course I may point out that Dr. Jeffreys,

in describing the var. *sinistrorsa*, gives the shell as spirally ridged, but it is evident in this case—as in many other parallel cases which could be adduced—that the spiral sculpture is what I have termed an individual peculiarity and not necessarily present in sinistrally-coiled specimens.

In the present paper I propose to divide the form-variations into two groups or sections, under which I shall give faithful and accurate outlines of the various modifications of shape that have received definite names, characterizing the groups by the relative lengths of the aperture and spire, and the proportion they bear to the length of the whole shell.

SECTION A.

Spire short and aperture exceeding three-fourths of the total length of the shell.

Var. **burnetti** Alder. Shell globose, rather solid, of a dull dark horn-colour, epidermis rather thick, strongly striate in line of growth, spire scarcely elevated beyond the body-whorl, apex intorted.

This remarkable variety, which is apparently confined to the British Isles, has only been found well characterized in the original locality, Loch Skene, Dumfriesshire. Dr. Jeffreys has, however, recorded it from a Welsh lake called Llyn-y-van-fach, and as having been taken from the stomach of a gillaroo trout caught in a lake in Tipperary. Tate is the only author I am aware of who, in addition to the original locality, states that it is also found 'in a few other Scottish lakes.'



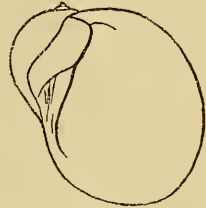
Specimens collected by Mr. F. W. Wotton, and Mr. J. Madison from the Welsh locality, do not fully exhibit the peculiarities of this form, and would seem to link this variety with the var. *lacustris* of Leach.

Westerlund treats this form as a distinct species, placing it in his arrangement between *L. ovata* and *L. peregrina*.

The original figures of this variety are given by Alder in Ann. and Mag. Nat. Hist., Dec. 1848, p. 396.

The specimen figured is one of several collected in Loch Skene by Miss F. M. Hele, of Bristol, who has kindly given me this and many other interesting varieties of our British shells.

Var. **obtusa** Kobelt. Shell large, spire very small, whorls very convex and increasing very rapidly in size, mouth ample and almost attaining the summit of the spire.



This is a very interesting variety, and from its inflated body-whorl might easily be mistaken for *L. auricularia*; an attentive examination and comparison will, however, result in its true affinities being recognized.

It may be considered as standing in the same relation to the var. *ovata* that the var. *ampla* holds to the typical *L. auricularia*. Its similitude to the last-named species is strikingly shown by the fact that Dr. Kobelt referred it successively to *Gulnaria ampla* and *G. ovata*.

Herr Clessin has got somewhat confused in his treatment of this form, as in the same book he treats of it on p. 534 as a var. of *Gulnaria ampla*, and on p. 541 again treats upon it as a var. of *G. ovata*, in each case giving the reference to Kobelt's Icon., figure 1251. Clessin's figures seem hardly to be referable to this form, but would, I should imagine, be more correctly placed with var. *inflata*.

M. Bourguignat places this with some others named in this paper in his group *Auriculariana* as being in his opinion more closely related to that group than to *L. peregrina*.

The specimen figured was collected by Mr. J. Madison, of Birmingham, from a pond at Hall Green, Worcestershire, and kindly given to me by him.

The original figure by Kobelt is published in Mal. Bl., 1870, pl. ii., fig. 6.

Var. **acronica** Studer. Shell much longer than broad, spire excessively short, last whorl shouldered, aperture oblong-oval.

The original figure given by Charpentier (Moll. Suisse, pl. ii., fig. 16) is to me conclusive that Moquin-Tandon is in error in considering this as a variety of *auricularia*. That accomplished conchologist, M. Bourguignat, however, also regards it as having its affinities more with *auricularia* than *peregrina*, as he places it in his group Auriculariana.



Westerlund refers it to *Limnæa tumida* of Held as a variety.

The specimen figured by me I owe to the kindness of Mr. L. E. Adams, of Penistone, who gave it me amongst others collected by him near Stafford. It differs from the type figure in being a trifle more convex and less shouldered at the aperture, but there is no other noticeable divergence.

Var. **lacustris** Leach. "Shell resembling that of the last variety [var. *burnetti*], but is much smaller and more glossy, and has strong and regular transverse grooves, and the spire is not quite so short, nor inclined to be intorted. The shell is often eroded." Jeffeys, Brit. Conch., I., p. 105, 1862.



This is closely allied to the variety *burnetti*, but the tip of the spire is not actually intorted, as in that variety. It is widely distributed in more or less characteristic forms.

Captain Brown's variety only seems to differ from that of Leach by its greater delicacy and transparency, a circumstance that has been attributed to its inhabiting the deeper parts of the lakes where it is found.

In Duddingston Loch near Edinburgh, Mr. W. D. Roebuck, amongst a lot of the commoner form, found one specimen of the most exquisite glassy transparency and delicacy, which rivalled in those characters the finest examples of *Amphipeplea glutinosa*, and which without a very severe scrutiny would be referred to that species. The var. *glacialis* of Dupuy would seem to be correctly referred to the form named by Capt. Brown.

Westerlund gives the var. *lacustris* of Brown as synonymous with *L. ovata* var. *balthica* L., and also with the var. *lineata* of Bean; the last determination is, however, I think, quite incorrect. Leach's variety he considers to be a variety of *L. lagotis*. As far as could be judged from the limited facilities for examination of specimens in the cases at the British Museum, *L. ribeirensis* from Cape Verde Islands would appear to be referable to this variety.

The specimens figured I owe to the kindness of Rev. Dr. Norman, who obtained them from Lake Windermere.

Var. **balthica** L. Shell small, globose, whorls very convex, spire not produced, mouth pyriform.

This small form of *peregrina*, originally described from the Baltic, is stated by Nilsson to be thin and somewhat pellucid.



It seems closely allied to, if not identical with, the var. *lacustris*, but I do not venture to unite them in the present paper.

The only published figure I am aware of is the one given by Sowerby, on pl. xv., fig. 103, of Reeve's *Conchologia Iconica*, and with which figure the one I now give exactly agrees. The outline is from a specimen found by Mr. L. E. Adams, near Stafford, and kindly given me by him.

Var. **lutea** Montagu. "Shell remarkably solid, having a very short spire of from three to four whorls."—Jeffreys, *Brit. Conch.*, I., p. 105, 1802.

Regarding this variety as having its more special peculiarity in its thickened shell substance, and not in the shade of colouring expressed by its name, we shall place here the vars. *fluminensis* Clessin, *pachygastra* Slavik, *crassa* Gassies, *solida* Pirona, and *solidula* Hartmann.



The specimen figured, kindly given me by Mr. J. Pickering, was named for me by Dr. Jeffreys twenty-five years ago.

The original figure was given by Montagu, in 1803, on pl. xvi. of his *Testacea Britannica*.

Var. *inflata* Kobelt. Shell large, spire small, whorls not very convex, aperture somewhat pyriform.

This fine variety is allied to variety *ovata*, but the body-whorl is more ample and the spire less pronounced.

I am indebted to the kindness of Mr. H. W. Kew, of London, for the specimen figured, which he found in the Moat, at Finchley, Middlesex.



The original figure by Kobelt is in *Mal. Bl.*, 1870, plate iv., figure 12.

Var. *patula* Da Costa. Shell larger and much more inflated and globular than typical form, spire short, whorls very convex, mouth ample.

I am disposed to consider the present form as DaCosta's *Turbo patulus*, and also as the *Linnaeus ampullaceus* of Rossm.; Clessin states that *L. microcephalus* Kuster, *L. hemisphaericus* Kuster, *L. bulla* Hartmann, and *L. acronicus* Studer, are referable to this form, but I have figured the latter in this paper under a separate heading.



It is probable that the varieties *subovata* Locard, *subrotunda* Borch., and *doliolum* Kuster, should also be placed here.

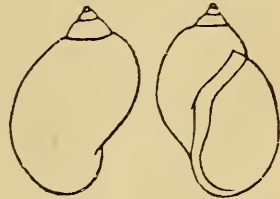
M. Bourguignat considers that *microcephalus* Kuster and *hemisphaericus* Kuster, which I have placed under this head on the authority of Clessin and others, have more affinity with *L. auricularia*, and has placed them in his group *Auriculariana*.

This is also the *Helix auricularia* of Rackett's edition of Pulteney's Dorset, pl. xxi., fig. 17. The original figure is shown in DaCosta's Test. Brit., pl. v., fig. 17.

The specimen figured was given me in 1867 by Mr. J. Pickering, of London, and Dr. Jeffreys, to whom I submitted it during the same year, considered it to be the variety *ovata* Drap., but a comparison of the figure now given with that of the true variety *ovata* will show that he was not so exact as usual in this determination.

Var. **ovata** Drap. Shell ampullaceous and rather thinner than usual, whorls convex, spire short, mouth oblong.

This is, perhaps, the best known of all the varieties of *peregrina*, and in the opinion of some of the more critical conchologists is really the *Helix limosa* of Linné. If this can be satisfactorily established the species would take the name *limosa* L., in lieu of *peregrina* Müll.



Under this head may be placed the variety *dickinii* of Kobelt, and judging from the figure given by Sowerby, in Conch. Icon., I am also inclined to place the Japanese *Limnæa japonica* Jay here also.

M. Bourguignat gives *L. lineata* Bean as synonymous with *L. dickinii* Kobelt, but a comparison of the original figures of *L. lineatus* by Bean in Loudon's Mag. Nat. Hist., Oct., 1834, p. 493, and of var. *dickinii* by Kobelt in Rossmässler's Iconographie, pl. 129, fig. 1254, will show that this view is erroneous.

The outlines given are carefully copied from the original figures by Draparnaud in his Hist. Moll. France, pl. ii., fig. 30, 31.

Var. *oblonga* Jeffreys. "Shell oblong and compressed in front." Brit. Conch., vol. I., p. 105, 1862.

This is one of the varieties of which I am unaware of any published figure and which we are compelled to identify by a careful study of the description.



The figure given by Clessin in Die Moll.-Fauna Oesterreich-Ungarns und der Schweiz of var. *compressa* Hartmann, may, in my opinion, be placed here, if we do not wish to exercise too great a degree of refinement in the differentiation.

The specimen figured was collected in May, 1883, from a ditch near Finningley, South Yorkshire.

SECTION B.

Spire produced, aperture not exceeding three-fourths of the total length of the shell.

Var. *microstoma* Kobelt. Shell more elongate and slender than type, with a spire perceptibly longer than the mouth, the whole shell approximating in general outline to *L. palustris*.

To this, the longest-spined variety of this species, I have Clessin's authority for referring as synonymous the vars. *elongatissima* Gredler, *alpicola* Westerlund, *paludarium* Hartmann, *producta* Westerlund, and his own variety *clongata*. The figures he gives do not, however, satisfactorily confirm the views he expresses.



According to Westerlund the variety *apricensis* of G. B. Adami, which has been renamed *L. apricana* by M. Bourguignat, is entirely the same as variety *microstoma* Kobelt.

The specimen figured, which agrees fairly well with the original one given by Kobelt at fig. 1491 of his continuation of Rossmässler's Iconographie, was found by Mr. B. Hudson at Seaton Carew, and kindly given to me by him.

Var. *maritima* Jeffreys. "Shell dwarfed, rather solid, spire produced, suture deep. L. 0·4, B. 0·225."—Brit. Conch., vol. i., p. 105, 1862.



This is another of the interesting forms of which no authentic figure has as yet been published. The specimen figured answers more exactly to the characters given above than any that I have yet seen. It was found along with others of the same variety in "an isolated pond, sometimes nearly dry, at east end of Luffness Links, Haddingtonshire," by Rev. J. McMurtrie, who kindly gave me some.

On the continent there seems to be some misconception about the characteristics of this variety, Herr Clessin erroneously giving it as synonymous with variety *balthica* L., a globose short-spined form; Westerlund also gives it as a short-spined variety, though the author of the variety expressly states 'spire produced,' and instances the form of *L. truncatula* as recalling to some extent that of this variety.

Var. *acuminata* Jeffreys. "Shell resembling the last variety [var. *ovata* Drap.] in all respects, except in having a more produced spire and a smaller mouth."—Brit. Conch., vol. I., p. 105, 1862.



Dr. Jeffreys characterized this variety in a wholly comparative way, setting out the relation it bore to the variety *ovata*. I have seen no authentic or reliably-named specimen, though I have made many fruitless efforts to obtain an example identified by Dr. Jeffreys himself.

This form bears a great resemblance to some of the specimens of *L. columella* Say, as figured by some American authors.

The *Gulnaria peregrina* var. *acutispinata* of Clessin seems to be referable to this variety, judging from the figure he gives. His varieties *raiblensis* and *janoviensis* would also seem, according to his most recent figures, to be quite similar, though the

figures first published by him do not show nearly so great a resemblance. Clessin gives Westerlund's variety *ullepitschi* as synonymous with his *raiblensis*. Ziegler's var. *solemia* is also very closely allied to or identical with the var. *acuminata*.

The specimen figured was found by Mr. S. C. Cockerell, at Mottingham, Kent, and kindly given me in 1883 by him. It answers to the original description, but the outline shows the whorls rather too convex.

Var. **vulgaris** C. Pfeiffer. Shell smaller than typical *peregræ*, and with a less prominent spire, whorls and aperture less convex.

This would seem to be one of the most common forms of this most variable species. It was considered by its author to be intermediate between *L. auricularia* and *L. ovata*.



The variety figured by Kobelt and named by him *peregro-ovata* does not offer any sufficiently appreciable differences to warrant separation from this form, and the variety *ovaliformis* T. D. A. Cockerell may also very appropriately be included here.

The specimen figured was kindly given me by Mr. F. W. Wotton, of Cardiff, and is one of several found by him in a ditch on the East Moors near that town, and fairly reproduces the original figure given by C. Pfeiffer, Deutsch. Moll., vol. I., pl. iv., fig. 22, which is also practically identical with *L. ovata* var. β . of Draparnaud, but must be carefully distinguished from *L. vulgaris* of Rossmässler, which appears to be *L. lagotis* of Schrank, a form we know in England as *L. auricularia* var. *acuta* Jeffreys.

Var. **boissii** Dupuy. Shell smaller and more globose than type, whorls convex, spire produced, aperture oval.

This variety would appear to be practically identical with both the Hungarian var. *hazayana* of Clessin, and the var. *fontinalis* Studer, a native of Switzerland, both these forms differing only by their



larger size from typical *boissii*, and it is possible that variety *globulosa* Locard would be correctly placed here also. Prof. von Martens considered a specimen similar to the one outlined above to be the variety *curta* of Kobelt.

The specimen figured was found in a rapid stream near Southport by Mr. W. H. Heathcote, who kindly gave it to me.

The original figures are given by Dupuy in Hist. Moll. France, pl. xxv., fig. 9.

Var. **bakowskyana** Clessin. Shell somewhat solid, whorls convex, aperture ovate, about $\frac{2}{3}$ rds of total length.

This variety, which was instituted by Herr Clessin for the reception of some Galician specimens, is fairly represented in the accompanying outline, which is from a specimen found at Burnt-island, Fife, by Mr. W. Evans.



The original figure is contained in Mal. Bl., 1879, pl. i., f. 8.

Var. **pulchella** Roffiaen. "Shell of a small size, pale semi-transparent horn colour, lines of growth rather pronounced, aperture slightly margined, length 11 mill." Ann. Soc. Mal. Belg., 1868, p. 77.



This pretty variety, which was originally discovered by M. Colbeau, in a ditch, on the plain of Altorf, near Seedorf, in Switzerland, has been found in a ditch, near Faversham, by Miss E. B. Fairbrass, who kindly gave me the specimens here figured.

Var. **gibilmannica** Calcara. Shell smaller and much more solid than type, spire somewhat produced, last whorl flattened at sides, giving a somewhat conical appearance to the shell; aperture pyriform, outer lip somewhat concave.



This peculiar variety which is especially characterized by its concave outer margin, is a Sicilian form. The only figure I am aware of is that given by Sowerby in

Reeve's Conch. Iconica, taken from an example in the collection of Mr. Sylvanus Hanley.

It is worthy of note that the Rev. S. Spencer Pearce, while staying in the vicinity of Lago di Como last season, found specimens in that neighbourhood, hardly differing from those from the original locality. I have never seen a British specimen of this form.

Westerlund says *L. solidus* Phil. is a synonym.

The specimens figured here are from the original locality, Gibilmanna, Madonie Mountains, Sicily, and were kindly given me by Signor C. Platania-Platania, who had himself collected them.

Var. *succineæformis* Shuttl. "Shell shaped like a *Succinea*, and very thin, whorls four, spire small and oblique."—Jeffreys, Brit. Conch., I., p. 106, 1862.

This is in my opinion a rare variety, as I have only seen this single specimen amongst the many thousands of *L. peregrina* I have examined.



L. succineæformis Shuttl. is figured by Sowerby in Conch. Icon., plate viii., fig. 55, and agrees fairly well with the outline I give here, which is that of a specimen kindly given me by Mr. Fortey, and found by him near Ludlow.

Judging from the figure I do not consider that the *Gulnaria ovata* var. *hasta* of Clessin, a native of Hungary, differs in any material point from this variety.

SECTION C.

Modifications other than those of form or outline and which exist only in combination with form-variation.

In addition to the form-variations already enumerated and figured, there are numerous other modifications, each more or less noteworthy, which may, as already hinted at, co-exist in the same shell with any of the foregoing variations of shape, or even as in some exceptional cases several of these peculiarities may be combined in one and the same shell, creating at times a

feeling of the greatest perplexity how most correctly to designate the particular specimen or specimens combining those complex characters.

Size variation has been noticed by many authors, and special varietal or sub-varietal names have been given by some of those conchologists who have noticed the remarkable range in size to which the species is liable. For shells considered unusually large, Kobelt has a f. *gigantea*, but I have not seen the dimensions he assigns to it. Pirona has a var. *major*, which has a total length of 20 mill.; while Westerlund has several sub-vars. of the same name, which he has applied to large specimens of several form-variations, the largest being 36 mill. in length and belonging to the var. *ampullacea*.

Diminutive specimens, which are the *L. pullus* of Zgl., have received the name of *minor* from several conchologists, but in some cases they refer to different form-variations, and vary in dimensions from a length of 6 mill. as given by Baudon, to 12 mill. as given by Colbeau; the last-mentioned author has, however, a variety *lilliputiana*, which will probably be nearly identical in size with the variety *minor* of Dr. Baudon.

Var. **labiosa** Jeffr. Shell with outer lip remarkably expanded and reflected.

This variety, which I was compelled to relinquish the idea of figuring, owing to the difficulty experienced in faithfully portraying its characters by a simple outline, is a very remarkable one, and its peculiar feature is at times so excessively developed that the outer lip coils backward upon itself and forms almost a complete tubular outer margin.

The variety *eversa* von Martens is identical with Jeffreys' *labiosa*, but with the peculiarity not so strongly expressed. Hartmann's variety *labrosus* is probably another synonym.

Var. **candida** Porro. Shell white.

This is an albine form of the species under consideration with which the var. *consobrina* Zgl., described as 'semi-opaque

and of a milk-white colour,' is identical. Other names bestowed upon this variety are *albinos* by Baudon and Van-den-Broeck which refer to the same peculiarity but in shells of different form. The name *albida* has also been applied to this variety by several authors.

Var. *picta* Jeffreys. Shell beautifully marked spirally by alternate bands of brown and white.

This variety is characterized by the presence of white or whitish lines revolving with the spire and alternating with the ordinary ground color of the shell. I have already in the present paper expressed my views as to the origin of these markings in the majority of cases.

In other specimens transverse linear markings traverse the shell in an opposite direction to those of var. *picta*, as is well shown in the var. *gibilmannica* figured by Sowerby, and very characteristically by Tryon's var. *zebra* in the closely allied species *L. palustris*. I have also a similar specimen of *B. tentaculata*, showing the same disposition of markings, but caused by undoubted disintegration of the shell substance at remarkably regular intervals.

Var. *diaphana* Parreyss. Shell very thin and transparent.

The most beautiful and characteristic specimens of this pretty and delicate shell that I have myself seen are some procured from an engine-cistern at Burnley by Mr. R. Wigglesworth.

The *L. membranaceus* Porro agrees with this form in its great delicacy of shell. The vars. *pellucida* Gassies, *tenuis* Brown, *tenera* Parreyss, and *tener* Ziegler, are all intended to distinguish the same peculiarity. The var. *podkumensis* Bayer is stated by Westerlund to be identical with *tenera* Parreyss. The *L. succinea* of Nilsson may also be practically the same, the author comparing it for colour, lustre, and transparency with *Physa fontinalis*.

The vars. *thermalis* and *glacialis*, in respect to the tenuity of their shell substance, also resemble the var. *diaphana*. Dupuy states that the *L. rochi* is identical with the var. *thermalis*.

Var. **lineata** Bean. Shell furnished with strong spiral ridges.

This variety received its name on account of the spiral ridges with which the shell and more especially the last whorl is furnished. The original figure was published in Loudon's Mag. Nat. Hist., Oct. 1834, p. 493.

Var. **marginata** Michaud. Shell furnished with a distinct rib near the margin of the outer lip.

This variety is characterized by the unusual thickening of the outer lip, in such a manner as to resemble what is usually termed an internal rib. The variety *labiata* Rossm. and the variety *styriaca* are stated by Westerlund to have the same peculiarity. The var. *albo-limbata* Kuster is probably also identical. The var. *albo-marginata* Clessin has for its special feature the pure milk-white apertural margin.

If, however, the inner margins of the mouth are brown, and not the usual dull whitish or pale-horn colour, we have then the chief character of the variety *melanostoma* of Ziegler and Parreyss.

When the animal forms two thickenings or ribs, it is then the variety *bilabiata* of Hartmann.

If, however, the calcareous secretion becomes unusually thick upon the inner lip, it is then the variety *callosa* of Ziegler and Kobelt.

Var. **margaritana** Esm. Shell with the interior nacreous or pearly.

This variety is another modification of this species, intended to distinguish an unusually nacreous or pearly appearance of the interior of the shell, which peculiarity is made more strikingly visible when the outer surface of the shell

is encrusted with a dark extraneous deposit. I have occasionally observed that this pearly appearance of the interior is very noticeable shortly after the death of the animal, when the shell has remained exposed.

Monst. **sinistrorsum** Jeffreys. Shell with the spire sinistral or reversed.

I have not thought it necessary to give a figure of this form, as the only difference from the ordinary specimens is the reversal of the direction of convolution. Dr. Baudon has applied the term *sinistra* and Dr. Jeffreys that of *sinistrorsa* to specimens exhibiting this peculiarity. The latter author gives *Limnæus lineatus* Bean as a synonym without comment, but it should be remarked that Bean included both dextral and sinistral forms under that name, and had chiefly in view the remarkably strong spiral ridging as the special peculiarity of his variety, which peculiarity was shared alike by the normal and the sinistrally coiled specimens.

The example in my collection was obtained from a pond at Tooting, by Mr. S. C. Cockerell, who kindly gave it to me.

Monst. **scalariforme** Jeffreys. Shell with whorls more or less disjointed, suture consequently very deep.

This variety or monstrosity, which is characterized primarily by its deep sutures, has also received the name of *scalaris* from A. Braun, and *subscalaris* from Dr. Baudon, and may really be considered as an accidental modification, which may be, and probably is, often caused by the interposition of a solid particle between shell and mantle, near the sutural line, compelling a widening of the sutural groove, which is often continued to the completion of growth. Such peculiarities acquired during life are probably not perpetuated in the offspring, but disappear with the death of the particular individual or individuals affected, differing thus from deformities or malformations dating back to the embryonic stage, which may be transmissible to succeeding generations.

Monst. **decollatum** Jeffreys. "Shell more or less eroded, spire truncate."
Brit. Conch., I., p. 106, 1862.

Decollation, by which term we allude to the loss, usually by erosion, of more or less of the apical whorls, has in many species received distinctive names, and the terms *cariosa* Gené, *corrosus* von Gall., *decollata* Zgl., Jeffr., Anders., have been applied to the specimens showing this phenomenon in *L. peregræ*. Under the head of decollated forms we may with almost perfect safety comprise nearly all carious or eroded shells, for if erosion or disintegration of the shell substance takes place at all, it is practically certain to attack the upper whorls, as it is there the protecting epidermis is thinnest and most delicate, and therefore from time and other causes more liable to injurious influences. Some specimens of this genus are at times so extensively eroded that little or none of the epidermis is left intact.

Specimens encrusted by various extraneous substances have been from time to time and by various authors dignified by special names: thus, the vars. *opaca* of Locard and Ziegler are shells encrusted with a black or blackish deposit, but if the deposit is blackish-brown or smoke-coloured they become the var. *fuliginosa* Zgl. The varieties *nigrita* Gassies and *nigrinus* Zgl. have also received their names from being similarly coated.

The foregoing somewhat lengthy paper upon this species does not by any means, even approximately, exhaust the material from which much interesting matter could be derived. I have, however, dealt with the bulk of the forms in my own collection, and trust that those conchologists who have given this group of shells any amount of study will supplement, correct and complete as far as they are able, the preliminary account I have given. The whole subject of varieties and variation may be and is actually viewed from so many different standpoints that it is hopeless to expect all to agree as to the utility or even the desirability of discriminating with precision the different forms which any given

species is known to assume. I have therefore contented myself with the knowledge that a paper upon the present lines dealing with *L. peregra* was one greatly desired by very many active students, and this want I have endeavoured to the best of my ability to partially supply.

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CONCHOLOGICAL SOCIETY
OF GREAT BRITAIN AND IRELAND.

PROCEEDINGS.

183RD MEETING, 5TH NOV. 1890.

Held at the Philosophical Hall, Park Row, Leeds.

Mr. John W. Taylor, F.L.S., Vice-President, in the chair.

New Members Elected :

Mr. Fredk. Wm. Fierke, 1, Florence Pl., Villa Pl., Hessele Rd., Hull.

Mr. James Howard, 21, Burnt-Ash Road, Lee, London, S.E.

Candidate Proposed for Membership :

Miss Amy Warren, Moyview, Ballina, Ireland (nominated by Dr. R. F. Scharff and Mr. J. T. Marshall).

Donations to Library announced and thanks voted : Notes on Slugs, by Mr. T. D. A. Cockerell, and The Naturalist.

Donations to Collection announced and thanks voted: *Helix nemoralis* and *H. hortensis*, selected examples, from Blagdon, Somerset N. (Miss Hele); *Physa acuta* from Botanic Gardens, Regent's Park, and from Banner Mill Pond, Aberdeen (Mr. A. J. Jenkins); *Helix arbustorum* from Glen Beag, 1800 ft. alt., July 1889 (Mr. W. West); *Planorbis nautilicus* from Gulane Links, *Physa hypnorum* and *Planorbis spirorbis* from pools near Dunbar (Mr. Thos. Scott, F.L.S.); *Physa acuta* Dp., very small var., from a hot spring at Aix, South of France, *Martensia percarinata* Mts., collected at Marseilles but brought by steamer from Mozambique, *Pupa bigorriensis* Chp., St. Sauveur, Hautes Pyrénées, *Helix boghariensis* Deb., *H. rhodocheila* West. ? var. and *Fupa granum* Dp., from Boghari, Algeria, *H. melanostoma* Dp. from Chahbounia, south of Boghari, *H. egyptianis* Bgt. ? from Kherba near Orleansville, Algeria, *Bulinus pupa* Brug. var. *nontuberculata* Bgt., and *Rumina decollata* from Berrouaghia, Algeria (Mons. C. F. Ancey); *Amphipeplea glutinosa* from Skidby Drain at Hull (Mr. F. W. Fierke); a number of shells from Tomintoul, Banffshire, new to the Records and including *Balea*, *Bulinus obscurus*, *Vitrina*, &c. (Mr. Lionel W. Hinxman); and *Limax maximus* vars. *cellaria* and *maculata* (skins) from Middlesex (Mr. H. W. Kew).

Papers Read.

A paper by Mr. A. J. Jenkins on 'Physa acuta (Drp.) in Scotland' was read, and illustrated by specimens presented to the Society's collection [printed in J. of C., Oct. 1890, vi., p. 270].

A paper by Mr. Lionel E. Adams, B.A., Treasurer to the Society, entitled 'A Few Notes on the Eastern Counties,' was read, and illustrated by the specimens referred to [printed in J. of C., Oct. 1890, vi., p. 277].

Mr. John W. Taylor, F.L.S., Vice-President, read a paper on 'The variation of *Limnaea peregra*' [printed in J. of C., Oct. 1890, vi., p. 284].

Exhibits.

The specimens shown in illustration of Mr. Adams' paper included *Bythinia leachii*, *Succinea Pfeifferi*, *Ancylus lacustris* var. *moquiniana*, *Physa hypnorum*, &c., from a pond at Little Tey, Essex N.; *Helix carthusiana* from Long Stratton, Norfolk E.; *Succinea elegans* var. *longiscata* from Norwich; and numerous examples from various places of *Helix virgata*, *H. caperata*, and *H. hortensis*.

On behalf of Mr. F. W. Fierke were shown *Zonites radiatulus* var. *viridescenti-alba* from Rombald's Moor, near Ilkley, and *Helix nemoralis* var. *rubella* ooooo *roseolabiata* and *H. hortensis* var. *castanea* ooooo from near Hull.

The Chairman exhibited specimens of a *Pupa* and a *Vertigo* from the Bembridge limestone at Thorley, Isle of Wight, both probably new, sent by Mr. Chas. Ashford; also *Succinea putris* and *S. elegans* from Christchurch, Hants. S., and a malformation of *S. elegans* from the River Lea at Tottenham, Middlesex, also from Mr. Ashford.

On behalf of Mr. Chas. Oldham, *Helix arbustorum*, type and vars. *alpestris* and *flavescens*, from Miller's Dale, Derbyshire.

On behalf of Mr. Thos. Scott, F.L.S., *Pisidium amnicum* from Loch Coulter, Stirlingshire; and *Anodonta cygnea*, very thick shelled, from Loch Leven, Kinross-shire.

Mr. W. Denison Roebuck, F.L.S., showed numerous Scottish shells sent by Mr. W. Evans, F.R.S.E., including some of the Hunterian Museum specimens of *Azeca tridens* from Bridge of Allan, Perth S., *Balea perversa* from Caroline Park, Granton, near Edinburgh, *Planorbis albus*, *P. nautileus*, and *Pisidium roseum* from Haining Lake near Selkirk, and *Anodonta anatina* from Lochend near Edinburgh.

184th MEETING, DECEMBER 10th, 1890.

Mr. John W. Taylor, F.L.S., Vice-President, in the chair.

New Member Elected :

Miss Amy Warren, Moyview, Ballina, Ireland.

Candidates Proposed for Membership :

Rev. John Hawell, M.A., Ingleby Greenhow (by W. Denison Roebuck and Baker Hudson); Mr. Alfred Hawes, Penistone (by L. E. Adams and

W. Denison Roebuck); Mr. James Mitchell, Glasgow (by James Steel and Thomas Scott).

Donations to Library announced and thanks voted: Report of Trustees of Australian Museum for 1889 (from the Trustees); B. B. Woodward on the Pleistocene (non-marine) Mollusca of the London District, 1890 (from the Author).

Donation to Collection announced and thanks voted: Various shells from Newsholme near Wressle, S.E. York (Mr. J. Beanland).

Letter Read: From Mr. Isaac B. Hardy, Santa Barbara, California, wishing to be put in exchange relationship with British collectors of marine shells who desire fine examples of Pacific Coast species.

Exhibits.

On behalf of Mr. Thomas Scott, F.L.S., a depressed example of *Helix aspersa* from near Rothesay, Bute.

On behalf of Mr. J. W. Dixon, marine shells from Sennen Cove, Cornwall.

By Mr. W. Denison Roebuck, F.L.S., numerous miscellaneous land and freshwater shells.

185th (ANNUAL) MEETING, SATURDAY, 20th DEC., 1890.

At Philosophical Hall, Leeds.

The meeting was opened at 3 p.m., the chair being occupied by the President, Mr. Edgar A. Smith, F.Z.S.

Messrs. W. E. Collinge and J. W. Taylor, F.L.S., were appointed Scrutineers, and Messrs. Edgar R. Waite, F.L.S., and W. Denison Roebuck, F.L.S., auditors. The meeting was then suspended.

At 4 p.m. the chair was again taken by the President.

The minutes of the last Annual Meeting having been confirmed, the Hon. Secretary, Mr. W. Denison Roebuck, F.L.S., read the Annual Report of the Council [printed at p. 311], the Treasurer, Mr. Lionel E. Adams, B.A., submitted his audited Balance Sheet [see p. 313], the Recorder read the Report on the Records [see p. 314], and the Report of the Manchester Branch [see p. 313] was read on behalf of Mr. Robert Standen, the Secretary of the Branch, who was unable to be present.

The various reports were adopted, on the motion of Mr. John W. Taylor, F.L.S.

Election of Officers.

The Scrutineers then reported that 34 members had voted, and that the following had been duly elected to fill the various offices for 1891:—

PRESIDENT—Rev. R. BOOG WATSON, B.A., F.R.S.E., F.L.S., Cardross, Dumbartonshire.

VICE-PRESIDENTS—J. COSMO MELVILL, M.A., F.L.S., Manchester; EDGAR A. SMITH, F.Z.S., London; ALEXANDER SOMERVILLE, B.Sc., F.L.S., Glasgow; JOHN W. TAYLOR, F.L.S., Leeds.

HON. TREASURER—LIONEL E. ADAMS, B.A., Penistone.

HON. SECRETARY AND RECORDER—WM. DENISON ROEBUCK, F.L.S., Leeds.

HON. CURATOR—WILLIAM NELSON, Leeds.

HON. LIBRARIAN—W. E. COLLINGE, Leeds.

COUNCIL—THOMAS WILLIAM BELL, Leeds; WALTER CROUCH, F.Z.S., Wanstead, Essex; R. D. DARBISHIRE, B.A., F.G.S., Manchester; Rev. EDWARD S. DEWICK, M.A., London; JOHN H. PONSONBY, F.Z.S., London; B. B. WOODWARD, F.G.S., F.R.M.S., London.

The meeting was then adjourned.

At 6-30 p.m., the chair was again taken by the President.

New Members Elected :

Rev. John Hawell, M.A., vicar of Ingleby Greenhow, Northallerton.

Mr. Alfred Hawes, Penistone, Yorkshire.

Mr. James Mitchell, Glasgow.

Candidate Proposed for Membership :

Mr. Edgar R. Waite, F.L.S. (by W. Denison Roebuck and J. W. Taylor).

Donations to Library announced and thanks voted : De Gregorio, *Studi su talune Conchiglie Mediterranee*, 1885, and *Gastéropodes*, l'Ann. Géol., 1888 (from M. Cossmann); 20 reprints of his own papers (Rev. R. Boog Watson); 2 reprints (Mr. T. D. A. Cockerell); 3 reprints (Mr. Thomas Scott); List of Members of American Association of Conchologists (the Association); and Prospectus of Stawell School of Mines (the School).

Donations to Collection announced and thanks voted : *Helix ericetorum* var. and *H. cantiana* from Ostend, collected by J. T. Carrington; *Limnea palustris* var., *Planorbis parvus*, and *Succinea lineata* from rejectamenta of Muddy Creek, Kremmling, Colorado; *Ilyalina nitida*, from Dover Plains, Dutchess Co., New York, collected Nov. 1889, by W. S. Teator, and *Helix caperata* from Isleworth, Middlesex (all from Mr. T. D. A. Cockerell); *Helix elegans* from Dover (Mr. C. Stanley Bell Cox); *Zonites cellarius* var. *albinus* from Cottingham, and an exotic *Stenogyra* from Ferniehurst, Shipley (Mr. Frederick Rhodes).

President's Address.

The President, Mr. Edgar A. Smith, F.Z.S., opened the meeting by delivering his valedictory address as President for 1890, taking as his subject "The Nomenclature of Certain Genera of British Land and Freshwater Shells" [to be printed in J. of C. for April].

At the conclusion of the address it was resolved, on the motion of Mr. W. E. Hoyle, M.A., seconded by Mr. John W. Taylor, F.L.S., supported by Mr. W. Nelson and other members, that the thanks of the Society be voted to the President for his address, and that with his consent it be printed.

New List of British Land and Freshwater Mollusca.

During the discussion on the presidential address the need of a new edition of the Conchological Society's List was referred to, and it was afterwards proposed by Mr. Lionel E. Adams, B.A., seconded by Mr. Frederick Rhodes, and unanimously resolved that Messrs. Taylor, Nelson, and the Secretary be requested to prepare a new edition of the Conchological Society's List of British Land and Freshwater Mollusca. to be printed in the 'Journal of Conchology' and afterwards reprinted for sale.

Papers Read.

A paper on 'The Marine Mollusca of Madeira,' by the Rev. R. Boog Watson, B.A., F.R.S.E., was laid before the meeting [to be printed in J. of C. for April].

A paper on 'The Occurrence of *Helix elegans* in East Kent, near Dover,' by Mr. C. Stanley Bell Cox, with an appended note by the President, was read [to be printed in J. of C. for April].

A paper on '*Vertigo moulinsiana* in Dorsetshire,' by Mr. Robert Standen, Secretary of the Manchester Branch, was read [to be printed in J. of C. for April].

Other papers were postponed for lack of time.

Exhibits.

The President exhibited a number of examples of *Helix elegans* from Dover, in illustration of Mr. Cox's paper, and kindly presented some to the Society's collection. Several members entertained the view that the shell must have been introduced to the locality, where it has since thriven, and the opinion was expressed that if this was intentionally done, it is highly desirable that the introducer should place the fact on definite record.

Mr Wm. Nelson exhibited a long series of most interesting malformations of *Limnaea peregra* from Allerton Ings, near Castleford.

Mr. Frederick Rhodes showed a large number of sections of different genera of shells, in which the internal structure was laid open in an interesting manner.

Mr. H. T. Soppitt, of Bradford, who was present as a visitor, showed a living example of *Testacella haliotidea* from Fernichurst, Shipley, where it and at least ten other specimens have been found by Mr. E. Self, who supposes that they were introduced with plants from Backhouse's Nurseries at York.

Mr. J. Beanland, of Bradford, also a visitor, showed a specimen of *Helix nemoralis* var. *libellula* (123)(45) *hyalozonata albolabiata*, from between Saltaire and Bingley.

The Rev. Charles Crawshaw sent for exhibition a beautiful series of *Pecten opercularis* from Mount's Bay, Cornwall, to illustrate its variability of coloration.

Mr. John W. Taylor, F.L.S., had on view his album of conchologists, which proved of great interest to the members present.—W.D.R.

ANNUAL REPORT.

The Council in presenting their Report for the year 1890 have to congratulate the Members on a year of steady and continued progress.

The Membership has increased by the election of twenty new Members, seven Honorary Life Members, and thirteen Ordinary Members. Three Members have been lost by death (F. Akers, S. A. Adamson, and T. W. Pocock), two have resigned, and three whose addresses have been for some time unknown have had their names removed from the roll. This leaves the existing Membership at 199, of whom ten are Honorary Life Members, six are Ordinary Members resident abroad, and 183 Ordinary Members on the home list. The steady increase in the Membership is a source of satisfaction as demonstrating that the Society has by no means reached its maximum development, and that both the Society and the Journal possess the confidence of the general body of Conchologists of the British Isles.

The Meetings have been held regularly at the beginning of each month, the only omission being that of the September Meeting, which could not be held on account of the meetings in Leeds of the British Association.

Numerous specimens have been exhibited at the meetings, which have all been of an interesting character.

The following papers have been read:—

- L. E. Adams—‘A few Notes on Derbyshire from a Conchological Point of View.’
- T. F. Burrows—‘Re-discovery of *Helix fusca* and *H. lamellata* in Staffordshire.’
- H. Byne—‘A Note on var. *varicosa* of *Rissoa striatula* at Scilly.’
- T. D. A. Cockerell—‘Critical Notes on some Land and Freshwater Mollusca.’
- A. J. Jenkins—‘On the Difference in Habits of the Plumstead-Beckton *Hydrobia* (*H. jenkinsi* Smith) and *H. ventrosa* Smith.’
- H. K. Jordan—‘On the Species and Varieties of the Genus *Fusus* inhabiting the British Seas.’
- F. W. Fierke—‘Discovery of *Limnæa glutinosa* near Hull.’
- E. A. Smith—‘Reply to Mr. Marshall’s ‘Further Notes on British *Hydrobia*.’’
- L. E. Adams—‘*Zonites glaber* var. *viridula* at Penistone.’
- E. A. Smith—‘A List of Shells from the Tizard Bank, China Seas.’
- W. A. Gain—‘Notes on the Food of some of the British Mollusks.’
- R. F. Scharff—‘*Arion minimus* a British Slug.’
- J. T. Marshall—‘New British Marine Shells.’
- A. J. Jenkins—‘*Physa acuta* in Scotland.’
- L. E. Adams—‘A Few Notes from the Eastern Counties of England.’
- J. W. Taylor—‘The Variation of *Limnæa peregrina*.’

Most of these papers have been duly printed in the ‘Journal of Conchology,’ and one or two are awaiting publication.

The usual four numbers of the 'Journal of Conchology' have been issued during the year by its editor, Mr. J. W. Taylor. Copies of the Journal have been furnished for issue to the Members in accordance with the arrangements entered into with the editor a couple of years ago. The Council recommend that the arrangement be continued.

The Society's Collections—which are stored partly in the displayed collection of British Marine Mollusca in the Museum of the Leeds Philosophical Society, and partly in three Cabinets belonging to the Conchological Society—have been considerably increased in extent during the year. In response to an appeal to Members for examples of Marine Shells, acceptable donations have been received from Mrs. Brockbank, Rev. Chas. Crawshaw, Mr. A. J. Jenkins, and Mr. B. Sturges Dodd. The Council venture here to repeat and emphasize this appeal, and trust to have a further and large response from Members. Other donations have been received from M. C. F. Ancey, Mr. J. Beanland, Miss F. M. Hele, Mr. Thos. Scott, Mr. F. W. Fierke, Mr. Lionel Hinxman, Mr. H. W. Kew, Mrs. Edward Passavant, Mr. W. Denison Roebuck, Mr. James H. Rowntree, Mr. W. West, Mr. T. D. A. Cockerell, Rev. R. A. Summerfield, Mr. L. E. Adams, Mr. T. F. Burrows, and Mr. W. Nelson. The Hon. Curator, Mr. Nelson, has given considerable attention to the mounting and arrangement of the collections—and has adopted a geographical arrangement. It is proposed to bring together a series of County Collections for the British Islands, and to arrange the foreign shells in a similar manner, and the Curator would be pleased if Members would assist him by giving series of specimens from the districts which they are in the habit of working.

The Library has increased during the year by numerous donations of books, pamphlets and reprints. A working list of the books was prepared at the beginning of the year—and during the past few weeks Mr. W. E. Collinge has kindly prepared an alphabetical catalogue by authors' names, which your Council propose shall be printed in the Journal along with the Annual Reports. The result of this will be to render the Library accessible for the use of Members generally, and the Council hope that Members possessing works which they can easily spare will help by timely donations to render the Library more complete and useful.

The Council also venture to invite Members to make further contributions to the Cabinet Fund. The Society's income being but small and mostly required to defray the cost of the Journal of Conchology supplied to the Members, it is dependent upon voluntary generosity for the means to enable the accommodation for the Collections to be increased.

The Reports of the Treasurer, upon the Records, and of the Manchester Branch, are given separately.

Treasurer's Report.

In presenting the financial report for the present year it is necessary to state that, while the income of the Society has been about the same as usual, the expenses, both of the General Fund and of the Cabinet Fund, have been unusually heavy. This is due partly to the increase of members, but more

especially to the expenses incurred by the arrangement of the Society's collections. In spite of this there is a clear balance to be shown on both accounts. The balance of the General Fund would be much larger if the arrears of subscriptions had been duly paid up. In spite of three notices and a special circular sent to Members in arrear there is £9 12s. 6d. due for the present year, and £14 7s. for previous years, amounting to the large total of £23 19s. 6d. The property of the Society has been valued as follows:— Three Cabinets, cost £6 15s., say £3 10s.; tubes in stock, cost £3 14s. 6d., say £2; Books in Library have not been valued but may be taken at the low figure of £10; unpaid subscriptions, £23 19s. 6d.; stamped envelopes and post-cards in Treasurer's hands, 2s. 6d.; total assets, say £39 11s.—LIONEL E. ADAMS, Hon. Treasurer, Dec. 20th, 1890.

BALANCE SHEET FOR 1890.

GENERAL FUND.

Receipts.	£	s.	d.		Payments.	£	s.	d.
Balance from 1889 ...	13	5	5		Cost of Journals ...	32	17	4
Bank Interest for 1889	0	0	6		Postage and Secretary's			
Do. for 1890 ...	0	2	6		Expenses ...	7	8	4
Sale of Journals, Lists,					Stationery ...	3	0	9
and Reprints ...	1	2	4		Books Bound ...	0	17	6
Postage Repaid ...	0	0	7		Museum Expenses ...	0	0	9
Subscriptions Received					Balance in hand	9	14	2
during 1890 ...	39	7	6					
	<u>£53 18 10</u>					<u>£53 18 10</u>		

CABINET FUND.

Receipts.	£	s.	d.		Payments.	£	s.	d.
Balance from 1889 ...	5	8	8		Expenses during 1890...	8	6	9
Donations, &c., received					Balance in hand	0	2	11
during 1890...	3	1	0					
	<u>£8 9 8</u>					<u>£8 9 8</u>		

Audited and found correct, } EDGAR R. WAITE.
 Nov. 20th, 1890. } W. DENISON ROEBUCK.

L. E. ADAMS,
 HON. TREASURER.

REPORT OF THE MANCHESTER BRANCH.

In presenting this second Annual Report of the Manchester Branch, which was approved at its monthly meeting held on December 11th, it gives me great pleasure to state that our financial and general condition is very satisfactory. The interest shown by the members continues unabated. There has been a good addition of enthusiastic workers to our numbers, and

much good work has been done in local investigation of our district during the year. Excursions have been made to Darley Dale and Miller's Dale, Derbyshire; Ingleton, Yorkshire; and various places around Manchester, resulting in many interesting discoveries. The monthly meetings have been held regularly throughout the year, and a large number of interesting exhibitions made by the members, which have been duly noted in the Record Books of the Branch.

The following notes and papers, all well illustrated by the specimens described, have been contributed by our Members:—

J. G. Milne—'The Land and Freshwater Mollusca of Achil Island, Ireland.'

Thos. Rogers—'Notes on the Influence of Food and Domestication upon the Size and Colouring of *Helix aspersa*.'

Chas. Oldham—'Notes on a day's Collecting in the Woods around Cheltenham.'

Ed. Collier—'Geographical Distribution of the Genus *Clausilia*.'

J. R. Hardy—'Notes on the Distribution of Freshwater Mollusca by Insect Agency.'

J. R. Hardy—'Notes on a Species of British Beetle (*Drilus flavescens*), parasitic upon *Helix aspersa*, *nemorialis*, and *hortensis*.'

J. R. Hardy—'Notes on the occurrence of *Bulimus goodallii*, *Stenogyia octona*, and various Foreign Helices in Greenhouses around Manchester.'

R. Standen—'Reports on the Mollusca collected during the Excursions of the Branch at Darley Dale, Miller's Dale, and Ingleton.'

The most important discoveries recorded during the year are those of *Helix lamellata* at Darley Dale, Derbyshire; and of *Cyclostoma elegans* at Silverdale, Lancashire, by Mr. J. Ray Hardy; of *Vertigo substriata* at Helks Wood, Ingleton, and *Vertigo pygmaea* in extraordinary numbers in an old quarry at Clitheroe, by Messrs. W. Moss and R. Cairns; of *Testacella haliotideia* var. *scutulum* in a greenhouse at Sale, by Mr. Thos. Rogers; of *Pisidium roseum* and *Pisidium nitidum* at Birkenhead and near Liverpool, and *Sphaerium lacustre* var. *ryckholtii* near Liverpool by Mr. J. W. Farrer; and of *Limnaea auricularia* and its var. *albida*, in great numbers and of immense size, in a reservoir at Levenshulme, near Manchester. *Bulimus acutus* has also been found to still exist in considerable numbers in its old recorded stations at Leasowe, Cheshire, and at Rossal, near Fleetwood.—
R. STANDEN, Hon. Secretary, Manchester Branch.

REPORT ON THE RECORDS

MADE DURING THE YEAR ENDING DECEMBER 20TH, 1890.

During this the thirteenth year in which the record-system has been carried out, there has been 2165 entries made in the Record Books, all of them having been duly authenticated by the submission of specimens to the Society's Referees. This brings the total number of Records entered to 30,384 for the thirteen years.

With regard to the number of *species* (not records merely) registered for the various counties and vice-counties, the average is now 41 species per county as against 36 at the date of the previous report. The average for the 72 counties of England and Wales has been raised from 56 to 58, for the 41 Scottish counties from 21 to 31, a notable increase, and for the 36 Irish counties from 14 to nearly 20. It will thus be seen that a great advance has been made during the year in the authentication of Scottish Mollusca. This has been in the main due to the fact that your Recorder presented a paper to the Royal Physical Society of Edinburgh dealing with the comital range of Scottish Mollusca, which will shortly be printed in their Proceedings, and that to render it more complete numerous Scottish naturalists have co-operated by sending material for authentication. More particularly is credit due to Mr. William Evans, F.R.S.E., the able Secretary of the Royal Physical Society, for the energy and success with which he has laboured both personally and by correspondence to provide material for accelerating the completion of our knowledge of the range of Land and Fresh Water Mollusca in Scotland. He has thus done for the eastern side of Scotland what our old friends Mr. A. Somerville and Rev. J. E. Somerville did for the western and northern districts a year or two ago. The Society is also indebted to Mr. Alex. Shaw for much assistance in this respect, while to the Rev. Dr. Gordon, of Elgin, the Society's thanks are due for the privilege of inspecting the whole collection of Land and Fresh Water Mollusca belonging to the Elgin Museum, which was specially sent to Leeds for examination.

For English records the Society has been indebted to numerous conchologists, particularly to Mr. E. R. Sykes for the inspection of a very full set of Dorsetshire Shells, and to Rev. W. L. W. Eyre for shells from South Wiltshire and North Hampshire.

For Ireland, numerous shells from various counties of Ulster and Connaught have been submitted by Mr. J. G. Milne, from Mayo and Sligo by Miss Amy Warren, and from Louth by Miss Sidney Smith.

There is one respect, however, in which no progress has been made, and the four counties (Queen's, Carlow, Longford and Galway East) from which no records had been made at the date of the last report remain blank or virgin counties still. In addition to these four there are 17 from which the total number of authenticated records still falls short of ten each, and to which it is therefore hoped that Members will pay special and speedy attention. These are the Welsh county of Radnor, the seven Scottish counties of Dumfries, Aberdeen North, Westernness, Ebudes South, Ebudes North, Orkney, and Shetland, and the nine Irish counties of Donegal, Cavan, Kildare, Wicklow, Kilkenny, Roscommon, Clare, Tipperary North, and Cork North.

In conclusion the Recorder has to thank the Members and others who have so heartily co-operated in the work of authentication for so many years.
—W DENISON ROEBUCK, Recorder.

LIST OF MEMBERS

(With year of election; O = founder, or original member).

HONORARY MEMBERS

(Limited to ten in number).

1889. Bergh, Prof. Dr. Rud., Vestre Hospital, Stormgade, 19, 2, Copenhagen.
 1889. Binney, Wm. G., 222, E. Union St., Burlington, New Jersey, U.S.A.
 1886. Bourguignat, J. R., Rue des Ursulines, 6, Saint Germain-en-Laye, Seine-et-Oise, France.
 1889. Cossmann, Maurice, Ingénieur-chef des services techniques du chemin de fer du Nord, 95, Rue de Maubeuge. Paris.
 1889. Crosse, Hippolyte, Rue Tronchet, 25, Paris.
 1878. Kobelt, Dr. W., Schwannheim, Frankfort-am-Main.
 1886. Martens, Dr. E. von, C.M.Z.S., Paulstrasse, Berlin, N.W.
 1889. Philippi, Dr. R. A., Director del Museo Nacional, Santiago, Chile.
 1889. Sars, Prof. G. O., Universitat, Christiania, Norway.
 1889. Simroth, Dr. Heinrich, Gohlis, Leipzig.

ORDINARY MEMBERS.

1885. Adams, Lionel E., B.A., Rose Hill, Penistone, Yorkshire.
 1889. Agius, Paul, B.A., 106, Strada Reale, Valletta, Malta.
 1888. Bailey, Rev. George, F.R.M.S., The Manse, Finchingfield, Essex.
 1886. Baillie, William, Brora, Sutherlandshire.
 1889. Baker, Arthur Edwin, 77, Conduit Street, Leicester.
 1886. Barnacle, Rev. H. Glanville, M.A., F.R.A.S., The Vicarage, Holmes Chapel, Crewe, R.S.O.
 1887. Beaulah, John, Ravensthorpe, Brigg.
 1888. Bell, Alfred, 78, Wells St., Oxford Street, London.
 1877. Bell, Thomas William, 2, Carr Lane, Leeds.
 1886. Bendall, Wilfrid, 28, Gloucester Place, Portman Square, London, W.
 1884. Bostock, Edwin D., The Radfords, Stone, Staffordshire.
 1879. Brazier, John, C.M.Z.S., Curaçoa House, Windmill Street, Sydney, N.S.W.
 1889. Brockbank, Maria (Mrs. E.), Bond End, Settle.
 1888. Brindley, H. Hulme, B.A., 2, Holland Road, Sutton, Surrey.
 1887. Brown, Alfred, 7, Bowmont Terrace, Glasgow.
 1888. Burkill, Clifford, Herm View, Guernsey.
 1890. Burkill, Isaac Henry, Caius College, Cambridge; and 3, Royal Parade, Cheltenham.
 1888. Burrows, Thomas F., 4, Wellington Road, Newark-on-Trent.
 1879. Butterell, J. Darker, 4, Willow Grove, Westwood, Beverley.
 1888. Byne, Loftus St. George, 5, Sea View Terrace, Teignmouth, Devon.

1878. Cash, William, F.L.S., F.G.S., F.R.M.S., 38, Elmfield Terrace, Halifax.
1887. Chaytor, R. C., Scafton Lodge, Middleham, Bedale, Yorkshire.
1889. Christy, Robert Miller, F.L.S., Chignal St. James, Chelmsford, Essex.
1886. Coates, Henry, F.R.P.S., Pitcullen House, Perth.
1883. Coates, William, Phoenix Hotel, Stockton-on-Tees.
1885. Cockerell, Sydney C., 5, Priory Road, Bedford Park, Chiswick, London, W.
1885. Cockerell, T. D. A., 3, Fairfax Rd., Bedford Park, Chiswick, W.
1880. Collier, Edwd., 1, Heather Bank, Moss Lane East, Oxford Road, Manchester.
1886. Collinge, W. E., 45, Caledonian Road, Leeds.
1887. Cooke, Rev. Alfred Hands, M.A., F.L.S., King's College, Cambridge.
1886. Coulson, Frank, 6, Montague Terrace, Kelvinside, Glasgow.
1888. Cox, Chas. Stanley Bell, B.A., M.R.C.S., San Remo, Chelston, Torquay.
1886. Craven, Alfred E., F.G.S., F.L.S., F.Z.S., 65, St. George's Road, Warwick Square, London, S.W.
1890. Crawford, James, c/o J. C. Kemsley and Co., Port Elizabeth, Cape Colony.
1889. Crawshaw, Rev. Charles, Linden House, Shipley, Yorkshire.
1886. Crick, Walter D., 7, Alfred Street, Northampton.
1888. Crouch, Walter, F.Z.S., Grafton House, Wellesley Road, Wanstead, Essex.
1879. Cundall, J. W., Carville, Alexandra Park, Redland, Bristol.
1886. DaCosta, S. J., 2, Craven Hill, London.
1888. Dale, Henry F., A.A., B.Sc., F.R.G.S., F.R.M.S., F.Z.S., F.E.S., &c., Post Office, Estabrook, Park Co., Colorado, U.S.A.
1888. Dale, (Mrs.) Violet, P. O., Estabrook, Park County, Colorado, U.S.A.
1888. Dale, (Miss) A. M., Hatherley, Bampfylde Road, Torquay.
1886. Darbshire, R. D., B.A., F.G.S., Victoria Park, Manchester.
1878. Davis, James W., F.S.A., F.L.S., F.G.S., Chevinedge, Halifax.
1889. Dawson, Oswald, Caledonian House, Leeds.
1888. Dewick, Rev. Edward S., M.A., 26, Oxford Square, London, W.
1886. Dixon, George, sen., Great Ayton, Northallerton.
1886. Dodd, B. Sturges, 67, Beech Avenue, New Basford, Nottingham.
1886. Duncan, W., 1, India Street, Montrose.
1884. Elliott, Edward J., High Street, Stroud.
1888. Evans, (Mrs.) A., sen., Brimscombe Court, Thrupp, near Stroud.
1886. Eyre, Rev. W. L. W., M.A., Swarraton Rectory, Alresford, Hants.
1885. Fairbrass (Miss) E. B., Abbey Street, Faversham, Kent.
1889. Falloon, (Mrs.) Beatrice J., Long Ashton Vicarage, Clifton, Bristol.
1885. Fenn, F. G., Syon Lodge, Isleworth, Middlesex.
1890. Fierke, Frederick Wm., 1, Florence Place, Villa Place, Hessle Rd., Hull.

1887. Fitzgerald, Francis R., F.S.Sc., 26, Great Percy Street, Pentonville, London, W.C.
1884. Fitzgerald, H. Purefoy, North Hall, Preston Candover, Hants.
1886. Fitzgerald, (Mrs.) J., 10, West Terrace, Folkestone.
1888. Fortune, Riley, F.Z.S., Ravensgill, Franklin Mount, Harrogate.
1886. Gain, Wm. Albert, Tuxford, Newark.
1887. Galizia, Joseph Sylvester, 64, Piazza Celsi, Valletta, Malta.
1889. Gaskell, Roger, M.A., 5, The Grove, Highgate, London, N.
1887. Gatto, Alfred Caruana, B.A., 59, Strada Levante, Valletta, Malta.
1887. Gerland, Conrad, M.Sc., Ph.D., F.C.S., Church Hall, Church, Lancashire.
1886. Godlee, Theo., Whips Cross, Walthamstow, Essex.
1887. Gordon, Rev. George, LL.D., Braebirnie, Elgin, N.B.
1886. Greene, Rev. Carleton, M.A., Great Barford Vicarage, St. Neots.
1890. Grocock, Leonard Oakley, 13, Lower Maryon Road, Charlton, Kent.
1890. Gude, G. K., 5, Giesbach Road, Upper Holloway, London, N.
1886. Gwatkin, H. M., M.A., Scrope Terrace, Cambridge.
1886. Hagger, John, F.L.S., Repton School, Burton-on-Trent.
1888. Halstead, John J., 19, Millholme Terrace, Carlisle.
1887. Hanley, Sylvanus, F.L.S., Hanley Road, Hornsey Road, London.
1887. Hargreaves, J. A., 40, Ramskill Road, Scarborough.
1889. Hartley, Alfred, 8, Cavendish Road, Idle, near Bradford.
1887. Harvard, T. Mawson, Green Bank, Lingard Road, Lewisham, London.
1887. Heathcote, Wm. Henry, 54, Frenchwood Street, Preston.
1889. Hedworth, Thomas H., 1, Railway Terrace, Dunston, Gateshead-on-Tyne.
1888. Heitland, (Mrs.) M., The Priory, Shrewsbury.
1878. Hepburn, Frederick, B.A., Sutton, Surrey.
1887. Hey, Thomas, Bloomfield Street, Derby.
1887. Hey, Rev. W. C., M.A., St. Olave's Vicarage, York.
1886. Hillman, Thomas Stanton, Eastgate Street, Lewes, Sussex.
1886. Hockin, (Miss) S., Phillack Rectory, Hayle, Cornwall.
1888. Hodgson, (Mrs.) Julia, Chalgrave Vicarage, Leighton Buzzard, Beds.
1886. Holmes, W. J. O., F.L.S., Strumpshaw Hall, Norwich.
1890. Howard, James, 21, Burnt-Ash Road, Lee, London, S.E.
1884. Howell, G. O., 3, Ripon Villas, Ripon Road, Plumstead.
1886. Hoyle, W. E., M.A., M.R.C.S., F.R.S.E., Keeper of the Manchester Museum, Owens College, Manchester.
1883. Hudson, Baker, 113, Grange Road East, Middlesbrough.
1886. James, John H., A.R.I.Cornwall, 3, Truro Veau Terrace, Truro.
1878. Jeffery, William, Ratham, Chichester.
1886. Jeffreys, Charles, 15, Warren Street, Tenby.
1886. Jenkins, A. J., 1, Douglas Terrace, Douglas Street, Deptford.
1888. Jones, (Miss) L. C., 5, Alexandra Road, Clifton, Bristol.
1888. Jones, Wm. Jas., jun., 27, Mayton Street, Holloway, London, N.

1889. Jordan, H. K., F.G.S., Clytha Park, Newport, Monmouthshire.
 1889. Kendall, Percy F., F.G.S., 16, Leegate Rd., Heaton Moor, Stockport.
 1887. Kew, H. Wallis, F.E.S., 5, Giesbach Road, Upper Holloway, N.
 1889. Knight, G. A. Frank, M.A., Rosenlani, Bearsden, Glasgow.
 1879. Laver, Henry, M.R.C.S., F.L.S., Trinity Street, Colchester.
 1886. Lightwood, James T., Hope House, Lytham, Lancashire.
 1889. Linter, (Miss) J. E., Arragon Close, Twickenham, Middlesex.
 1886. Lowe, E. J., D.L., J.P., F.R.S., F.L.S., F.G.S., F.R.A.S.,
 F.R.M.S., &c., Shirenewton Hall, Chepstow, Monmouthshire.
 1887. Luther, S. M., Garrettsville. Ohio, U.S.A.
 1889. MacAndrews, James J., Lukesland, Ivy Bridge, Devonshire.
 1885. McKean, Kenneth, F.L.S., Summerfield, Warham Road, Croydon.
 1886. McMurtrie, Rev. John, M.A., D.D., 14, Inverleith Row, Edinburgh.
 1884. Madison, James, 167, Bradford Street, Birmingham.
 1885. Marquand, Ernest D., M.A., Fermain House, Guernsey.
 1887. Marshall, J. T., Sevenoaks, Torquay.
 1889. Martin, Sydney Trice, Hanover Chambers, King Street, Manchester.
 1887. Masefield, J. R. B., M.A., Rosehill, Cheadle, Staffordshire.
 1888. Mason, Philip B., M.R.C.S., F.L.S., F.Z.S., Burton-on-Trent.
 1889. Mayfield, Arthur, 88, Stafford Street, Norwich.
 1887. Mellors, George W., 49, Alkham Road, Stoke Newington, London, N.
 1880. Melvill, James Cosmo, M.A., F.L.S., Kersal Cottage, Prestwich,
 1888. Milne, J. Grafton, Albert Square, Bowdon, Cheshire. [Manchester.
 1879. Milnes, Rev. Herbert, M.A., Winster Vicarage, near Derby.
 1886. Morgan, J. Bickerton, 30, Severn Street, Welshpool.
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 Nelson, William, Graveleythorpe, Halton, near Leeds.
 1887. Newstead, A. H. L., B.A. Cantab., Roseacre, Epping.
 1890. Nicholson, John, Chapeltown, Pudsey, Yorkshire.
 1887. North, S. W., M.R.C.S., F.G.S., Micklegate, York.
 1887. Oldham, Charles, Ashlands, Ashton-on-Mersey.
 1889. Paling, Albert, B.A., B.Sc., Middlesex Hospital, London.
 1882. Parke, George H., F.L.S., F.G.S., College Grove Road, Wakefield.
 1887. Parry, Lieut-Col. G. S., 18, Hyde Gardens, Eastbourne.
 1888. Peal, C. N., F.L.S., F.R.M.S., Fernhurst, Mattock Lane, Ealing, W.
 1886. Pearce, Rev. S. Spencer, M.A., Yelverton, near Norwich.
 1890. Pickard-Cambridge, C. Owen, Bloxworth, Wareham, Dorsetshire.
 1886. Pidgeon, D., F.G.S., Holmwood, Putney Hill, London.
 1886. Ponsonby, John H., F.Z.S., 15, Chesham Place, London, S.W.
 1885. Quilter, H. E., 4, Cedar Road, Leicester.
 1888. Radcliffe, John, 111, Oxford Street, Ashton-under-Lyne.
 1886. Ramage, John, 20, Hill Street, Dundee.
 1887. Reader, T. W., 171, Hemingford Road, Barnsbury, London, N.
 1885. Redding, J. R., 31, Belvedere Road, Dublin.
 1887. Renton, Robert, Fans Road, Greenlaw, Berwickshire.
 1888. Rhodes, Frederick, 13, Moorside Terrace, Eccleshill, Bradford.
 1888. Robertson, David, F.L.S., F.G.S., Fernbank, Millport, N.B.
 O
 Roebuck, W. Denison, F.L.S., Sunny Bank, Leeds.

1886. Rogers, Thomas, 27, Oldham Road, Manchester.
1886. Rope, George Thomas, Blaxhall, Wickham Market, Suffolk.
1886. Saunders, Edward, F.L.S., St. Ann's, Mount Hermon, Woking.
1877. Scharff, R. F., Ph.D., B.Sc., M.R.I.A., Museum, Dublin.
1886. Sclater, A. J. R., Bank Street, Teignmouth, Devonshire.
1886. Scott, Thomas, F.L.S., 14, Lorne Street, Leith.
1887. Shaw, Alexander, 56, Dover Street, Glasgow.
1886. Shrubsole, George Wm., Town Hall Square, Chester.
1889. Siggs, F. L., B.A., Middlesex Hospital, London.
1884. Skilton (Mrs.) M., 21, London Road, Brentford, Middlesex.
1886. Smart, Rev. R. W. J., M.A., Parkham Rectory, Bideham, N. Devon.
1886. Smith, Edgar A., F.Z.S., Nat. History Museum, South Kensington.
1886. Smout, Charles L., 8, Trinity Street, Hastings.
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1886. Somerville, A., B.Sc., F.L.S., 4, Bute Mansions, Hillhead, Glasgow.
1887. Somerville, Rev. J. E., M.A., B.D., 11, Southpark Terr., Glasgow.
1886. Sowerby, G. Brettingham, F.L.S., 121, Fulham Road, London, S.W.
1886. Standen, Robert, 40, Palmerston Street, Moss Side, Manchester.
1888. Stanley, Frederick, 6, Clifton Gardens, Margate, Kent.
1886. Steel, James. (Glass Stainer), 104, Renfrew Street, Glasgow.
1888. Stirrup, Mark, F.G.S., High Thorn, Bowdon, near Manchester.
1888. Storrs, George Godwyn, B.A., Sandown Vicarage, Isle of Wight.
1889. Storey, J. A., B.A., St. Joseph's, High School, Cardiff.
1890. Stubbs, Arthur Goodwin, Sherwood Rise, Nottingham.
1888. Sykes, Ernest Ruthven, B.A., 9, Belvedere, Weymouth, Dorsetshire.
1886. Taylor, (Miss) H. L., Woodside, Rowditch, Derby.
- O
Taylor, John W., F.L.S., Outwood Villa, Horsforth, Leeds.
1887. Taylor, J. M., Free Museum, Paisley, N.B.
1886. Tomlin, J. R. Brockton, B.A., 59, Liverpool Road, Chester.
1886. Turner, Rev. William, 5, St. Andrew's Square, Edinburgh.
1890. Turton, Frank, Penistone, Yorkshire.
1880. Tye, G. Sherriff, 10, Richmond Road, Handsworth, Birmingham.
1886. Viner, C. W., M.A., Ph.D., 9, Seymour Street, Bath.
1890. Warren, (Miss) Amy, Moyview, Ballina, Co. Mayo, Ireland.
1885. Waters, A. H., B.A., Willoughby House, Mill Road, Cambridge.
1886. Watson, Rev. Robert Boog, B.A., F.R.S.E., F.L.S., Free Church
Manse, Cardross, Dumbartonshire.
1887. Webb, F. B., 64, Clyde Street, Croydon, Surrey.
1888. Whatmore, Charles A., Much Marcle, Herefordshire.
1886. Whitwell, Wm., 4, Thurleigh Road, Balham, London, S.W.
1889. Williams, John M., 4, Exchange Alley, Liverpool.
1890. Wood, Albert, Wyndley, Sutton Coldfield, Warwickshire.
1886. Wood, James Wm., 2, Windsor Terrace, Bedford.
1886. Woodward, Bernard B., F.G.S., F.R.M.S., 23, Batoum Gardens,
West Kensington Park, London, S.W.
1886. Wotton, F. W., 11, Moira Terrace, Cardiff.
1878. Wright, Bryce M., F.R.G.S., 26, Saville Row, London, W.

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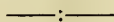
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ON THE NOMENCLATURE OF CERTAIN GENERA
OF BRITISH LAND & FRESHWATER SHELLS.

BY EDGAR A. SMITH, F.Z.S.

BEING HIS VALEDICTORY ADDRESS AS PRESIDENT OF THE CONCHOLOGICAL SOCIETY
FOR THE YEAR 1890.

The selection of a subject for the presidential address was to me a matter of considerable anxiety; however, this being a society, a large proportion of whose members are more or less exclusively students of British Conchology, it occurred to me to offer some remarks in connection with that particular branch of science, in the hope it might afford a greater amount of interest than to refer, as is customary, to the losses of the society during the past year, to give short biographical notices of deceased members, and to discuss the general progress during the year of the branch of science to which the society is devoted. The latter task in these days of 'Zoological Records' and similar publications is rendered less necessary than in former times, and indeed the value of many works and treatises can only be fairly judged and criticised by those who are specialists in the various branches of malacology treated.

The subject selected, upon which I beg to offer the following observations, is the nomenclature of the land and freshwater shells of the United Kingdom.

It seems to me that British Conchologists, as a rule, are apt to be too conservative in this respect. They do not advance with Continental Malacologists; not that I for a moment advocate the extreme views propounded by the absurd '*nouvelle école*' in France.

As an example of the conservatism I refer to, I would instance the genus *Fusus*, which is still retained by English Conchologists to include a number of shells, none of which in reality have affinity with the typical forms of that genus. They were located in it almost solely on conchological grounds, but

now the more intimate knowledge of the animals, and especially the characters derived from a study of the radulæ, has revealed differences which separate them from *Fusus* as at present restricted. This genus is now known to have relationship with the *Fasciolariidæ* rather than with the *Buccinidæ*, to which family it has been shown, belong the several British forms usually placed in *Fusus*.

These alterations appear to be universally accepted on the Continent and in America, but not so here. It is to be hoped that the 'Revision of British Conchology' in course of publication by the Rev. Canon Norman in the 'Annals and Magazine of Natural History' will have a beneficial influence in this respect.

British Conchologists have their Jeffreys in happy remembrance, and seem to forget that time is fleeting, and, that to follow in his sober footsteps, is not to advance with the rational progress of science.

Even Jeffreys himself in his day was rather too conservative in his opinions, but, to some extent, with respect to nomenclature, in advance of his rivals Forbes and Hanley.

One of the greatest troubles which beset Conchologists is to know under what genera to place certain species. This arises from the fact that in our standard works on British mollusca the generic terms are not fully discussed. In many cases the same species are located under different generic names in the works of Forbes and Hanley, Jeffreys, Reeve, Turton, Norman, &c., and it is in the hope of throwing some light upon these discrepancies, that I have put together the following notes.

The first case which I desire to bring before the notice of the members is the employment of the name *Viviparus* instead of *Paludina*; but, in doing so, I do not pretend that, in this and other cases, I have more to point out than has already been shown by other writers. My object is to present to British Conchologists, in an English journal, the reasons why certain usually accepted names ought to be changed if we wish to act

strictly in accordance with the law of priority, which must, I think, be regarded as affording the best means of justly deciding difficult questions in nomenclature.

I am fully aware that there exists a very strong feeling against altering the usual nomenclature as set forth by Jeffreys, but if it can be clearly shown that he was in error, such prejudice I think should be set aside—‘*De mortuis, nil nisi bonum,*’—quite so, but still, I am of opinion that it is time to dissipate the notion of the infallibility of our respected author and friend. His book on British Conchology is a charming work, but still, in respect of nomenclature, it has its blemishes. He himself would eagerly have welcomed criticism, although his answer might have been more or less dogmatic.

VIVIPARUS *vice* PALUDINA.

The British species which we recognise under this genus were placed by Linnæus in his comprehensive group *Helix*. Lamarck seems to have been the first to remove them, and in his work entitled ‘*Philosophie Zoologique,*’ he indicated a group for them and their allies under the name ‘*Vivipare.*’ No description, however, was given, nor were any specific names quoted. Such being the case, the genus cannot be said to be established at that date (1809). In the year following, Montfort¹ adopted Lamarck’s name and rendered it into latin as *Viviparus*. He gave a generic description and quoted *Helix vivipara* of Linn. (the specific name of which he changed to *fluviiorum*) as his type, which he both described and figured.

Lamarck² in 1812 substituted the name ‘*Paludine*’ for ‘*Vivipare,*’ but gave no description at the time, and did not refer to any species. In 1819³ he gave full particulars of his genus *Paludina* and described the known species. However, as the name ‘*Vivipare*’ in the meantime had been latinized and properly characterised by Montfort, Lamarck had no right

¹ Conch. System., vol. ii., p. 247.

² Extrait du Cours de Zoologie, p. 117.

³ Hist. Anim. sans vert., vol. vi., (2), p. 172.

to annul it. Such being the case I think the name *Viviparus* must be adopted, a view taken by Binney, Bourguignat, Dupuy, Clessin, Kreglinger, Locard, Frauenfeld, H. and A. Adams, and others.

Some may not agree with the use of the same term for both specific and generic names, considering *Viviparus viviparus* objectionable. But this double employment of names is admitted by many persons in other branches of zoology:—for instance *Lutra lutra* for the otter; *Merula merula* for the blackbird; *Pica pica* for the magpie; *Bufo bufo* for the toad; *Scomber scomber* for the mackerel; *Thynnus thynnus* for the Tunney, &c.

It may also be urged that generic names derived from adjectives, like *Viviparus*, are not admissible. True, it is not advisable to employ such terms *in future*, but, if it were decided that such names must be cast aside, we should have to part with the old familiar genera *Vitrina*, *Productus*, *Achatina*, *Succinea*, *Ianthina*, and many others.

My own opinion is to let remain names such as these which were proposed before the laws of nomenclature were so well known and respected as at present.

AMPHIPEPLEA.

This is one of those divisions which I think may fairly take generic rank. It is acknowledged of such importance in the Manuals of H. and A. Adams, Tryon, Philippi, and Fischer, and almost without exception by recent Continental writers.

Although the British species which comes in this group, viz., *A. glutinosa* (Müller), appears in the works of Jeffreys, Reeve, Forbes, and Hanley, and the Conchological Society's list under *Limnæa*, still, in each case, the propriety of its separation is more or less hinted at and discussed. The points in which it differs from the true *Limnæa* are (1) the greater development of the mantle, which is capable of reflexion, so as almost entirely to conceal the shell, which is very thin and glossy, (2) certain peculiarities in the nervous system, having

relationship to the greatly developed mantle, (3) the presence of only an upper jaw in the mouth, and (4) slight differences in the radula. This subject has been fully treated of, many years ago, by Troschel in Wiegmann's *Archiv f. Naturgeschichte*, 1839, pp. 177-184, pl. v. f. 8. (radula).

PHYSA.

This genus was founded by Draparnaud in 1801 (*Tab. Moll. terr. et fluv. France*, p. 52) and not by Lamarck as stated by Jeffreys and in the Conchological Society's list.

P. fontinalis (Linn.) is the first species quoted by Draparnaud, and may therefore be regarded as the type of the genus. This in the Conchological Society's list is placed in the section *Bulinus*. This location is erroneous, as it does not possess the essential characters of that group.

Adanson¹ (the author of the genus) distinctly states that the mantle does not extend beyond the border of the aperture of the shell, whereas in *P. fontinalis* the digitate prolongations are very remarkable.

The animal of *Bulinus* has been studied by Jickeli² and he discovered that, both as regards the jaw and radula, it has a much closer affinity with *Planorbis* than with *Physa*.

The second British species (*P. hypnorum*) forms the type of Fleming's³ genus *Aplexa*⁴ distinguished from *Physa* merely on account of the mantle being neither digitate nor expanded. This character alone, however, seems scarcely of generic importance, and therefore I should be inclined to regard *Aplexa* as a section or sub-genus. It agrees with *Bulinus* as regards the mantle, but differs from it in the jaw and radula, which are both as in *Physa*.

It is stated by Fischer⁵ that the etymology of *Bulinus* is unknown; but, it is evident that Oken, who in 1815, emended

1 *Hist. Nat. Sénégal, Coquil*, p. 6.

2 *Verhandl. Leop. Carol. Akad. Naturf.* 1874, vol. xxxvii, p. 209, pl. iii, f. 1-4.

3 *British Animals*, p. 276.

4 Emended by Hermannsen to *Aplecta*, *Indicis Gen. Mal.*, p. 65.

5 *Manuel de Conch.* p. 509.

the name, calling it *Bullinus*, was right in assigning its origin to the latin *Bulla* (a bubble), for Adanson states that he used the name *Bulinus* because "sa coquille flotte comme une petite *bulle* d'air transparente."

PALUDESTRINA *vice* HYDROBIA.

The genus *Hydrobia* was indicated, but not described, by Hartmann in 1821,¹ but as this term was preoccupied by Leach for a genus of Coleoptera (*Hydrobius*), it becomes necessary to employ some other name for this group of molluscs. In his treatise on the *Hydrobiinæ* Stimpson² expresses the opinion that the two names are "sufficiently distinct to avoid confusion" and Jeffreys³ makes some observations to the same effect. Personally I fully agree with this view, but as the laws on nomenclature set forth by the British Association which are almost universally accepted, forbid the employment of the same generic name in more than one branch of zoology, the term *Hydrobia* (merely the feminine form of *Hydrobius*) can no longer be used in conchology. For this reason it was cast aside by Moquin-Tandon⁴.

Paludestrina was founded by D'Orbigny in 1840⁵ as a subgenus of *Paludina*, and he selected *P. acuta* (Drap.) as his type. He subsequently⁶ raised it to generic rank but gave no additional details or reasons for so doing. It is a curious coincidence that the first species quoted by Hartmann, and which therefore may be regarded as the type of his genus *Hydrobia*, should be the same as that chosen by D'Orbigny.

Some of the species described by the latter author may not belong to *Paludestrina*; for instance, *P. peristomata* and *P. lapidum* have a very *Lithoglyphus*-like appearance. This, however, will not affect the employment of this generic term,

1 Sturm's Deutschlands Fauna, vi. (5) pp. 47, 58.

2 Smithsonian Reports, 201, p. 6.

3 Brit. Conch. vol. 1, p. 64.

4 Hist. Nat. Moll. France, vol. ii, p. 515.

5 Voy. Amér. Mérid., Mollusques, p. 381.

6 Sagra's Hist. Cuba, Mollus (1841) vol. ii. p. 7.

as, in his general remarks on *Paludina*, as I have already observed, he quotes *P. acuta* (Drap.)=(*ventrosa* Montagu fide Jeffreys) as the typical species, so that we can for ourselves limit his genus to that and allied species.

Jeffreys states that 'the estuarine or brackish-water species of *Hydrobia* were formed by Professor D'Orbigny into another genus, which he called *Paludestrina*; and these also constitute the genus *Paludinella* of Pfeiffer and Lovén.'

I do not know from what source Jeffreys may have derived his information, but it is not a fact that D'Orbigny included only brackish-water forms in his genus, for of the ten species described in the 'Voyage dans l'Amérique Méridionale,' seven are from fresh and three only from brackish-water.

In the next place I would point out that *Paludinella* of Pfeiffer¹ is totally distinct from *Paludestrina* and belongs to the *Assiminiidae*, having the eyes on the upper surface at the base of the tentacles, and being more or less amphibious.

VITREA *vice* ZONITES.

The species which I propose to place in the genus *Vitrea* of Fitzinger are generally spoken of by British Conchologists as species of *Zonites*. None of them however agree with the typical form of that genus, *Z. algerus*. This species is a large coarsely striated shell and without the beautiful gloss so characteristic of the typical *Vitrea*. But the chief difference which distinguishes *Vitrea* from *Zonites* occurs in the radula, that of the latter genus much more closely resembling that of *Helix* proper, than that of *Vitrea*, or *Hyalinia* as this group is usually called by most Continental and American writers.

It will be seen from the following synonymy that the name *Hyalinia* and its modifications cannot be adopted for these species, as it has been employed in various senses, and has also been used for genera of Lepidoptera (*Hyalina* 1866) and Reptiles (*Hyalinus* 1820).

¹ Wiegmann's Archiv, f. Naturgesch., 1841, p. 227.

Schumacher in 1817 first of all introduced this term (*Hyalina*¹) and the shell he described forms a section of *Marginella* which may be retained.

In 1819 Férussac gave the name *Hyalinæ* to a section of *Aplostomæ*, a group of *Helicella*, which he called a subgenus of *Helix*. The first species quoted by him under this head is *H. olivetorum* of Gmelin. He also included *H. glabra*, *H. cellaria*, &c. He did not intend *Hyalinæ* as a subgeneric term, but merely to be descriptive of certain species which he enumerates. In the same way he used the term '*Fasciate*' for another group of species.

Studer in 1820 created a genus *Hyalina*, but this is synonymous with *Vitrina* of Draparnaud, 1805.

In 1837 Charpentier established the genus *Hyalinia*, as understood at the present day, including therein *H. glabra* of Studer, *H. nitens* Mich. and Fèrus., and *H. nitidula* Drap.

Hyalina or *Hyalinia* is so generally accepted by Continental writers that I feel disinclined to suggest the use of any other name for our British species. However, to be consistent I must do so, and therefore propose that *Vitrea* of Fitzinger should be employed. This genus was published four years before *Hyalinia* and agrees precisely with that genus in its scope.

The only species mentioned by Fitzinger under his genus *Vitrea* is *V. crystallina*, and this therefore must be regarded as the type. Some Continental authors consider this and allied species sufficiently distinct from *cellaria* Müller, and its allies, to form a generic or subgeneric group, and therefore apply the term *Polita* of Held to the latter species. For *H. nitidus* Müller, Lehmann has proposed the subgenus *Zonitoides*, and *H. fulvus* falls in Fitzinger's genus *Conulus*. Conchologists who have an inclination for minute sectional divisions may therefore range our British species thus:—

¹ Whether this section hold good or not, the name having once been used cannot again be employed for any other group.

Vitrea FITZINGER.

Section 1 (typical).	<i>V. crystallina</i> Müller.
	<i>V. draparnaudi</i> Beck.
	<i>V. alliaria</i> Miller.
„ 2 (Polita).	<i>V. glabra</i> Studer.
	<i>V. nitidula</i> Drap.
	<i>V. pura</i> Alder.
	<i>V. radiatula</i> Alder.
„ 3 (Zonitoides).	<i>V. excavata</i> Bean.
	<i>V. nitida</i> Müller.
„ 4 (Conulus).	<i>V. fulva</i> Müller.

ABRIDGED SYNONYMY OF *Vitrea*.

- (1817 Not *Hyalina* Schumacher, Syst. Vers. Test. p. 234 ; belongs to *Marginellidæ*).
- 1819 *Helix* (*Helicella*) *sp. hyalinæ*, part, Férus. Prodröm, p. 44.
- (1820 Not *Hyalina* Studer, Syst. Verzeich. Schweiz. Conch. p. 11 = *Vitrina*, Drap. 1805.)
- 1833 *Vitrea* Fitzinger, Syst. Verzeich. Weichth., p. 99.
- 1833 *Oxychilus*¹ Fitzinger, part, l. c. p. 100.
- 1837 *Hyalinia* Agassiz MSS. Charpentier Nouv. Mem. Soc. Helv. 1, p. 13, as a subgenus of *Helix*.
- 1837 *Polita* Held, Isis 1837, p. 915.
- 1840 *Zonites* (*Hyalinæ*) Gray in Turton's Manual, p. 168.
- 1853 *Zonites* Gray (!) Forbes & Han., Brit. Moll. vol. iv. p. 32.
- 1862 *Zonites* Jeffreys, Brit. Conch. vol. i. p. 158.
- 1863 *Zonites* Reeve, Brit. Land and F. water Moll. p. 45.
- 1890 *Hyalinia* Férussac (!), Norman, Ann. Mag. Nat. Hist. vol. vi. p. 329.

COCHLICOPA, FERUSSACIA, ZUA, AZECA, CIONELLA, CÆCILIOIDES,
AND CÆCILIANELLA.

Much diversity of opinion appears to exist respecting the generic names which should be applied respectively to the

¹ Preoccupied in 1825 by Dejean for a genus of Beetles, *Oxycheila*,

Helix lubrica of Müller and the *Turbo tridens* of Pulteney. The former is placed in *Cochlicopa* (Férus.) by Jeffreys and in the Conchological Society's list; in the works of Forbes and Hanley, Reeve and Turton (ed. Gray) it is assigned to *Zua* of Leach, and finally in Norman's 'Revision of British Mollusca', lately issued, it is located in the genus *Cionella* of Jeffreys.

This difference of location is very unsatisfactory and confusing to British conchologists who may not have the opportunity of investigating the subject themselves. I therefore lay before such students the history of the genera quoted, in order that they may judge of their respective merits.

The whole difficulty has arisen through the partial publication of Leach's Synopsis of the Mollusca of Great Britain, somewhere between the years 1820-1830. Dr. Gray states in the preface to the completed work, published in 1852, that 'this work was in course of printing when the author was prevented from completing it by ill-health, in 1820. The first 116 pages were actually printed and the plates engraved, and more than one copy of the proofs were in circulation at the time of its interruption.'¹ The first quotation of this work appears in Turton's Manual of Land and Freshwater Shells published in 1831. *Zua lubrica* is given among the synonyms of *Bulimus lubricus*, and Leach's *Azeca matoni* (= *tridens*) is acknowledged on p. 68.

The latter genus however had been established three years previously (1828) by Fleming, in his work on British Animals, p. 269.

The next mention of *Zua* appears to be in Gray's edition of Turton, where (p. 187) it is accorded generic rank. This work was published in 1840, and it seems to me that the genus must take that year as the date of its publication, for the mere mention of it among the synonymy by Turton does not in my opinion entitle it to take the date of his work.

¹ The mere distribution of a few copies of proofs certainly does not constitute publication.

If Leach had published his Synopsis in 1820, both his names (*Zua* and *Azeca*) would have taken precedence of those subsequently proposed.

The *Cochlicopa* of Férussac (1821) included all sorts of forms, and constituted his tenth subgenus of *Helix*. He divided it into two groups, *Polyphemæ* (Montfort) and *Styloides*. In the first section he included *H. priamus* (*Halia* of modern authors, a marine shell) and several well-known species of *Glandina*. In his second section (*Styloides*) he placed a very miscellaneous group of species, including forms of *Columna*, *Stenogyra*, &c., and also *H. lubrica*, *H. folliculus*, Gronovius, and *Helix acicula* Müller.

Such being the case, *Cochlicopa*, as originally proposed by Férussac, cannot be admitted. However, in 1826 Risso¹ eliminated three of the above species and founded a genus for each. To *H. lubrica* he applied Férussac's name *Cochlicopa*, for *H. folliculus* he founded *Férussacia*, and for *H. acicula* he proposed the genus *Acicula*,² at the same time altering the specific name to *eburnea*.

Cionella was proposed by Jeffreys³ in 1829 for the reception of *H. lubrica*, *H. acicula*, and *C. elongata* Jeff. (= *Stenogyra octona* Chem. sp.).

These three species are representatives of three different genera as now understood, and the first two of them, as already shown, had previously been located by Risso (1836) in *Cochlicopa* and *Acicula* respectively. It is therefore quite evident that the name *Cionella* cannot be employed for either of these British species.

The question now arises whether we should place *H. lubrica*, *T. tridens* and *H. acicula* in one, two, or three genera. *H. acicula* is so different, both conchologically and in respect of the animal, that its generic separation is imperative. It is quite

¹ Hist. Nat. Europe, Mérid. vol. iv, pp. 79-81.

² Preoccupied by Hartmann in 1821.

³ Trans. Linn. Soc. vol. xvi, p. 347.

distinct from the true African *Achatina*, and was first of all generically separated by Blainville in 1817, who adopted a manuscript name proposed by Férussac. This is printed 'Cecilionides' in the 'Dictionnaire des Sciences Naturalles,' vol. v., Suppl. p. 129. In the seventh volume of the same work (p. 332) this generic term is rendered in French 'Cecilioide.' There can, I think, be little doubt that both these names are typographical errors, and that Férussac intended to refer to this little creature's blindness, of which he was fully cognisant.¹

Hermannsen in 1846 emended the spelling to *Cecilioides*, and Bourguignat in 1856, who objected to this term on account of its being an adjective, proposed as a substitute, *Cecilianella*.

In connection with the term *Viviparus* I have already stated my reasons for retaining such adjective names as these, which have been used in times past, and therefore in this instance also I propose to adhere to the name *Cecilioides*.

With regard to the other two species, namely, *Helix lubrica* and *Turbo tridens*, I am inclined to place them in distinct genera, the former in *Cochlicopa* (Risso ex Férussac) and the latter in *Azeca* (Leach) Fleming.

The difference in the apertures of these two shells is very considerable. In *Azeca tridens* the outer lip is peculiarly sinuated at the upper part, and the thickening of the inner lip is remarkable, in addition to which the armature within forms another distinction.

Risso's genera *Férussacia* and *Cochlicopa* are very closely related, and, by several authors have been united. The foot of the animal of *Férussacia*, however, is said to have a mucous pore, which is wanting in *Cochlicopa*.

ABRIDGED SYNONYMY OF *Cecilioides* FÉRUSSAC.

1817 *Cecilionides* (Férussac MSS.) Blainville, Dict. Sci. Nat. vol. v. Suppl. p. 129.

1817 *Cecilioide* (Férussac) Blainville, l.c. vol. vii. p. 332.

¹ Vide his Essai d'une Méthode Conchyl. p. 77.

- 1829 *Cionella* part, Jeffreys, Trans. Linn. Soc. vol. xvi. p. 347.
 1853 *Achatina* Forbes and Hanley, Brit. Moll. vol. iv. p. 130.
 1856 *Cecilianella* Bourg., Rev. et Mag. Zool, 1856, p. 378.
 1862 *Achatina* Jeffreys, Brit. Conch. vol. i. p. 295.
 1863 *Achatina* Reeve, Land and Freshwater Moll. p. 96.
 1890 *Cecilianella* (Férussac) Norman, Ann. Mag. Nat. Hist.
 vol. vi. p. 337.

Cochlicopa (FÉRUSSAC) RISSO.

- 1821 *Helix* (*Cochlicopa*) part, Férussac, Prodrôm., pp. 28
 and 54.
 1826 *Cochlicopa* Risso, Hist. Nat. Europ. Mérid. vol. iv. p. 79.
 1829 *Cionella* part, Jeffreys, Trans. Linn. Soc. vol. xvi. p. 347.
 1840 *Zua* Turton's Manual, ed. Gray, p. 187.
 1852 — Leach, Synopsis Moll. Gt. Brit. p. 81 (in proofs
 1820, p. 114).
 1853 — Forbes and Hanley, l. c. p. 125.
 1862 *Cochlicopa* part, Jeffreys, Brit. Conch. vol. i. p. 287.
 1863 *Zua* Reeve, l. c. p. 92.
 1890 *Cionella* Norman, l. c. p. 337.

Azeca (LEACH) FLEMING.

- 1828 *Azeca* (Leach MS.) Fleming, Brit. Anim., p. 269.
 1831 — Turton, Man. Land and Freshwater Shells, p. 68.
 1840 — Turton's Man., ed. Gray, pp. 68, 110, 189.
 1853 — Forbes and Hanley, l. c. p. 127.
 1862 *Cochlicopa* part, Jeffreys, Brit. Conch. vol. i. p. 287.
 1863 — *Azeca* Reeve, l. c. p. 94.
 1890 *Cionella* (*Azeca*) Norman, l. c. p. 337.

ACICULA *vice* ACME.

The little *Bulimus lineatus* of Draparnaud is placed in Hartmann's genus *Acme* by Forbes and Hanley, Jeffreys, Reeve, and most other English authors and also in the Conchological Society's list.

In 1841 in Wiegmann's *Archiv für Naturgeschichte* (p. 225) Dr. Pfeiffer has shown that the name *Acicula* should be used in preference to that of *Acme*.

The genus *Acicula* was proposed in 1821 by Hartmann¹ for the *Bul. lineatus* of Draparnaud. Later in the same year he changed the name to *Acme*², and again in 1840³ he placed this species in the genus *Pupula* of Agassiz.

Hartmann assigned no reason for these changes, and therefore if the law of priority is to be respected we must retain the name originally proposed, and this has been adopted by Kobelt, H. and A. Adams, Fischer, Woodward, Chenu, and others.

P.S.—Since writing the above I have been informed by Mr. R. B. Newton that the name *Cyclostoma* is not retainable, and that *Pomatias* should be substituted for it. He proposes to publish a Note upon the subject in the April number of the *Annals and Magazine of Natural History*.

¹ Steinmüller's *Neue Alpina*, i. 205. 215.

² Sturm's *Deutschland's Fauna*, Abt. vi. Heft. 5, pp. 37, 49, pl. 1, f. 4; Heft 6, p. 2, figs. a, b, c, d.

³ *Erd- und Susswassergaster*. Heft. i. p. 5.

***Helix hortensis* m. *sinistrorsum* and m. *scalariforme* in S. Devon.**—In June, 1890, a very characteristic specimen of the m. *scalariforme*, $\frac{1}{16}$ ths of an inch high and $\frac{9}{16}$ ths of an inch broad, was found about three feet up a white-thorn hedge, at Topsham, South Devon. Subsequently, a specimen of the m. *sinistrorsum* was found in the same spot. Both were the yellow bandless form referable to v. *lutea*.—E. COLLIER, Manchester.

***Helix hortensis* v. *lutea* 12045 at Dovedale.**—In looking over some specimens of *Helix hortensis* v. *lutea*, taken at Dovedale in the autumn of last year, I found one with band formation, 12045. I thought, as this is an unusual band formula, it might be worth while to mention its capture.—H. MILNES, Winster, near Derby, *March 10th, 1891*.

THE MARINE SHELLS OF SCILLY.

BY CLIFFORD BURKILL AND J. T. MARSHALL.

(Read before the Conchological Society, Dec. 10th, 1890).

MR. Clifford Burkill spent several months at Scilly during last summer, and added considerably to the species previously recorded from those islands.

In the 'Journal of Conchology' for January, 1885, will be found a long and valuable list, by Messrs. Smart and Cooke, of 'The Marine Shells of Scilly.' To this we added a supplementary list, in January, 1889, of forty-seven additional species and varieties. To this we now add thirty-six more, which will bring up the Scillonian marine record to very respectable proportions, especially considering the rare and interesting character of many of the captures.

Most of the dredgings were from St. Mary's Sound, the usual 'roll' from the Atlantic preventing any good dredging from that side of the islands in a small boat, added to which there was the usual difficulty with the boatmen, which appears to reach an acute stage in those islands.

Perhaps the most interesting 'find' of this series is *Rissoa jeffreysi* Waller. It has not occurred on the British coasts since it was found many years ago by Dr. Jeffreys in Shetland—'in sandy ground off Unst, the most northern of the British Isles, at eight to thirty miles from land, in 70-85 fathoms.' It appears to be everywhere rare. Very few specimens were obtained in Scilly, and all are dead, but perfectly fresh. They are much larger and coarser than examples I have from Vadsö,

Upper Norway, or from the Atlantic coast of Ireland, with the exception of one specimen about one-third the size of the rest, showing the same tendency to dwarf inherent in many other species of Rissoa. Besides being larger and coarser, the longitudinal ribs predominate over the spirals, instead of *vice versa*. It is a curious circumstance that several other species from Scilly are unusually coarsely sculptured, viz:—*R. reticulata*, *R. punctura*, *Trophon muricatus*, etc., the latter so much so as to be taken at first sight for *T. barvicensis*.

Three new varieties are added:—*Odostomia spiralis* var. *coarctata*, *O. pusilla* var. *minuscula*, and *Cerithiopsis concatenata* (*pulchella*) var. *lactea*.

The following are the additions:—

Lima subauriculata Mont.—St. Mary's Sound, live. Messrs. Smart and Cooke have already recorded 'one or two valves.'

Lepton nitidum Turt.—St. Mary's Sound.

L. nitidum var. **convexum** Ald.—St. Mary's Sound.

Lucina spinifera Mont.—St. Mary's Sound.

Cardium minimum Phil.—Muncoy Neck, two small valves.

Not previously found on the English coasts with the exception of a single valve dredged by Mr. Marshall off Guernsey some years ago.

Thracia papyracea var. **villosiuscula** Macg.—St. Mary's Sound.

Xylophaga dorsalis Turt.—St. Mary's Sound.

Chiton hanleyi Bean.—St. Mary's Sound. A perfect example and several plates.

C. cancellatus Sow.—St. Mary's Sound.

C. lævis Mont.—St. Mary's Sound. Several plates dredged, and a perfect specimen from low water found by Mr. Ruthven Sykes.

Rissoa jeffreysi Waller.—East of St. Mary's, Menavawr,

and Muncoy, 30-40 fathoms. Several examples were obtained in the dredgings of 1888.

- R. punctura** var. **diversa** Jeff.—Menavawr and St. Mary's Sound.
- R. parva** var. **exilis** Jeff.—St. Mary's Sound.
- R. fulgida** Adams.—St. Mary's Sound, dredged dead.
- R. cingillus** var. **rupestris** Forb.—St. Mary's Sound, shore.
- Jeffreysia opalina** Jeff.—St. Mary's Sound, dredged dead.
- Homalogyra rota** F. & H.—St. Mary's Sound.
- H. atomus** Phil.—St. Mary's Sound.
- Aclis gulsonæ** var. **tenuicula** Jeff.—Menavawr.
- Odostomia warreni** Thomp.—Menavawr and St. Mary's Sound.
- O. turrita** var. **nana** Jeff.—Menavawr and St. Mary's Sound.
- O. insculpta** var. **lævissima** Sars.—St. Mary's Sound.
- O. spiralis** var. **coarctata** Marsh., n.v. — Shell nearly cylindrical, in consequence of having a narrower base, and the last whorl not projecting beyond the penultimate one, with a deeper suture. It is analogous to *O. interstincta* var. *suturalis*. Occurs occasionally with the type, but is rare.
- O. pusilla** var. **minuscule** Marsh., n.v.—Shell a miniature of the type, and corresponding to the dwarf form of *O. lactea*. I have this variety from Jersey, Torbay, Southport, Barmouth and Aberdovey in Wales, and from Skegness. Mr. Stanley Cox has also dredged it off Teignmouth, and Mr. Sturges Dodd at Connemara. It has probably been hitherto overlooked.
- O. acicula** var. **turris** Jeff.—Muncoy, Menavawr, and St. Mary's. Found with the type. This form appears to take the place of *O. ventricosa*, which does not seem to occur at Scilly.
- O. nitidissima** Mont.—St. Mary's Sound.

Eulima latipes Wats., n.s.—Menavawr and St. Mary's Sound.

A detailed account of this species was given in the last number of the Journal.

E. intermedia var. **rubro-tincta** Jeff.—St. Mary's Sound.

Cerithiopsis concatenata var. **lactea** Marsh., n.v.—Shell milk white. Found east of St. Mary's.

C. barleei Jeff.—St. Mary's Sound.

Lachesis minima var. **pallescens** Jeff.—St. Mary's Sound.

Defrancia leufroyi Mich.—St. Mary's Sound.

D. purpurea var. **oblonga** Jeff.—St. Mary's Sound.

D. reticulata Ren.—St. Mary's Sound.

Philine catena Mont.—St. Mary's Sound and Menavawr.

P. punctata var. **cingulata** Marsh.—St. Mary's Sound.

SEVENOAKS, TORQUAY.



VERTIGO MOULINSIANA DUPUY IN DORSETSHIRE.

BY ROBERT STANDEN.

(Read before the Conchological Society, Dec. 10th, 1890).

At the meeting of the Manchester Branch of the Conchological Society, on December 11th, 1890, I had the pleasure of exhibiting a splendid series of this rare Vertigo, received from my esteemed correspondent, Mr. Chas. O. P. Cambridge. In an interesting communication, accompanying the shells, Mr. Cambridge informs me that he first took the species at Morden during the summer of 1889, but only got a few, and in January, 1890, sent specimens to Leeds for identification, as he did not know what it was. During the summer of the present year, however, he again found a better place for it, not far away from the last, and has, altogether, collected about 200 specimens. They were all found on the stems of bulrushes and

large water-sedges above a marshy piece of ground near a large stream. What becomes of the shells during winter is rather a mystery, for all the plants die off, and the whole place is generally about two feet under water. The shells sit very much exposed on all parts of the plants and do not appear to move about very much. As regards their existence during the winter, under the conditions described by Mr. Cambridge, I think it highly probable that they creep into the stems of the bulrushes, &c., for shelter, and hibernate there. Mr. Cambridge informs me that he has made no record of his important discovery, and requests me to do so; a task which affords me great pleasure, knowing that it will be of deep interest to many brother conchologists.

December 18th, 1890.

NOTES ON THE FOOD OF SOME OF
THE BRITISH MOLLUSKS.

BY W. A. GAIN, TUXFORD, NEWARK, NOTTS.

(Read before the Conchological Society, Oct. 8th, 1890).

THE following tables show the results of several years of observation. The colonies of each species varied in number, but were generally composed of from half a dozen to a dozen individuals; in the case of *Limax levis* the number often fell below this, and *Helix cantiana* and *H. virgata*, being shy feeders in confinement, necessitated a much larger number, fifty and occasionally more being often fed together.

Each colony occupied a flower-pot, partly filled with earth, which was moistened from time to time, the pot being covered with perforated zinc kept in place by a weight,

Frequently several kinds of food were supplied at the same time, removed one after another as they were attacked by the inhabitants, and fresh supplies of the uneaten put in place of the stale or withered. When any kind of food was eaten with such avidity as showed it to be a special favourite, the number 4 is used (this only rarely occurs); 3 shows that the food was taken freely; 2, less freely; 1, just touched, generally after two or three days starvation; and 0 is only used when the food, kept fresh by frequent renewal (no other being supplied) has been untouched for at least three days.

I kept two colonies of *Arion hortensis*—one of the type, and another of the var. *subfusca*. It will be noticed that there is a marked difference in their likes and dislikes. The variety being less common than the type, this colony was naturally smaller than the other, and perhaps individualism may account for some of the variations. This is a subject which I hope to investigate more fully. I have observed that the fact of a species having been found on a certain plant is no proof that this species will feed on the plant—at least in confinement. I expected to discover the reason of the habit recorded of *L. arborum*—that of ascending trees. The fact is that it did not eat the foliage of any of our ordinary forest trees, nor any fungus or other growth found on trees; the various insects found on trees, or at least several of them, were also tried without result.

The Zonites with which I have experimented frequently remained for several days without eating, although supplied with their favourite foods; on this account I make no mention of negative results, simply giving a list of foliage, &c., which I have found them eat in captivity. *Helix sericea*, *H. caperata*, and *Bulimus obscurus*, I had for a short time only, and in small numbers, so the negative results are not given. The plants experimented with are in all cases of the same species as those mentioned in the table, and the figures, when given, are used for the same purpose.

Helix sericea.—Foliage of potato, 3; cornbine, 1; dandelion, 3; groundsel, 3; speedwell, 1; white dead nettle, 1; creeping loosestrife, 1; persicaria, 2; caper spurge, 1; elm, 3; cabbage, 3; lettuce, 3; white turnip, 2; scarlet runner, 3; beet, 1; *Boletus edulis*, 1; withered red clover, 3; cooked potato, 2; grass; moss.

Helix caperata.—Pea; red clover; nettle.

Bulimus obscurus.—Cooked potato, 2.

Zonites cellarius.—Lettuce leaves, 3; the fruit of the raspberry, 4.

Z. nitidulus.—Lesser celandine, 1; cornbine, 2; bryony, 1; thistle when half decayed, 3; foliage of the onion, 3; houseleek, 2; raspberry fruit, 4; potato root, carrot root, 3; leaves and roots of the two species of turnip, 2; *Agaricus procerus*, 2; and the two species of *Russula*, 3.

Z. alliarius.—Rejected most of the foods offered, but ate freely of lettuce leaves and cooked potato.

Z. nitidus.—Appears to feed principally on moist dead leaves; my colony ate those of the oak, chestnut, and lime, besides the fresh leaves of lettuce, cabbage, scarlet runners, and onions, roots of carrot and turnip, and cooked potato.

Cyclostoma elegans is another feeder on dead leaves, oak, lime, ash, and elm, preferring those which have lain a year on the ground, but refusing them when dropping to pieces through decay. I kept a few individuals in a glass jar for twelve months with no other food, renewing the leaves from time to time; they also ate mushrooms, turnip root, ripe raspberries, and the foliage of the radish and meadow-sweet. This species appears to have periods of feeding, remaining at other times with the mouth of the shells firmly closed by the operculum; those active periods frequently occur in the depth of winter.

Succinea putris ate freely of lettuce leaves, the score or so of other foods being left untouched except the leaves of the great willow-herb.

In the following List of Plants, the foliage is the part used, unless stated otherwise.		<i>Arion ater</i>	<i>Arion subfuscus</i>	<i>Arion hortensis</i>	<i>Arion hortensis</i> var. <i>subfuscus</i>	<i>Arion bourguignati</i>	<i>Amalia gagates</i>
1	Buttercup <i>Ranunculus repens</i> ...	3	0	0	0	0	1
2	Corn Crowfoot <i>Ranunculus arvensis</i> ...	3	0	2	0	0	3
3	Lesser Celandine <i>Ranunculus ficaria</i> ...	2	0	1	2	1	1
4	Barberry <i>Berberis vulgaris</i> ...	3	0	0	1	2	3
5	Red Poppy <i>Papaver rhoeas</i> ...	3	3	0	0	1	2
6	Wallflower <i>Cheiranthus cheiri</i> ...	3	2	0	2	2	3
7	Charlock <i>Sinapis arvensis</i> ...	3	3	2	2	2	3
8	Violet <i>Viola odorata</i> ...	3	4	2	2	2	3
9	Red Robin <i>Lychnis diurna</i> ...	2	3	1	0	0	2
10	Chickweed <i>Stellaria media</i> ...	2	3	1	0	0	0
11	Stitchwort <i>Stellaria holostea</i> ...	3	2	2	2	1	3
12	Mallow <i>Malva sylvestris</i> ...	3	3	1	0	1	2
13	Lime <i>Tilia europaea</i> ...	2	0	2	1	1	3
14	Perforated St. John's Wort <i>Hypericum perforatum</i> ...	1	3	0	0	1	1
15	Maple <i>Acer campestre</i> ...	0	0	0	0	1	1
16	Sycamore <i>Acer pseudo-platanus</i> ...	0	0	1	0	0	2
17	Herb Robert <i>Geranium robertianum</i> ...	2	0	0	0	0	2
18	Blue Crane's Bill <i>Geranium pratense</i> ...	0	2	0	0	0	0
19	Buckthorn <i>Rhamnus catharticus</i> ...	1	0	0	0	0	1
20	Furze <i>Ulex europaeus</i> ...	0	2	0	0	0	1
21	Woad <i>Genista tinctoria</i> ...	1	0	0	0	0	3
22	Broom <i>Sarothamnus scoparius</i> ...	2	1	0	2	2	2
23	Kest Harrow <i>Ononis arvensis</i> ...	3	2	0	0	0	3
24	Red Clover <i>Trifolium pratense</i> ...	2	2	0	0	0	2
25	White Clover <i>Trifolium repens</i> ...	3	2	2	0	0	3
26	Bird's-Foot Trefoil <i>Lotus major</i> ...	0	0	0	0	0	2
27	Shoes-and-Stockings <i>Lotus corniculatus</i> ...	2	1	1	0	0	1
28	Vetch <i>Vicia sativa</i> ...	2	2	2	2	1	3
29	Sloe <i>Prunus communis</i> ...	0	0	0	0	0	0
30	Meadowsweet <i>Spiraea ulmaria</i> ...	0	0	0	0	0	3
31	Avens <i>Geum urbanum</i> ...	0	2	0	0	0	2
32	Silverweed <i>Potentilla anserina</i> ...	0	0	0	0	0	1
33	Creeping Cinquefoil <i>Potentilla reptans</i> ...	0	1	0	0	0	1
34	Blackberry <i>Rubus fruticosus</i> ...	0	0	0	0	0	1
35	Agrimony <i>Agrimonia eupatoria</i> ...	0	1	0	0	1	0
36	Rose <i>Rosa canina</i> ...	0	0	0	0	0	0
37	Mountain Ash <i>Pyrus aucuparia</i> ...	2	0	0	0	0	2
38	Hawthorn <i>Crataegus oxyacantha</i> ...	2	0	0	0	0	3
39	Great Willow Herb <i>Epilobium hirsutum</i> ...	2	0	0	0	0	0
40	Marsh Willow Herb <i>Epilobium palustre</i> ...	0	0	0	0	0	2
41	Bryony <i>Bryonia dioica</i> ...	3	3	2	2	3	3
42	Houseleek <i>Sempervivum tectorum</i> ...	2	1	0	2	0	2
43	Houseleek <i>Sempervivum tectorum</i> root ...	...	...	...	...	...	...
44	Stoncrop <i>Sedum acre</i> ...	2	0	0	0	2	2
45	London Pride <i>Saxifraga umbrosa</i> ...	0	0	0	0	0	0

	<i>Anatica marginata</i>	<i>Limax flavus</i>	<i>Limax agrestis</i>	<i>Limax lœvis</i>	<i>Limax arborum</i>	<i>Limax maximus</i>	<i>Helix aspersa</i>	<i>Helix nemoralis</i>	<i>Helix hortensis</i>	<i>Helix arbusorum</i>	<i>Helix cantiana</i>	<i>Helix virgata</i>	<i>Helix rotundata</i>	<i>Helix hispida</i>
1	0	0	2		0	0	1	0	0	2	0	0	0	0
2	3	0	0		0	0	0	3	3	3	0	0	0	0
3	1	0	2		0	0	0	0	0	1	0	0	0	0
4	3	0	0		0	1	2	2	0	3	0	0	0	2
5	2	0	2	3	0	0	0	0	0	3	0	1	0	0
6	3	0	0		0	0	2	0	0	2	0	3	0	0
7	3	0	3	0	0	0	3	2	2	3	0	0	0	2
8	0	0	2	1	0	0	2	2	0	3	0	1	0	0
9	2	0	2	3	0	0	2	0	0	2	0	2	1	0
10	0	0	0	2	0	0	0	0	0	1	0	1	0	0
11	0	0	2	2	0	0	1	0	0	2	0	1	0	0
12	3	0	0	0	0	0	0	1	1	3	3	4	0	0
13	3	0	1		0	0	3	2	0	2		0	0	1
14	2	0	0	0	0	0	1	0	0	1	0	0	0	0
15	0	0	0		0	0	0	0	0	0	0	0	0	0
16	2	0	0		0	0	2	0	0	2	1	0	0	0
17	1	0	2		0	0	0	0	0	2	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	1	0	0	0	0	0	1	1	1	1	0	0	0	0
20	0	0	0	0	0	0	2	1	0	1	1	0	0	0
21	0	0	1		0	0	1	2	0	1	0	0	0	1
22	2	0	2		0	1	3	1	1	3	3	1	0	0
23	3	0	0	2	0	0	0	1	0	0	2	0	0	0
24	2	0	3	0	0	0	2	0	1	3	0	0	0	3
25	2	0	3	0	0	0	2	0	0	3	0	0	0	3
26	2	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	2	0	2		0	1	3	0	0	2	0	0	2	0
29	1	0	0		0	0	0	0	0	0	0	0	0	0
30	2	0	0		0	0	0	0	0	3	2	0	0	0
31	3	0	0	0	0	0	1	0	0	2	0	0	0	0
32	0	0	0		0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	2	0	0	0	0
34	0	0	0		0	0	0	0	0	0	0	0	0	0
35	0	0	0	2	0	0	2	0	0	1	0	0	0	0
36	0	0	0		0	0	0	0	0	0	0	0	0	0
37	3	0	0		0	0	2	1	0	3	0	0	0	3
38	3	0	2		0	0	0	0	0	0	0	0	0	1
39	0	0	2	0	0	0	0	0	0	0	0	0	0	0
40	2	0	0	0	0	0	0	0	0	3	3	2	0	0
41	3	3	3	2	0	0	3	0	2	0	0	0	0	3
42	2	0	2		0	0	2	0	0	3	0	0	0	3
43			3							3				
44	0	0	0		0	0	0	0	0	2	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0

In the following List of Plants the foliage is the part used, unless stated otherwise.		<i>Arion ater</i>	<i>Arion subfusca</i>	<i>Arion hortensis</i>	<i>Arion hortensis</i> var. <i>subfusca</i>	<i>Arion bourguignati</i>	<i>Amalia gagates</i>
46	Scotch Lovage <i>Ligusticum scoticum</i> ...	3		0	0	0	2
47	Billar, Cow-Parasit <i>Heracleum sphondylium</i> ...	3	1	0	0	2	3
48	Hemlock <i>Conium maculatum</i> ...	3	3	3	2	3	3
49	Shepherd's Needle <i>Scandix pecten</i> ...	3		2	2	0	3
50	Ivy <i>Hedera helix</i> ...	3	0	0	0	2	2
51	Elder <i>Sambucus nigra</i> ...	4	3	2	3	3	3
52	Honeysuckle <i>Lonicera periclymenum</i> ...	3	3	2	2	3	3
53	Crosswort <i>Galium cruciatum</i> ...	3	1	2	0	1	2
54	Cleavers <i>Galium aparine</i> ...	2	0	0	0	0	2
55	Teazle <i>Dipsacus sylvestris</i> ...	3	2	2	0	0	1
56	Scabious <i>Scabiosa columbaria</i> ...	1	0	1	0	0	1
57	Sowthistle <i>Sonchus oleraceus</i> ...	3	3	2	0	1	3
58	Dandelion <i>Leontodon taraxacum</i> ...	3	0	0	0	0	3
59	Thistle <i>Cnicus lanceolatus</i> ...	3	0	2	0	0	1
60	Thistle <i>Cnicus arvensis</i> ...	1	3	1	3	2	1
61	Knapweed <i>Centaurea nigra</i> ...	2	0	1	0	1	3
62	Tansy <i>Tanacetum vulgare</i> ...	0	2	0	0	0	0
63	Butterbur <i>Petasites vulgaris</i> ...	2	0	0	0	0	3
64	Coltsfoot <i>Tussilago farfara</i> ...	3	0	0	0	0	3
65	Groundsel <i>Senecio vulgaris</i> ...	3	1	2	3	3	1
66	Ragwort <i>Senecio jacobea</i> ...	3	3	1	0	1	1
67	Fleabane <i>Pulicaria dysenterica</i> ...	1	1	0	0	0	2
68	Oxeye <i>Chrysanthemum leucanthemum</i> ...	3	3	0	1	0	3
69	Corn Marigold <i>Chrysanthemum segetum</i> ...	3		1	0	2	2
70	Wild Chamomile <i>Matricaria chamomilla</i> ...	0		1	0	0	3
71	Milfoil (Yarrow) <i>Achillea ptarmica</i> ...	2		0	0	0	3
72	Bellflower <i>Campanula latifolia</i> ...	3	0	2	3	3	3
73	Hairbell <i>Campanula rotundifolia</i> ...	3	2	2	0	2	3
74	Heather <i>Calluna vulgaris</i> ...	0	0	0	0	0	1
75	Holly <i>Ilex aquifolium</i> ...	1	1	0	0	0	2
76	Privet <i>Ligustrum vulgare</i> ...	0	0	0	0	0	0
77	Ash <i>Fraxinus excelsior</i> ...	2		2	2	2	3
78	Periwinkle <i>Vinca major</i> ...	3	3	0	1	2	1
79	Convolvulus <i>Calystegia sepium</i> ...	3	2	2	2	3	3
80	Forget-me-not <i>Myosotis arvensis</i> ...	0	0	0	0	0	2
81	Nightshade <i>Solanum dulcamara</i> ...	3	3	2	0	1	3
82	Brooklime <i>Veronica beccabunga</i> ...	1		0	3	1	2
83	Bird's Eye <i>Veronica agrestis</i> ...	1	0	0	0	0	1
84	Foxglove <i>Digitalis purpurea</i> ...	3	3	1	1	1	3
85	Toadflax <i>Linaria cymbalaria</i> ...	0	0	0	0	0	0
86	Bugle <i>Ajuga reptans</i> ...	3		0	0	0	2
87	Dead Nettle <i>Lamium album</i> ...	3	1	1	2	0	2
88	Woundwort <i>Stachys sylvatica</i> ...	3	1A	0	0	0	3
89	Self-heal <i>Prunella vulgaris</i> ...	3	1	0	2	1	2
90	Primrose <i>Primula vulgaris</i> ...	1	0	0	0	0	1
91	Creeping Loosestrife <i>Lys. nummularia</i> ...	0	0	0	1	0	1

A.—The flower only.

	<i>Amalia marginata</i>	<i>Limax flavus</i>	<i>Limax agrestis</i>	<i>Limax levis</i>	<i>Limax arborum</i>	<i>Limax maximus</i>	<i>Helix aspersa</i>	<i>Helix nemoralis</i>	<i>Helix hortensis</i>	<i>Helix arbustorum</i>	<i>Helix cantiana</i>	<i>Helix virgata</i>	<i>Helix rotundata</i>	<i>Helix hispida</i>
46	3	0	0		0	0	0	0	0	0		0	0	0
47	3	0	3	2	0	0	2	2	3	3		0	0	3
48	3	0	0	0	0	0	3	0	1	3		0	0	0
49	3	0	1		0	0	3	3	3	3		0	0	0
50	2	0	0		0	0	0	0	0	1	0	0	0	0
51	3	0	4		0	0	1	1	0	3	1	1	0	0
52	2	0	3		0	0	2	0	0	3	3	1	0	0
53	2	0	2	3	0	0	3	0	0	2	1		0	0
54	2	0	2		0	0	1	2	0	0			0	0
55	0	0	2		0	0	0	0	0	0	1	0	0	0
56	1	0	1		0	0	1	0	0	1	0	0	0	0
57	3	0	3	3	0	0	3	0	0	3	3	1	0	0
58	0	0	2		0	0	0	0	0	3	2	3	0	0
59	2	0	0		0	0	3	1	3	3	0	3	0	0
60	3	0	0	0	0	0	3	0	0	2			0	0
61	3	0	2		0	0	3	1	1	3	2	0	0	0
62	2	0	0	0	0	0	0	1	1	3	0	0	0	0
63	3	0	2	0	0	0	2	1	1	3	3	3	0	0
64	3	0	2		0	0	3	2	2	3	0	2	0	1
65	0	0	1		0	0	2	1	0	2	2	2	0	3
66	1	1	1	2	0	1	0	0	0	1	1	1	1	2
67	2	0	2	3	0	0	2	0	0	0	2	0	0	0
68	3	0	0	0		0	2	0	0	3			0	0
69	1	0	0		0	0	3	0	1	2			0	1
70	3	0	1	2	0	0	0	0	1	1	0	0	0	0
71	2	0	0		0	0	0	2	0	3			0	0
72	3	2	3		0	0	3	2	2	3	0	0	0	3
73	3	0	2		0	0	3	3	3	3	0	0	1	3
74	0	0	0		0	0	0	0	0	0	0	0	0	1
75	0	3	0		0	0	0	0	0	0	0	0	1	0
76	0	0	1		0	0	0	0	0	0	0	0	0	0
77	2	0	2		0	0	1	0	0	2		1	0	0
78	1	0	1	0	0	0	0	0	0	3	0	0	0	0
79	2	0	1		0	0	1	2	0	1	2	2	2	2
80	2	0	0	0	0	0	0	0	0	0		0	0	0
81	3	0	2		0	0	2	0	0	2	3	3	0	0
82	0	0	2		0	0	1	0	0	0			0	0
83	1	0	0	0	0	0	0	0	0	0	0	0	0	0
84	3	0	1	3	0	0	0	0	0	1			0	1
85	1	0	2	0	0	0	0	0	0	1	0	0	0	0
86	3	0	2		0	0	2	0	0	2			0	3
87	2	0	2	0	0	0	2	0	0	1	0	2	1	1
88	3	0	2	2	0	0	0	0	1	1			0	0
89	2	0	3	2	0	0	1	0	0	2			0	0
90	1	0	0	1	0	0	0	0	0	0	0	0	0	0
91	2	0	2		0	0	0	0	0	1c	0	2	0	0

c.—Eaten by this species in 1887, but refused by another colony the following year.

In the following List of Plants the foliage is the part used, unless stated otherwise.		<i>Arion ater</i>	<i>Arion subfuscus</i>	<i>Arion hortensis</i>	<i>Arion hortensis</i> var. <i>subfuscus</i>	<i>Arion</i> <i>bourguignati</i>	<i>Amalia sagalis</i>
92	Plantain <i>Plantago major</i>	3	3	0	0	1	2
93	Plantain <i>Plantago lanceolata</i>	3	0	0	0	0	0
94	Knotgrass <i>Polygonum aviculare</i>	2	3	0	0	0	3
95	Persicaria <i>Polygonum amphibium</i>	1	3	1	1	1	2
96	Dock <i>Rumex obtusifolius</i>	1	1	0	0	2	2
97	Sour Dock <i>Rumex acetosa</i>	3	0	3	3	3	3
98	Spurge <i>Euphorbia peplus</i>	3	3	3	2	3	3
99	Caper Spurge <i>Euphorbia lathyris</i>	3	3	2	2	3	3
100	Nettle <i>Urtica dioica</i>	2	0	0	0	2	3
101	Hop <i>Humulus lupulus</i>	2	3	2	0	0	3
102	Elm <i>Ulmus suberosa</i>	3		1	0	2	3
103	Birch <i>Betula alba</i>	0		0	0	0	0
104	Alder <i>Alnus glutinosa</i>	0	2	0	0	1	2
105	Willow, various species	3	3	0	0	0	2
106	Goat Sallow <i>Salix caprea</i>	0		0	0	1	2
107	Beech <i>Fagus sylvatica</i>	0		0	0	0	0
108	Chestnut <i>Castanea vulgaris</i>	0	0	0	0	0	0
109	Oak <i>Quercus pedunculata</i>	0	0	0	0	0	1
110	Hazel <i>Corylus avellana</i>	2		0	0	0	2
111	Spruce <i>Abies communis</i>	0	0	0	0	0	0
112	Yew <i>Taxus baccata</i>	1	1	0	0	0	0
113	Orchis <i>mascula</i>	2		2	1	1	2
114	Orchis <i>maculata</i>	3		2	2	2	3
115	Yellow Iris <i>Iris pseud-acorus</i>	3	3	0	0	0	2
116	Lily of the Valley <i>Convallaria majalis</i>	3	1	2	0	0	2
117	Wild Hyacinth <i>Agaphis nu'ans</i>	3		3	2	2	3
118	Wild Garlic <i>Allium ursinum</i>	3		3	2	2	2
119	Rush <i>Juncus glaucus</i>	0	0	0	0	0	0
120	Cuckoo Flower <i>Arum maculatum</i>	2	3	2	1	1	1
121	Grass, various species	3	2	3	3	2	3
122	Bracken	0	0	0	0	0	1
123	Male Fern	0	1	1	0	0	1
124	Horsetail <i>Equisetum arvense</i>	0	OA	0	0	0	0
125	Liverwort species	0		0	0	0	0
126	Moss <i>Tortula</i> species						
127	Lichen, yellow and grey from stone	0		0	0	0	0
128	Mushroom <i>Agaricus campestris</i>	3	3	3	3	3	3
129	Mushroom <i>Agaricus procerus</i>	3	2	3	3	2	3
130	Mushroom <i>Agaricus melleus</i>	3		3	0	0	3
131	Coprinus species	3		2	2	3	2
132	<i>Russula emetica</i>	3		3	3	2	3
133	<i>Russula heterophylla</i>	3		3	3	2	3
134	<i>Marasmius orcadus</i>	3	2	2	0	3	3
135	<i>Boletus edulis</i>	4	3	2	2	3	3
136	<i>Polyporus squamosus</i>	3	3	0	0	0	2
137	Puff-ball <i>Lycoperdon calatum</i>	2	2	2	2	2	2

A.—Ate the young plant.

	<i>Amalia marginata</i>	<i>Limax flavus</i>	<i>Limax agrestis</i>	<i>Limax levis</i>	<i>Limax arborum</i>	<i>Limax maximus</i>	<i>Helix aspersa</i>	<i>Helix nemoralis</i>	<i>Helix hortensis</i>	<i>Helix arborum</i>	<i>Helix cantiana</i>	<i>Helix virgata</i>	<i>Helix rotundata</i>	<i>Helix hispida</i>
92	0	0	0		0	0	2	0	0	1	0	0	0	0
93	0	0	3		0	0	1	0	0	2	2	0	0	0
94	2	0	0	OB	0	0	0	0	0	0	0	0	0	2
95	2	0	0	0	0	0	1	0	0	2	0	0	0	0
96	2	0	2	2	0	0	0	0	0	3	0	0	1	0
97	3	0	3	0	0	0	3	2	0	3		2	2	1
98	3	2	0		0	1	3	3	0	3	2	2	2	2
99	3	2	0		0	1	1	1	1	0	1	0	0	2
100	0	0	1		0	0	3	0	0	2	0	0	0	0
101	3	0	2	0	0	0	0	0	0	1	2	0	0	0
102	3	0	0		0	0	3	0	0	3		1	0	0
103	0	0	0	0	0	0	2	0	0	2	0	0	0	0
104	2	0	0	0	0	0	2	1	0	2		0	0	0
105	2	0	0		0	0	0	2	2	3	0	0	0	0
106	2	0	0		0	0	2	0	0	3		0	0	0
107	0	0	0		0	0	0	0	0	0		0	0	0
108	0	0	0	0	0	0	0	0	0	0		0	0	0
109	3	0	0		0	0	3	0	1	3	1	0	0	0
110	0	0	0		0	0	0	0	0	3		0	0	0
111	0	0	0	0	0	0	0	0	0	0	0	0	0	0
112	0	0	0	0	0	0	0	0	0	1		0	0	0
113	2	0	2		0	0	2	0	0	1	1		2	0
114	3	0	0	1	0	0	0	0	0	1			0	0
115	2	0	0	0	0	0	0	0	0	0			0	0
116	3	0	3	0	0	0	3	0	0	0			0	0
117	2	0	2		0	0	0	0	0	0			0	0
118	3	0	3		0	0	2	1	2	2			2	0
119	0	0	0	0	0	0	0	0	0	0	0		0	0
120	2	0	2	0	0	0	1	0	0	0	0		1	0
121	3	0	3	1	0	0	2	2	2	1	1	2	1	2
122	0	0	0	0	0	0	0	0	0	0		0	0	0
123	1	0	0	0	0	0	2	0	0	0			0	0
124	0	0	0	0	0	0	0	0	0	0	2	2	0	0
125	0	0	0		0	0	0	0	0	0			0	0
126	0	0			0									
127	0	0	0		0	0	0	0	0	0			0	0
128	3	4	3		0	3	1	0	0	2	3	3	2	0
129	3	2	0		0	0	0	0	2	2	0	1	3	2
130	3	3	0		0	0	0	0	0	0		0	0	3
131	2	0	0		2	0	0	0	0	0		0	0	0
132	3	2	0		0	0	0	0	2	2		0	3	2
133	3	3	0		2	3	3	0	2	2			3	3
134	2	3	1	2	0	3	0	0	0	0		2	2	0
135	4	4	2		0	4	2	3	3	3	3	4	3	0
136	3	3	0	3	0	3	0	0	0	0	0	1	0	0
137	3	2	0		0	2	0	0	0	0		0	0	0

B.—Refused the leaves but ate the stalk.

In the following List of Plants the foliage is the part used, unless stated otherwise.		<i>Arion ater</i>	<i>Arion subfusca</i>	<i>Arion hortensis</i>	<i>Arion hortensis</i> var. <i>subfuscus</i>	<i>Arion</i> <i>botryguignati</i>	<i>Amalia gagates</i>
138	Green growth on Bark <i>Protococcus</i> ...	0		0	0	0	0
139	Wheat	0		0	0	0	1
140	Wheat, seed-leaves	3		3	0	3	3
141	Barley	0		0	0	0	2
142	Barley, seed-leaves	3		2	0	1	3
143	Oats	1		2	0	1	2
144	Oats, seed-leaves	3		2	2	2	3
145	Carnation	1	3	0	0	0	1
146	Horse Chestnut	2	2	0	0	0	0
147	Walnut	3	2	3	2	2	2
148	Apple	1	2	0	0	1	3
149	Apple fruit	1		0		0	1
150	Pear	2		2	0	2	3
151	Plum	2		1	0	2	2
152	Cherry	3		0	0	1	3
153	Apricot	3	3	2	0	3	3
154	Black Currant	2		0	0	0	2
155	Red Currant fruit	1		0	0	0	2
156	Gooseberry	3	1	2	2	2	2
157	Gooseberry fruit	3		2		0	3
158	Strawberry	2	0	1	0	1	2
159	Strawberry fruit	3		1	1	1	3
160	Raspberry fruit	3	2	0	1	2	2
161	Pea	2	3	2	3	2	3
162	Bean	3	3	3	3	3	3
163	Scarlet Runner	3	3	1		2	3
164	Cabbage	3	1	2	3	2	3
165	Cabbage stalk	3		3	3	3	3
166	Lettuce	3	3	3	3	3	3
167	Lettuce stalk	3		3	3	3	3
168	Parsley	3	3	2	0	1	2
169	Parsnip	3	0	1	0	0	3
170	Parsnip root	3	2	2		2	3
171	Carrot	2		0		0	2
172	Carrot root	3		3		3	4
173	Radish	3	3	2	2	3	2
174	Radish root	3	3	2	2	3	3
175	Beet	3	3	2	3	3	3
176	Beet root	3	1	2		3	3
177	Potato	3	3	1	0	2	3
178	Potato root	3		3	2	3	4
179	Potato root, cooked	3	3	2	2	2	3
180	Turnip	3	3	2		3	3
181	Turnip root	3	3	3		3	3
182	Swede	3	3	3	2	3	3
183	Swede root	3	3	2	2	3	3

	<i>Amalia marginata</i>	<i>Limax flavus</i>	<i>Limax agrestis</i>	<i>Limax levis</i>	<i>Limax arborum</i>	<i>Limax maximus</i>	<i>Helix aspersa</i>	<i>Helix nemoralis</i>	<i>Helix hortensis</i>	<i>Helix arbutorum</i>	<i>Helix cantiana</i>	<i>Helix virgata</i>	<i>Helix rotundata</i>	<i>Helix hispida</i>
138	0	0	0		0	0	2	1	1	2			0	0
139	0	0	0		0	0	0	1	1	0			0	0
140	3	0	3		0	0	3	2	2	3			0	3
141	1	0	0	2	0	0	0	0	0	0			0	2
142	2	0	0		0	0	2	0	0	3			0	2
143	1	0	1		0	0	1	0	0	2			0	0
144	3	0	0		0	0	2	0	0	3			0	1
145	0	0	0	0	0	0	0	0	0	0			0	0
146	0	0	0	2	0	0	2	1	0	3			0	0
147	2	0	3	0	0	0	3	2	0	3			2	2
148	2	0	2		0	0	2	0	0	3	3	0	0	0
149	1	0	0		0	1	0	1	0	1			0	0
150	2	0	2		0	0	0	0	0	3			0	0
151	2	0	1		0	0	3	1	0	3	1		0	2
152	1	0	2		0	0	0	0	0	3			0	0
153	3	0	3		0	1	3	2	0	3	0	0	1	3
154	1	0	0		0	0	0	0	0	0	0	0	0	0
155	1	0	0		0	0	2	0	0	2			0	0
156	2	0	2		0	0	2	0	0	3	0	0	0	0
157	3	2	2		0	3	3	3	3	3			2	3
158	2	0	0		0	0	0	0	0	3	0	2	0	0
159	3	3	1		1	3	2	0	0	4			0	3
160	2	1	2		0	2	3	2	2	2		0	1	3
161	2	1	2		0	1	3	3	2	3		3	2	2
162	3	3	3	3	0	1	3	3	3	3	3	3	2	4
163	3	2	3		0	2	3	3	2	3	3	2	0	2
164	3	0	3		0	0	3	3	3	3	2		0	3
165	3	3	3		0	3	3	3	3	3			3	3
166	3	2	3	3	0	2	4	4	4	3	2	2	3	2
167	3	3	3		3 ^A	3	3	3	3	3			3	2
168	3	0	2		0	0	0	0	0	3		0	1	2
169	2	2	3		0	1	3	0	0	3			0	2
170	3	3	3		0	3	0	3	3	2		0	0	2
171	3	0	0		0	0	3	0	0	2			0	0
172	4	4	4		0	4	3	3	3	3			3	4
173	2	0	3	3	0	0	3	2	3	3	3	2	0	2
174	3	0	3	0	0	0	3	1	1	3	0	4	3	2
175	3	0	3	0	0	2	3	2	1	3	0	0	1	2
176	3	0	3		0	0	0	0	0	2	0	0	0	2
177	3	2	3	2	0	0	3	2	2	3	2	2	0	3
178	4	3	3	3	0	3	3	2	2	3	1	2	0	0
179	3	3	2		2	3	3	3	3	3		3	1	3
180	3	2	3		0	1	3	2	2	2	3	2	2	3
181	3	3	3	1	3	3	3	2	2	3	3	3	2	3
182	3	3	3		0	2	3	3	3	3	4	4	2	3
183	2	2	2		2	3	2	0	0	3			2	3

A.—Ate nothing after this for 3 or 4 weeks, and then very sparingly of the same food.

In the following List of Plants the foliage is the part used, unless stated otherwise.		<i>Arion ater</i>	<i>Arion subfuscus</i>	<i>Arion hortensis</i>	<i>Arion hortensis</i> var. <i>subfuscus</i>	<i>Arion</i> <i>botrugnati</i>	<i>Amalia gogates</i>
184	Onion	3	0	3	3	3	3
185	Onion root	3		2	2	0	2
186	Onion root, cooked...	3		0	0	1	3
187	Leek	3	3	3	1	1	3
188	Rhubarb	3		2	0	2	3
189	Rhubarb stalk	3		0	0	0	2
190	Mint	3	0	0	0	0	2
191	Sage	3	0	0	0	3	1
192	Thyme	0		1	0	0	1
193	Orange Peel B	3		2	2	3	2
194	Earth Worms	3		2	2	0	3
195	Raw Mutton	3		3	1	2	3
196	Cooked Mutton	3		3	1	2	3
197	Cannibalism... C	X					

b.—The white portion only eaten, except by *Arion ater*, which ate the whole.

c.—In confinement these slugs eat the slime off each other and with it portions of the skin.

◆◆◆

Helix arbustorum var. *canigonsis* Boubeé.—The shells of this species which I formerly considered to be the var. *repellini* on further examination and study induce me to think would be more correctly referred to var. *canigonsis* Boubeé. The most peculiar feature of this var. is that it is entirely destitute of the beautiful and characteristic marblings which form so striking a feature in the normal form, the shells being uniformly coloured but marked with the usual peripheral band, and thus bearing great resemblance to some of the members of the South European genus *Campylæa*. This variety has been found at Bishopthorpe, near York, by Mr. J. E. Morland; at Bell Busk, Yorkshire, by Mr. Madison; and at Clitheroe, in Lancashire, by Mr. R. Wigglesworth, and received its name from its first-noticed occurrence being at St. Martin du Canigou in the Pyrenees.—J. W. TAYLOR, *April 25th, 1891.*

	<i>Anatlia marginata</i>	<i>Limax flavus</i>	<i>Limax agrestis</i>	<i>Limax levis</i>	<i>Limax arborum</i>	<i>Limax maximus</i>	<i>Helix aspersa</i>	<i>Helix nemoralis</i>	<i>Helix hortensis</i>	<i>Helix arbusorum</i>	<i>Helix cantiana</i>	<i>Helix virgata</i>	<i>Helix rotundata</i>	<i>Helix hispida</i>
184	3	2	3	2	0	3	3	3	3	3		2	3	3
185	2	0	1		0	0	2	2	1	4			0	2
186	3	3	0		3	2	2	3	0	3			0	0
187	3	0	2	3	0	0	3	2	2	3	2	2	3	0
188	3	0	3		0	1	2	1	1	3			0	2
189	2	0	0		0	0	0	0	0	2			0	0
190	2	0	2		0	0	0	0	0	2	0	0	0	0
191	1	0	0		0	0	2	0	0	0	0	0	0	0
192	0	0	0		0	0	0	0	0	0		0	0	0
193	2	1	2		0	0	2	2	2	2			0	2
194	3	0	0		0	0	0	0	0	0			0	0
195	3	0	2			1								
196	3	0	2			1								
197						X								

NOTES ON THE LAND AND FRESHWATER MOLLUSCA OF EAST SUSSEX.

By J. H. A. JENNER, F.E.S.

(Read before the Conchological Society, April 8th, 1891.)

IN 1884 I compiled a List of the Land and Freshwater Shells of East Sussex, which showed the species then known to inhabit the vice-county and formed a basis for future work. Since that time some considerable attention has been devoted to the subject by myself and by my friends, Messrs. T. S. Hillman and C. H. Morris, and some interesting additions—mostly among varieties—have been made. Our work has, however, been chiefly confined to the Ouse drainage district, and some portions of the county still require further investigation. Among the additions are the following:—

Paludina vivipara L. This was inadvertently omitted from my list. It occurs in Pevensey Levels (vide 'Zoologist,' Dec., 1885), but I have never yet seen Sussex specimens.

Limnæa peregra var. **marginata** Mich.—Taken by Mr. C. H. Morris in an isolated pond on the Downs, near Lewes. This curious form perhaps arises from excess of calcareous matter in the water, as at times the pond is thick with chalky mud brought down by the rains.

L. palustris var. **elongata** Moq.—Occurs in the Winterbourne Stream, Lewes.

L. truncatula var. **minor** Moq.—Taken near Lewes by Mr. Morris.

Helix aspersa Müll.—The following additional varieties have now occurred near Lewes, viz:—

Var. **conoidea** Picard.

Var. **globosa** Moq.

Var. **zonata** Moq.

Var. **undulata** Moq.

Var. **flammea** Picard.

A very large proportion of the Lewes specimens approach either *flammea* or *undulata* in colouring and are generally very dark; forms approaching *grisea* being rare. In gardens in the town an especially dark race occurs, in some cases being very nearly *nigrescens* Moq. At Newhaven, where I discovered a small colony of *exalbida*, I found two specimens almost exactly intermediate in colouring between that variety and an *undulata* form which occurred with them.

H. nemoralis var. **hyalozonata** Tayl. has occurred singly at Lewes. A fine form of var. **roseolabiata** Taylor occurs in one locality near Lewes, with band formulæ 12345, 00300, and 00000. When living these shells have a greenish tint from the body of the animal showing through the pale yellow shell. They are certainly not hybrids, but are in my opinion an approach to albinism.

H. cantiana Mont. — Vars. **rubescens** Moq. and **alba**

Colb. may now be added, both occurring in distinct localities near Lewes.

H. carthusiana var. **alba** Jenner. New variety. Shell, pure milk-white; mouth and rib, white.

Mr. T. S. Hillman took a single specimen of this very beautiful variety in 1889 near Lewes, and I met with several specimens in a neighbouring locality in 1890.

H. carthusiana var. **major** Jenner. New variety. Shell much larger than the type, 15 mills. in diameter. Occurs in several spots near Lewes.

H. rufescens var. **rubens** Moq. Occurs not uncommonly near Lewes.

H. virgata DaCosta.—The following varieties have now been found:—

Var. **nigrescens** Grat. Lewes.

Var. **leucozona** Taylor. Wilmington.

Var. **hypozona** Moq. Seaford and Alfriston.

Var. **subalbida** Poiret. Seaford, Newhaven, and several other localities.

Var. **albicans** Grat.—With the last variety. I have noticed that these two varieties usually occur together.

Var. **picta** Jenner. New variety. Shell banded with rich purple brown, the bands broken by white dashes and spots, arranged in a radiate manner, usually with a white band at the periphery.

This very pretty variety occurs not uncommonly near Rye, Sussex—large on the sand-hills, and smaller and more highly coloured in the marshes near.

Of var. **alba** I discovered a very large colony near Newhaven, in 1888, and it appears to occur there every year in more or less abundance. When alive the black body of the animal shows through the translucent markings, so that at a distance the shell resembles the ordinary form, except for its greater whiteness.

H. caperata Mont.—Vars. **subscalaris** Jeff., **bizonalis**

Moq., and *fulva* Moq. have now all been found near Lewes.

H. ericetorum Müll.—Add the following varieties :—

Var. *leucozona* Moq. Downs near Lewes.

Var. *major* Loc. Specimens from Eastbourne, 20 mills. in diameter.

Vars. *bizonalis*, *bicolor*, and *monozona*. Near Lewes and Seaford.

Var. *subpellucida* Jenner. New variety. Shell with brown translucent banding, through which the body of the animal appears black.

Wilmington Hill, Sussex.

Bulimus acutus Mull.—This species is now quite lost to East Sussex, the ground where it occurred at Eastbourne having been built upon. The form which occurred there was white, opaque, and very large, some specimens reaching 18 mills. in length. I have searched the coast of Sussex, from Brighton to Rye, in every likely place, without finding another locality for this shell, and it seems most probable that this now extinct colony was introduced.

Clausilia rolfhii var. *curta* Jenner. New variety. Shell of the same diameter as the type, but much shorter. Length, 11 mills.

Lewes, with the type.

Monst. *decollata* Jenner.—Shell decollated, upper whorls wanting.

Occurs at Lewes with the type.

C. laminata var. *pellucida* Jeff.—Occurs sparingly at Lewes with the type.

Var. *tumidula* Jenner.—New variety. Shell shorter, spire more attenuate, length only 14 mills., with one whorl less than the type.

(Some shells of *C. laminata*, which Mr. Hillman collected at Hartley Maudit, Hants., are 18—19 mills. in length).

This paper is not intended as a complete list of the additions to East Sussex, but merely to enumerate some of the more interesting.

THE MARINE MOLLUSCA OF MADEIRA.

BY THE REV. R. BOOG WATSON, B.A., F.R.S.E., F.L.S., F.G.S.,
President of the Conchological Society of Great Britain and Ireland.

(Read before the Conchological Society, Dec. 20th, 1890).

MADEIRA is a group of small volcanic islands which rise steeply out of deep water some two hundred miles south of Gibraltar and about three hundred miles from the west coast of Africa, from which they are cut off by a deep submarine depression. They include—

1. Madeira proper.—35 miles long and 14 miles broad, rising to over 7,000 feet above the sea.
2. Porto Santo.—30 miles N.E. of Madeira, but with deep water between; 1,600 to 1,700 feet high.
3. The Desertas.—Three uninhabited islands, which are respectively 300, 1,600 and 1,300 feet high. They lie twelve miles off the eastern extremity of Madeira, but connected by a narrow submarine bank 70 fathoms below water. They stretch 15 miles S.E., are nowhere more than a mile wide, and are cut through by two narrow and shallow sea channels.
4. The Selvagens, which belong to this group rather politically than geographically—for they are cut off by very deep water, and are distant 150 miles to the S.S.E. of Madeira, while only 100 miles north of Teneriffe. They are three uninhabited islands, separated some ten miles from one another. The largest is three miles long by three-quarters of a mile broad, and 300 or 400 feet high.

The marine mollusca of this group of islands, so far as I possess them, were, in the main, gathered by myself during a residence which extended from 1864 to 1874.

Much of the dredging work was done by boatmen, who simply emptied the dredge into large boxes of my providing, in which by the time they reached me nearly all animal life was extinct. Some dead shells were bought from fishermen who brought them from Porto Santo, but such specimens I have reckoned as quite untrustworthy for determining a doubtful habitat. A very few were obtained through a friend from the Selvagens, which are visited every year for the purpose of collecting Barrilha (soda obtained by burning the *Membryan-themum crystallinum* L.), Orchil, a dye-lichen (*Rocella tinctoria* L.), and Cagarras (*Procellaria anglorum* Temm.)—sea-birds which when salted are still prized in Madeira as much as they formerly were here.

Besides my own gatherings those of the Rev. R. T. Lowe unexpectedly came into my hands. He seems, for nearly fifty years, to have collected interruptedly from 1826 till his lamented death in April, 1874, when the "Liberia" steamer with all on board disappeared in the Bay of Biscay. Mr. Vernon Wollaston, his executor—now deceased—sent Mr. Lowe's marine shells to me for publication, being himself too busy with his great work on "Atlantic Coleoptera" to undertake other work however congenial. The material thus sent me was in its mass bulky, but had not received very careful study; it consisted, thus, mainly of common shells, had less than half a dozen species not already in my own list, and the more difficult groups were not quite fully defined. Still, throughout, it bore the stamp of the conscientious care, labour, and knowledge of all Mr. Lowe's scientific work. The specimens were often many where mine were few, and good where mine were poor—so that his stock greatly enriched my own; but a good many of my rare species were absent from his collection. The very narrow margins of fresh additions to my list surprised me, for the impression I had carried away from my own dredgings was that I had got but a small part of the marine mollusca of Madeira, and even now I believe that some

future worker will gather here a rich harvest. Still, Mr. Lowe's collection as compared with my own shows that the marine shells of Madeira have now been brought together in a much larger proportion than I had supposed.

The fullest list of the marine shells of Madeira is that published by McAndrew, who dredged, as he says, "for a few days" in Funchal Bay, and gave the result in his reports to the British Association in the year 1850. Imperfect as his list necessarily was it showed that the marine mollusca are like the whole terrestrial fauna and flora of the island in the main Mediterranean. That is perhaps all most people care to know, still it is strange that McAndrew's list has not long ago been supplemented. Last year, however, Senhor Augusto Nobre, of Oporto, published in the Instituto of Coimbra a list of shells collected by Senhor Ernesto Schmitz, Madeira.

More interest might have been expected than has been shown in this field, but several causes have probably conspired to hinder much work here being done. Thus, visitors to Madeira, though many are mainly invalids who are not able for the fatigue and exposure of which a good deal is inevitable in collecting, for—very few spots of the shore are accessible—in most places the sea-edge is a surf-beaten precipice, and even those parts which are accessible present often a mere mass of rolled shingle. Not that even this shingle is destitute of shells, for if a sheltered place be chosen and a pit two or three feet deep below high water mark be cleared out, *Melampus*, *Pedipes*, *Assimineia*, *Rissoa*, *Odostomia*, &c., may often be found. But further the furious surf, which never ceases, destroys loose shells and makes many parts of the shore quite unapproachable. Thus near Funchal, where almost exclusively visitors congregate, there is only one strip of the sea margin of about one hundred yards long which is sheltered, and the only bit of sandy beach on the south side of the island is four hours' distant. It has repeatedly happened that after a sail of some hours I have been unable to effect a landing on the piece of shore for which I was

bound, and when at work one was constantly liable to be caught by a heavier wave than usual, such as actually surprised a friend of my own—rolled him over and over among the rocks and, washing him out to sea, scarce parted with him alive.

While these are the difficulties of the shore, the constant heavy swell of the Atlantic all round the coast makes dredging always disagreeable and arduous, often impossible. Thus my dredge was on one occasion away for many months on the stormy north-coast waiting for weather in which the boatmen could go to work, and in this case the delay proved the more vexatious as the dredgings when sent to me at last proved to be torrent sand, carried from the land far out to sea, but blank. The nature of the bottom, too, always proved very dangerous, and from some unexplained cause the dredge often came up empty.

Then, besides all this, one has to deal with boatmen utterly untrained in dredging work—always, in at least the matter of truth speaking, reckless—often quite impracticable, holding as they did that one who employed them on such work was a madman—impervious alike to money and to good words—and even at the best requiring an amount of time, patience, and command of the language, not at the disposal of every one.

Before giving the list of my own collection, as I hope to do later on, I may offer some remarks on Mr. McAndrew's list and on that of Senhor Nobre.

Mr. McAndrew names for Madeira 127 species—adding unnamed 29 more, or 156 in all. Of these species got at Madeira and of such as he collected at the Canary Islands, Mr. McAndrew presented many specimens to the British Museum, and his own complete collection he left to Cambridge University. Unfortunately Mr. McAndrew did not keep apart his dredgings from different places, but both in the British Museum and at Cambridge there are notes of locality on the labels of different specimens which supply most valuable information. At the British Museum Dr. Günther obligingly gave me full access to the specimens and allowed me to have

the very able help of Mr. Edgar Smith. At Cambridge I was deeply indebted for kindness to the Vice-Chancellor and to Mr. Clark, the Curator of the Anatomical Museum, besides private friends. I regret that the pressure of other duties has for 14 years prevented me turning these very favourable opportunities of study to any general good.

Of Mr. McAndrew's 127 named species, two must have slipped into his list by mistake, viz., *Dentalium dentalis* and *Neritina viridis*. Both of them are marked as 'frequent,' but of neither, I think, has any specimen been since got at Madeira. In neither the British Museum nor the Cambridge collection do any specimens from Madeira exist, though some are marked as having been got at the Canaries.

A third species, also noted as 'frequent,' but which has escaped all other seekers, and does not exist in the B. M. Madeira specimens, is *Marginella guancha*—a species not uncommon in the Canaries as Mr. McAndrews collection at Cambridge testifies, though d'Orbigny, its author (Moll. d. Can., p. 88) believes it to be 'assez rare.' I had no doubt that with the two previous it ought to be excluded from the Madeira list, but to my amazement I came on a solitary specimen of it quite lately in sand which distinctly bears the label 'from Madeira.' It seems to me certain then, that it must be erased from McAndrew's list in any case, and can only be admitted at all as 'doubtful' into the Madeira reckoning.

Mr. McAndrew's named list, then, contains 124 species which with a few exceptions are correctly named. The exceptions are these—

Rissoa purpurea.—This, as has already been pointed out by Manzoni (Journ. de Conch., xvi., 248, 1868), is a mere slip of the memory for *R. violacea* Desmarest.

Chiton fascicularis.—Mr. Gwyn Jeffreys (Brit. Conch., III, 212) in quoting McAndrew's localities for these species remarks 'that some of the southern localities which have been published probably belong to *Chiton discrepans*.' This is certainly the

case for Madeira, where *C. discrepans* Brown is frequent, as McAndrew found his species to be, but where *C. fascicularis* L. is unknown. The Madeiran species in the British Museum, and the specimens from Canary at Cambridge, both marked as *C. fascicularis*, are *discrepans*.

Bulla ampulla.—No Madeiran specimens exist at Cambridge, but in the British Museum there is a card marked '*B. ampulla*, Canary,' to which are attached some young Bullas in bad condition, and one bit of a full-grown shell, which last, though the locality is discordant, is no doubt the identical 'fragment' mentioned at p. 41 of McAndrew's list as got at Madeira. All these specimens are *B. punctata* A. Ad. (Sow., Thes. Conch., II, 557, sp. 53, cxxiii., 77), [the nomenclature of which I reserve for further discussion], a species unquestionably different, but so far similar in colour as to make mere fragments difficult of identification.

Pecten maximus McAndrew marks as 'rare, young.' No specimens of this species from Madeira exist either in the British Museum or at Cambridge; and the solitary specimen from Canary thus marked by McAndrew is *P. jacobæus* L.

Pecten opercularis.—'One minute specimen' is the entry against this for Madeira, and 'one small specimen' for the Canaries; and in his 'Geog. Distrib.,' p. 29 and p. 42, he adds a query to both of these identifications. From Madeira no specimen of this species is to be found either in the British Museum or at Cambridge, but from the Canaries a single very young specimen of McAndrew's exists in the British Museum—it is marked *P. opercularis*, but is *P. gibbus* = *commutatus* Montero.

Deducting these five species, 119 are left; but of these four species, though possible, are very doubtful inhabitants of Madeira, having rewarded no other collector.

Poromya granulata.—The solitary valve of this species which McAndrew mentions in his list exists neither in his own collection at Cambridge nor among his gifts to the British

Museum. I think he must hastily have taken for it a very young and perhaps not very well preserved specimen of *Thracia pubescens*, which in that condition somewhat resembles it.

Pectunculus siculus—It is very remarkable that this species which McAndrew marks 'frequent' should have entirely escaped all but McAndrew. Both in the British Museum and at Cambridge several specimens of this species are marked as from the Canaries, but there are none from Madeira, so that the name has probably crept in by mistake.

Murex cristatus, 'rare.' There are no specimens of this species from Madeira in either of the museums. One of the new species found by Mr. Lowe and also by myself at Madeira so far resembles *M. cristatus* Broc. that Dr. Gwyn Jeffreys, to whom I sent it in 1870, wrote that it might possibly be *M. cristatus* Broc., but that he was not quite satisfied, and better specimens made it obvious that they were distinct. It is this new species, therefore, which most probably misled Mr. McAndrew.

Amphispira hyalina.—'One.' From Madeira, distinctly, there is no specimen of this species in either museum, but in the Cambridge collection there is a card bearing two specimens, and on it Mr. McAndrew has written 'Canaries and Madeira'; but in his own (1854) copy of his report he has (under Madeira, p. 41) opposite to the entry 'one specimen' written 'broken, destroyed.' At the same time on p. 34 of his own copy, where he states that the species is 'rare' at Ortava in the Canaries, he has noted that he got only 'one' specimen. In these circumstances it is impossible to read any further the history of the two specimens in the Cambridge Museum, but until some other specimens be found the species can hardly remain in the Madeira list.

Excluding, then, these four, 115 remain, of which I may refer here to two.

Buccinum minus 'rare.' No specimens from Madeira of this species are in either museum, but in the Cambridge collec-

tion one is marked as coming from Canary. Neither Mr. Lowe nor myself met with it, but Senhor Nobre mentions it in his list, but with no further information of any sort, so that on the whole the species can hardly be reckoned as a well-established Madeiran species.

Finally, *Ianthina pallida* 'frequent.' Of this species none have been met with by any other collector and no Madeiran specimens of it exist at Cambridge, but in the British Museum there are several marked as from Madeira, and of course a chance aggregation of these sea rovers might be hit upon at any time.

Allowing, then, these last two to pass, Mr. McAndrew's Madeiran list will thus stand at, let us say, 115 species. The only other list which has been published is, as I have already mentioned, one by Senhor Nobre, of Oporto, from specimens collected by Senhor Ernesto Schmitz, teacher of Natural History in the Lyceum of Funchal. The total number of species enumerated by him is 93 in all, from which one falls to be deducted, viz., *Litorina canariensis* d'Orb., which is not even a variety, but only the young form of *Litorina striata* King. This species in its earliest stage always presents the tubercles and the relative difference of shape, which from hundreds of specimens one can trace in every shade of transition into the larger, smoother, more globose, and altogether more common-place form of full growth described by King.

Senhor Nobre's list then presents 92 species, of which 59 are the same as those of McAndrew, while 33 are additions to his list, and these require a little examination; the more so that outside of the mere list of names the information supplied by Senr. Nobre is meagre in the extreme. A very few times a synonym is supplied, but in nearly every case 'Funchal,' 'Dredged in Funchal Bay,' or 'Dredged at Caniçal' is the only entry. Beyond the bare mention of such facts a good deal is needed in order to its being possible for a reader to judge how far a species may really be accepted as indigenous. For all

localities this is true, but how absolutely essential it is for judging of species obtained at Funchal may be gathered from the fact that from my own dredgings out to a depth of 50 fathoms and therefore from most genuine sea bottom sand—I picked the following, many of them in considerable numbers—*Assiminea grayana* Leach, *Bythinia tentaculata* L., *Limnæa peregra* Müll., *Neritina fluviatilis* L., *Pisidium* sp. (not *P. watsoni* Paiva), *Planorbis carinatus* Müll., *Pl. sp.*, *Pl. sp.*, *Valvata piscinalis* Mull. estuarine and freshwater species, not one of which is to be found in Madeira, but which had been brought in ballast, probably from Lisbon or the Thames. If in such company a *Mytilus edulis* L., presents itself its claim to recognition as a native is felt to need more support than a few separate valves from the one locality offer. It is this fact which renders it necessary to offer somewhat more criticism of Senhor Nobre's list than would have been necessary had fuller details been supplied.

To save repetitions here I use 'L^e' for the Rev. R. Lowe and 'W' for myself.

Spondylus gaederopus Linné. 'Funchal.' L^e and W.

Common. This name has suffered much in varied spelling. It is a popular Greek name of the present day (Adanson, Senegal, p. 203) given from the resemblance of the shell to the hoof of an ass (Bonanni Mus. Kirch, p. 441, Lamarck A. S. vert., 1st ed., vi. (1) p. 188). The spelling of the modern Greek for a donkey is γαϊδαρος, with a diæresis over the *i* so as carefully to exclude the diphthong, thus the name of the mollusc should be *S. gaïdaropus*.

Pecten varius Lin. 'Funchal.' A species which from its distribution might very well occur at Madeira (Lowe got it at Mogador; his three specimens—dead single valves are in my collection), but has not been found by either Mr. Lowe or myself at Madeira.

Pecten lowenii Dunker. 'Dredged in Funchal Bay.' This is a species I do not know. Neither the description nor

the figure given by Dunker in his 'Mollusca of Guinea' give one much confidence in the species.

Mytilus edulis Lin. Funchal. Of this I have spoken above. Mr. Lowe got none of it. A few shells, young and dead, with a broken valve larger, were dredged by me in Funchal Bay, deep. A specimen now and then was brought to me for sale.

Chama gryphina Lam. 'Funchal.' Only one Chama—*C. gryphoides* Lam.—but that plentifully, presented itself to Mr. Lowe or myself. It is curious that Mr. McAndrew did not get it. The identity of *C. gryphina* with *C. gryphoides* Lam. has been abundantly shown by that most competent judge Mr. Searles Wood, 'Crag. Moll.' ii., 162.

'**Cardium paucicostatum** Lk.=**C. ciliare** Auct.' Some accidental slip of the pen has occurred here, Lamarck has no species of this name and Sowerby's *C. paucicostatum* is accepted as a synonym for *C. echinatum* L., which Senhor Nobre has given as the immediately preceding species in his list.

Cardium exiguum Gmel. 'Dredged at Caniçal.' The locality here given was little likely to have been disturbed by ballast discharges, and the species must perhaps be accepted, though not without hesitation.

Venus fasciata DaCosta. 'Dredged at Funchal and at Caniçal.' The same remark will apply here as to the preceding.

Tellina serrata Brocchi. 'Dredged at Funchal.' The locality here makes it impossible to receive this species without confirmation, though its distribution makes its occurrence far from improbable.

Psammobia ferroensis Lamarck. 'Dredged at Caniçal' (for Lam. read Chemn.).

Mesodesma cornea Poli. 'Dredged at Caniçal.' The distribution of both these species, as well as the locality given

for them, entitle them to pass as Madeiran, though not without query.

Trochus listeri Wood. 'Funchal.' This species is the *T. colubrinus* Gould. The synonymy is discussed in the 'Challenger Report,' p. 65. Wood's *T. listeri* is absolutely beyond identification. L^e and W. Very abundant. Largely used for food ; its shells may be met with everywhere, inland as well as on the shore, so that its absence from MacAndrew's list is singular.

Trochus candei d'Orb. 'Funchal.' L^e and W. Common.

Glanculus bertheloti. L^e and W. Common.

Scalaria communis Lamk. 'Funchal.' Two specimens of this species were given to me as obtained from fishermen in Funchal Bay, and one other specimen was brought under my notice as bought on assurance of its being Madeiran, but I never regarded the species as indigenous. It would need confirmation.

Scalaria commutata Monterosato. 'Funchal.' L^e and W. This species has been generally accepted as *S. pseudo-scalaris* Broc.

Natica flammulata Req. 'Funchal.'

Natica alderi Forbes. 'Funchal.'

Natica josephinia Risso. 'Funchal.'

Litorina punctata Gmel. 'Funchal.'

I have not heard before of any of these species being found in Madeira.

Cypræa spurca Linne. 'Funchal.' L^e and W. Frequent.

Cassis saburon Bruguière. 'Funchal.' L^e and W. Frequent.

Triton nodifer Lam. L^e and W.

Triton succinctus Linn. (a slip for Lam.). 'Funchal.' L^e and W. *T. parthenopus* v. Salis is the synonym preferred by some. Hanley, in Wood's Index Suppl., p. 127, claims priority for Born's name of *costatus*.

- Ranella gigantea** Lam. L^e and W. Rare.
- Bufonaria scrobiculata** (a slip for —tor) L. L^e and W. Common.
- Purpura hæmastoma** L. 'Funchal.' L^e and W. Very common.
- Coralliophila mayendorfi** Calc. 'Funchal.' L^e and W. Abundant.
- Marginella philippi** Montero. This is a species I have not met with in Madeira.
- Olivella leucozonias** Gray. 'Funchal.' Weinkauff, Conch. Cab. 2d edit. p. 137, identifies this with *O. pulchella* Duclos, for which he claims priority. I do not know it as Madeiran.
- Conus mediterraneus** L. 'Funchal.' MacAndrew gives this as frequent in the Canaries, and I have bought it from boatmen, but never believed it to be Madeiran.
- Ringicula someri** de Folin. 'Funchal.' I do not know this species.
- Roxianella jeffreysi** Weink. 'Funchal and Caniçal.' W. Common.

Out of these thirty-three, then, I reject three, which are to me quite unknown, and suggest nothing among the species found either by Mr. Lowe or myself, viz.:—*Pecten lowenii* Dkr., *Cardium paucicostatum* Lam., and *Ringicula someri* de Folin.

Fourteen species seem to me so far doubtful, as having never presented themselves throughout many years of dredging to either Mr. Lowe or myself, and as wanting some further details of information from Senhor Nobre, viz.: *Pecten varius* L., *Mytilus edulis* L., *Cardium exiguum* Gmel., *Venus fasciata* Da Costa, *Tellina serrata* Broc., *Psammobia ferroensis* Lam., *Mesodesma cornea* Poli, *Scalaria communis* Lam., *Natica flammulata* Req., *Natica alderi* Forb., *Natica josephinea* Risso, *Litorina punctata* Gmel., *Marginella philippii* Mont., *Olivella leucozonias* Gray.

There remain, then, 16 species beyond question, a valuable addition to McAndrew's list, making 131 as the published marine species of Madeira.

These, along with the additions of Mr. Lowe and myself, I propose to give in detail. I only regret that in doing this I have not the advantage for which I have long looked forward in the list of the marine species of Madeira by Mr. J. Yate Johnson. He has in his very admirable guide book given in all other branches of natural history details so full and so accurate that one cannot but feel how thoroughly he could long ago have done justice to the ample materials at his command for this somewhat neglected field.

OCCURRENCE OF *H. ELEGANS* AT DOVER.

By C. STANLEY B. COX.

(Read before the Conchological Society, Dec. 20th, 1890).

I HAVE pleasure in recording the discovery of a colony of this shell found living in the above-named district.

On October 27th, 1890, I received a box of shells of the above species, from my friend, Captain Gordon McDakin, President of the Dover Field Club and a well-known member of the East Kent Natural History Society; in the accompanying letter, he stated that Mrs. McDakin had found the specimens when walking with him in the neighbourhood of Dover, and asked for the name. I sent the sample on to Mr. Edgar Smith for corroboration, and asked Captain McDakin to communicate with the Rev. R. Horsley, whom I had heard of as an ardent collector of mollusca round Dover, thinking he might have introduced a colony; but this is not the case. I have since examined the locality with the discoverer; on the first visit we

found scarcely any living shells, but many dead, of all ages, and in every condition of preservation—we hunted in the long grass, at the roots, which was not the right locality. On later visits we found numbers of the living molluscs.

The position of the colony is suggestive of its having been originally introduced by a naturalist's hand, some few years ago. It now extends about half-a-mile, on a chalky bank by the roadside, in a retired locality some miles from Dover and far from houses or gardens, with coarse long grass and umbelliferæ. The shells are on both sides of the road, and disappear where the chalk bank terminates. It has been difficult to work out the exact extent of the colony, as I was not able to reach Dover till after the ground was hard and white with frost. When first seen by Mrs. McDakin and her husband, the animals were feeding on the tall grasses in some numbers before the frost set in, in company with *Helix caperata*, *H. virgata*, *H. ericetorum*, and *H. cantiana*. These were all hibernating on my arrival; no living *H. caperata*, *H. ericetorum*, or *H. virgata* could be found, while *H. cantiana* and *H. hispida* were beneath moss with *Zonites nitidulus*, without an epiphragm. All the specimens of *H. elegans* have their mouths closed, with a thin mucous epiphragm, and almost invariably are found lying among the lumps of frozen chalk, with short, scanty grass hardly covering the surface, often absent, having their apices pointing downwards, the broad base upwards, the shells being sometimes frozen to the ground. Nearly every individual examined, that had not the base upwards, proved to be dead. It is singular to notice that while the native species, *H. virgata* and *H. caperata*, are in hiding, an animal of supposed southern extraction should thus remain on the surface. The cold, this year, came on very suddenly and might have hardened the ground too rapidly for a species, stranger to frosts, to pierce through. The base is the thickest part of the shell, hence, possibly, the position chosen. It is curious to notice how many

of the dead shells have a hole (pecked?) in the base—the part that presents itself to the attack of birds.

Helix elegans is a common species on the shores of the Mediterranean, especially in the south of France and Corsica.

I hope that Mr. Edgar Smith will kindly follow with some notes on the more northern and western discoveries of the species.

19, EAST CLIFF, DOVER,
December 9th, 1890.

Besides the south of France, this species has been quoted from various localities in Spain, the Balearic Islands, Algeria, Italy, and Sicily, but it does not appear to range northward. This is not the first record of it as British, for Jeffreys (Brit. Conch, I, p. 215) mentions the existence of a specimen in Dr. Turton's collection of British shells, marked 'Cornwall,' and although he questioned its claim to be considered British, he observed that "it is remarkable that this characteristic species, which had been so long considered as peculiar to the shores of the Mediterranean, has been lately found by M. l'Abbe Maillard at Beauvais in the north of France.

A colony of this species was discovered in 1875 (Proc. Acad. Nat. Sci., Phila., 1876, p. 127) in St. Peter's (Episcopal) Churchyard, Logan Street, Charleston, South Carolina. Mr. Mazyck, who gave the account of finding the specimens, was of opinion that the species had "probably existed in small numbers for several years in this very restricted locality."

As in the case of the British specimens, I presume they owed their presence in the churchyard to human agency, for there appears to be no other rational explanation. It is also quite probable that the specimens found at Beauvais were also introduced.—E. A. SMITH.

LIMNÆA PEREGRA VAR. OVALIFORMIS.

By T. D. A. COCKERELL.

(Read before the Conchological Society, April 8th, 1891).

MR. J. W. TAYLOR, in his valuable paper on *Limnæa peregra*, has ('Journ. of Conch.', 1891, p. 298) referred my var. *ovaliformis* to var. *vulgaris* C. Pfr. I think, however, it is a quite distinct form, since it differs from *vulgaris* in its greater size, its texture and sculpture, and especially in its peculiar shape, which seems to ally it rather with such forms as Dr. Jeffrey's var. *oblonga*. It agrees with nothing figured in Mr. Taylor's paper, and, as it has never yet been figured, I give a drawing of it, traced from a sketch of the original specimen I made several years ago.



Fac-similé of T. D. A. Cockerell's sketches of Type Shell.

LIMNÆA PEREGRA VAR. OVALIFORMIS.

By J. W. TAYLOR, F.L.S.,

Membre Honoraire de la Société Malacologique de France, &c.

(Read before the Conchological Society, April 8th, 1891).

IN reply to Mr. T. D. A. Cockerell's kindly expressed criticism, I would refer the reader to Mr. Cockerell's original description and to the figures given here by me, which are careful and accurate reproduction of photographs, taken by me in 1886 of the type shell which Mr. Cockerell had most kindly sent to Leeds for examination. The differences exhibited in my exact copies of photographs and Mr. Cockerell's sketches of the identically same shell are perplexing, but a possible explanation may be that he did not anticipate controversy and did not sketch the outlines as accurately as he otherwise might have done, or he may unintentionally



Fac-similé of Photographs of Type Shell.

have accentuated the peculiarities he perceived. This view is strengthened by the fact that his description does not agree with his sketches, but conforms well with the figures I give. Mr. Cockerell in his description states shell 'of an oval shape,' which does not well describe the outline of the shell as figured by himself; the last whorl is stated to be 'very convex,' but this term cannot possibly apply to the last whorl of the shell as sketched by him, which especially at the aperture is shown as very much compressed and almost inclined to concavity, approaching in this respect var. *gibilmannica*; the aperture is said to be oval, with a diameter of a little more than half its length, but in neither of these points does the author's sketches accord with his description, the shape of the mouth as shown in his sketches being of an oblong character, and the length equalling or even slightly exceeding twice the diameter.

I add here a copy of the original description as published in the "Naturalists' World," Jan., 1886, pp. 18, 19:—

. . . It is of an oval shape, with the last whorl very convex, and bears a very striking resemblance in general outline to the Indian *L. ovalis*. It is glossy and semitransparent, with close and well marked striæ; the spire is moderately long and pointed, and the suture is rather shallow. There is a well developed umbilicus. The spire is a little less than half the length of the last whorl. The diameter of the aperture is rather more than half its length, its shape is oval. . . . Should this variety prove to be new it may be called *ovaliformis*. . . .

The foregoing description taken in conjunction with the figures I give, and which should be compared with the figure of var. *vulgaris* on page 298, will enable the student himself to decide whether the var. *ovaliformis* is sufficiently distinct to merit a special and distinctive name. The only differences seem to be that *vulgaris* is somewhat smaller and slightly less ventricose; the striation and texture in this species are inconstant and differences in their appearance are often noticed in specimens otherwise quite similar to each other, moreover these characters as set out in the description are quite usual in the species. As no two specimens are exactly alike in every respect we must of necessity allow some reasonable latitude for in-

dividual differences, and unless we are prepared to accept an excessive increase in the already large number of named varieties we cannot avoid, in my opinion, placing together forms differing so slightly as var. *ovaliformis* and var. *vulgaris*. But as the range of variation allowable in either species or varieties is, after all, to some extent a question of individual opinion, the preceding description and figures will enable those interested in the subject to form their own judgment and render further discussion in the Journal unnecessary.

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Obituary.—Mr. Clifford Burkill.

WE regret to announce the death of Mr. Clifford Burkill, of Scarborough, which occurred rather suddenly at Guernsey, on Sunday, the 22nd of February, whither he had gone on a six months' dredging excursion.

Though a young collector and a recent member of the Society, he was most assiduous and energetic in the pursuit, his thorough examination of the Scilly Islands, where he spent the summers of 1888 and 1890, having pretty well exhausted the marine fauna of that group, as will be seen from his additional paper in the Journal for April, 1891.

He was much liked by all fellow-workers who came in contact with him, to whom he was ever ready to give help and advice, and he was the centre of a little group of conchologists who assembled at Scilly last summer, consisting of Mr. Alex. Somerville, F.L.S., the Rev. Dale Roberts, of Birmingham, and Mr. Ruthven Sykes, when that outlying part of our coasts may be said to have been thoroughly explored, and where such a strong party of conchologists are not likely to meet again soon.

Had he lived there is no doubt he would have become a worthy and able conchologist, judging from the work he had done in the field during the last four or five years, and he will be greatly missed by the many friends and correspondents who had the pleasure of his acquaintance.

CONCHOLOGICAL SOCIETY
OF GREAT BRITAIN AND IRELAND.

PROCEEDINGS.

MANCHESTER BRANCH.—SECOND ANNUAL MEETING,

Held in the Zoological Laboratory, Owens' College, on Saturday, February 7th, 1891.

There was a good gathering of members and friends both from Manchester and vicinity and also from Leeds, Crewe, Derby, Preston, &c.

After reception of visitors by the President, a short formal Meeting was held, and the Honorary Secretary read a Report in which he described the circumstances under which the Society was formed in February, 1888, its aims and objects, and its recognition as a Branch of the Conchological Society of Great Britain and Ireland. The Excursions and Meetings had followed each other regularly, and had been very pleasant occasions for observation and collecting, for study and discussion, and for the exchange of information and specimens. A fair number of useful Papers and Notes had been read, of which he gave a full list. A proposal to place a collection of the Land and Freshwater Shells collected within a radius of twenty miles round Manchester in the Museum of the College was now under consideration. The members will be asked to contribute of their most characteristic specimens, as soon as the Museum may be prepared to receive and find accommodation for them.

The Honorary Treasurer then read his Report, which showed a favourable Balance Sheet.

After the adoption of the Secretary's and Treasurer's Reports, on the proposal of Mr. J. Cosmo Melvill the following were announced to be the elected Officers for the coming year:—President, Mr. Darbishire; Treasurer, Mr. Collier; Honorary Secretary, Mr. Standen; Committee, Messrs. W. E. Hoyle, W. H. Heathcote, and Chas. Oldham; Referee, Mr. Rogers.

The President then welcomed the members and their friends, amongst whom he rejoiced to meet ladies and young people, and drew attention to various Exhibits on view, of particular interest, and recommended the members not to confine themselves too closely to the collection of the shells of British Land and Freshwater species only, but to pursue a certain acquaintance with species from European and other countries, and with marine shells whenever they had an opportunity of doing so. "There might even be a real waste of power and other opportunities in collecting and arranging, however beautifully, the varieties of *L. peregra* from one thousand ponds."

At the conclusion of the Meeting some time was spent in inspecting the many beautiful and interesting Exhibits shown by the members, which covered all the tables in the room. The collections of Land and Freshwater Shells were very fine, and interesting not only from the beauty and variety of the specimens themselves, but also as illustrative of many favourite systems of mounting, each of which had its own particular advantages, which gave

rise to considerable discussion and comment. Mr. J. C. Melvill exhibited and described a number of rare and beautiful shells, many of them being newly-named species; amongst them was *Helix reticulata*—the most beautifully-sculptured land shell yet discovered, from Damaraland; *Tomigerus turbinatus* and *T. clausus*, and *Anastoma ringens*, *A. carinatum*, and *A. verreauxianum*, from Brazil; *Bulinus adamsonii*, from the Andes, with MS. note in Hugh Cuming's handwriting; *Columbarium distaphanotis* (prob. nov.), *Palaina moreleti*, *P. quadrasi*, *P. tuba*, *P. ariss*, *P. filocinctum*, *P. macrostoma*, *P. grandispinosa*, and *P. decrespignyi*, from Borneo; *Helicarion cumingii* and *Trochomorpha splendens*, from Cebu, Philippines; *Fusus pagoda*, from China; and *Pholadomya candida*, from Island Tortola, West Indies; two specimens of *Helix aspersa* monst. *scalariforme* and one sinistral specimen of same; and *Helix hæmastoma* monst. *sinistrorsum*, unique at present time.

For the College Museum there was shown an important series of *Rissoide* and *Pyramidellide* from British and European localities, localized and named, and extremely valuable for reference; and a similar series of *Scalaria* and *Dentalium*, all from the collection of Mr. J. H. Ponsonby.

Mr. Darbshire exhibited a series of *Cardium edule*, from the plains and terraces of the district of the Sea of Aral, and from Lake Marcotis and Ramleh, Alexandria, from the collection of Mr. W. Bateson, M.A., of St. John's College, Cambridge, illustrating that gentleman's paper in the Philosophical Trans., R.S., 1889, on 'Some Variations of *Cardium edule* correlated to the Conditions of Life.'

Also a series of the same species, from various coasts of Britain, France, and the Mediterranean, showing variation, and especially forms of *C. edule* var. *rusticum* from brackish waters.

Also a drawer of remarkably large British specimens of *Unio tumidus* and *U. pictorum*, shewing curious approximations amongst the old shells of the two species; four drawers of British Land and Freshwater Shells, collected in 1865—68 by the late Mr. T. Peace, mostly from localities in the neighbourhood of Manchester, now built upon or otherwise become barren; and *Loligo vulgaris* (body 14 inches long, arms 15 inches), dredged in October, 1890, on muddy ground off the Morecambe lightship.

Mr. Thos. Rogers showed varieties of *Helix aspersa*, and a collection of Marine Shells, from Port Jackson, Australia, including *Trigonia pectinata*, and two valves of what appeared to be another species, and other rarities.

Mr. Hey showed some fine *L. stagnalis*, with remarkably reflected lip, from Derby.

Mr. J. R. Hardy showed specimens of Newts, Dragon Fly Larva, Nepa, and large Freshwater Beetles with *Sphærium* and *Pisidium* attached to their feet, showing how such shells might possibly be dispersed from one pond to another.

Mr. Edward Collier exhibited a grand series of *Helix nemoralis* and *H. hortensis*, from Topsham, South Devon, including reversed and scalariforme specimens of *H. hortensis* (both taken in same hedgerow); also *H. virgata* monst. *scalariforme*, from Dublin; living and very fine *Z. draparnaldi* from

Topsham; and five drawers of *H. aspersa*, *H. nemoralis*, *H. hortensis*, and *H. arbustorum*, from various places and in endless variety of colour and banding, which were greatly admired.

Mr. W. Moss showed the British Vertigos under a powerful microscope, which enabled the specific characteristics of each to be readily interpreted. This exhibit attracted much attention.

Mr. W. H. Heathcote had a fine collection of British Shells on view, mostly marine species, from Lancashire localities, but he also showed some good Land and Freshwater specimens, notably a pair of Lancashire Anodons, which were the largest and smallest specimens respectively ever seen by anyone present. The largest measured $7\frac{1}{2}$ ins., the smallest 3 mills.

Mr. Chas. Oldham had a fine collection of Land and Freshwater Shells from many places, including most of the British species, and beautifully shown (loose on cotton wool under glass lids).

Mr. R. Standen exhibited three cases of the smaller British Land and Freshwater Shells, neatly mounted in glass tubes—a method possessing many advantages: the specimens are kept free from dust, can be readily and safely handled for critical examination, are well shown, and great economy of space is obtained. Also five cases of British Anodons and Unios, and their varieties. His case of *Unio margaritifera* included specimens from many of the known stations for this species now existing in the United Kingdom. He also showed under the microscope the Glochidium or Larval stage of *Anodonta cygnea*; specimens of Sticklebacks with the Glochidia attached to fins and tail; and a series of very young shells of Anodonta. He also showed on behalf of Mr. J. G. Milne, one of the members at present in Athens, a large collection of living Helices, Pupa, Bulimus, Stenogyra, and Clausilias, collected by him in December last on the summits of Mounts Hymettus and Lycabettus, near Athens.

After Tea, in the College Refectory, the company adjourned to the Museum, and several delightful hours were spent in inspecting the Shell Galleries, a grand case of *Pinna nobilis*, from Cannes, being specially noticed. Mr. W. E. Hoyle, the keeper of the Museum, and his assistants, Messrs. Hardy and Pearcy, were indefatigable in exhibiting the various treasures and answering questions. Mr. Hoyle made some interesting remarks upon the shell collections, and explained the system of classification and arrangement he proposed to adopt. He drew attention to a chart of classification exhibited in one of the cases, which he had drawn up to serve as a key to the whole collection.

The very successful and agreeable Meeting was closed with a cordial vote of thanks to Mr. Hoyle for the use of the rooms, and for his great kindness in promoting the welfare of the meeting and of the Society.

R. STANDEN, *Hon. Sec.*, Manchester Branch.

186th MEETING, WEDNESDAY, FEBRUARY 4th, 1891.

Held at the Philosophical Hall, Park Row, Leeds.

Mr. John W. Taylor, F.L.S., Vice-President, in the Chair.

New Member Elected :

Mr. Edgar R. Waite, F.L.S., Sub-Curator, Leeds Museum.

Candidates Proposed for Membership :

Mr. Robert Cairns (by E. Collier and R. Standen); Mr. Robert S. Dawson (by F. Rhodes and C. Crawshaw); Mr. Hubert Elgar (by J. W. Taylor and W. Nelson); Mr. Henry Lamb (by J. W. Taylor and C. Fenn); Mr. Robert Middleton (by W. Nelson and J. W. Taylor); Mr. William Moss (by E. Collier and R. Standen).

Decease of Member announced, and Secretary requested to express the condolence and sympathy of the Society: Mr. Jas. Wm. Wood, Bedford.

Donations to Library announced and thanks voted: Sixty-one Reprints of his own Papers, from Mr. Edgar A. Smith, F.Z.S.; Thirty-seven Reprints of Papers by Arthur Adams and W. T. Blanford, given by Mr. Lionel E. Adams, B.A.; Twenty-five Reprints by various Authors, given by Mr. John W. Taylor, F.L.S.; Five Reprints given by Mr. W. Denison Roebuck, F.L.S.; one each, of their own Papers, from Mr. R. E. C. Stearns, Mr. Charles D. Walcott, and Mr. T. D. A. Cockerell; vol. xxiii., part 2, of the Journal of the Royal Society of New South Wales, from the Society; the Journal of Microscopy for February, and the Naturalist for January and February, from the respective Editors.

Donations to Collection announced and thanks voted :

From Mr. Hubert Elgar: *Helix pomatia*, from Charing, Kent E., and Kemsing, Kent W.

From Rev. Carleton Greene, *Modiolaria nigra*, *Zonites nitidus*, and *Z. nitidulus* from Tenby; *Natica alderi* from the Dogger Bank; *Nucula tenuis* from Loch Fyne; *Leda minuta* from Oban; *Cylichna obtusa* from Aldborough, Suffolk; *Cerithium perversum* from Pembroke; *Nucula nucleus* from the Forth, near Edinburgh; *Chiton marginatus* from Barmouth; *Zonites cellarius*, *Z. alliarius*, and *Z. nitidulus* from Jersey; *Helix cantiana* from Hythe; *Bythinia leachii* from Blaxhall, Suffolk E.; *Limuca stagnalis* from the Ouse at Bedford; *Pupa secale* from Cheddar; *Helix concinna* from Reading, Berkshire; *Clausilia laminata* and *C. rugosa* from Cockfield, Suffolk; and *Zonites excavatus*, from Hengistbury Head, near Christchurch, Hants S.

From Mr. J. W. Storey: *Helix ericetorum* from Tenby.

From Mr. Albert Wood: *Zonites cellarius* and *Z. nitidulus* from Tenby.

From Mr. Lionel E. Adams, B.A.: *Helix pisana*, &c., from Marseilles.

From Mrs. Maria Brockbank: *T. nodiferus* from Torquay; *Fusus propinquus* and *Mya truncata*, from near Kirn, N.B.; *Cypræa europæa* from Iona; *C. moneta* from Seascale; *Solen marginatus* from Innellan, N.B.; *S. siliqua* from Saltburn; and *S. legumen* and *S. ensis* var. *scimitar* from Seascale.

From Mr. R. Barnes: Various shells from Kilton in Cleveland, Billy Bank near Richmond, and Coulterby Scars in Upper Swaledale.

Exhibits.

The Chairman showed, on behalf of the Rev. S. Spencer Pearce, M.A., some of the shells collected by him near Como, including *Limnæa stagnalis* var. *raphidia* from the Lago di Piano, *L. peregra* var. *gibilmannica* and *Helix nautiliformis* from near Como.

He also showed, on behalf of Miss Amy Warren, a specimen of *Bulinus exilis*, a native of the West Indies, which had been found on the shores of Lough Carra, County Mayo.

Also, on behalf of Mr. Charles Oldham, several much-encrusted specimens of *Limnæa peregra*, from a horse-trough at Bamborough, Cheviotland, September 14th, 1890.

Also a number of shells from Mr. H. Mathews, jun., including *Bulinus acutus* and *Helix virgata* from Troon, Ayrshire, *H. aspersa* from Prestwick, Ayrshire, &c.

Also a Portrait of Dr. and Mrs. J. E. Gray, and a Bronze Medal struck in commemoration of them, lent by Mr. E. A. Smith, F.Z.S.

On behalf of Mr. Albert Wood was shown a small collection of shells from Tenby, including *Helix pisana*, *H. virgata* vars. *maura*, *subdelata*, *bifasciata*, *leucozona*, etc., *H. capevata* var. *obliterata*, *H. concinna*, *H. rufescens* var. *albida*, *Zonites cellarius*, *Z. alliarius*, and *Z. nitidulus*.

The Recorder showed shells sent from Birsay, Orkney, collected Dec., 1890, including *Helix arbustorum*, *Vitrina*, *Zonites alliarius* and var. *viridula*.

On behalf of Mr. Alexander Shaw, a number of shells from Ceylon, Cochin China, etc.

187th MEETING, WEDNESDAY, MARCH 4th, 1891.

Held at the Philosophical Hall, Park Row, Leeds.

Mr. John W. Taylor, F.L.S., Vice-President, in the Chair.

New Members Elected :

Mr. Robert Cairns, 159, Queen Street, Hurst, Ashton-under-Lyne.

Mr. Robert S. Dawson, Belmont, Shipley, Yorkshire.

Mr. Hubert Elgar, 18a, Tunbridge Road, Maidstone, Kent.

Mr. Henry Lamb, Lime Villas, Bower Street, Maidstone, Kent.

Mr. Robert Middleton, Gledhow, Leeds.

Mr. William Moss, F.C.A., 23, Milton Place, Ashton-under-Lyne.

Candidates Proposed for Membership :

Messrs. Gerald Wheatley Adams (proposed by L. E. Adams and W. Denison Roebuck), and James Benj. Beckett (by B. Sturges Dodd and W. E. Collinge).

Donations to Library and Collections announced and thanks voted : The Naturalist for March (Editor) ; and a collection of the Land and Freshwater Shells of the Neighbourhood of Maidstone, Kent, to illustrate paper (presented by H. Elgar and H. Lamb).

Paper Read :

List of Land and Freshwater Mollusca occurring in the Maidstone District, illustrated by a full series of voucher-specimens presented to the Society's Collection, by Messrs. Hubert Elgar and Henry Lamb.

Exhibits :

The Chairman showed numerous examples of varieties of *Limnæa*, including *L. auricularia* var. *reflexa* from the Huddersfield Canal, var. *moratensis* from R. Falka at Dublin, var. *monnardii* from Frankfurt-am-Main, var. *acuta* from the Stratford Canal at Bearley, var. *acutalis* from Newsham, Lancs., *L. palustris* var. *expansa* from near Shoal Lake, Manitoba, *L. stagnalis* var. *raphidia* from the Lago di Piano, near Como, and var. *fossarina* from Rossclare Bay, Lough Erne, co. Fermanagh.

On behalf of Mr. T. D. A. Cockerell were exhibited *Clausilia plumbea* and *Cl. elagans* from Transylvania, *Helix costata* var. *cyclophorella* Ancey, *Zonites fulvus* var. *chersina* Say, *Z. radiatulus*, *Patula striatella* Anth., and *Pupa marginata* var., all from West Cliff, Custer County, Colorado; *Agriolimax hemphilli* var. *maculata* T.D.A.C., from Haywards, Calif., collected by Dr. Cooper; *A. agrestis* var. *sylvatica* Moq., Oakland, Cal., Mr. Raymond; *A. campestris*, Binney, var., Lake Merced, San Francisco Co., Cal., Mr. Raymond; *Limax flavus*, Washington, D.C., Mr. R. E. C. Stearns; and *Prophysaon andersoni* Coop., collected by H. Hemphill, near Oakland, Cal.

On behalf of Mrs. Smith of Topsham, Devon, were shown the following to authenticate new records for South Devon: *Zonites draparnaldi*, *Carychium*, *Helix cantiana*, and *Dreissena*, all from Topsham, and *Succinea putris* and *S. elegans* from the canal-banks at Topsham.

188th MEETING, WEDNESDAY, 8th APRIL, 1891.

Mr. John W. Taylor, F.L.S., Vice-President, in the Chair.

New Members Elected :

Mr. Gerald Wheatley Adams, M.R.C.S., L.R.C.P., the Infirmary, Stockport, Cheshire.

Mr. James Benjamin Beckett, II, Lancaster Road, Great Yarmouth.

Candidates Proposed for Membership :

Lady Lyons (by Rev. Jno. Hawell and W. Denison Roebuck); Mr. Gerald Eliot Hadow (by J. H. Burkill and E. R. Sykes); Mr. William James Farrer (by Edward Collier and R. Standen); M. César Felix Ancey (by J. W. Taylor and W. Denison Roebuck); Mr. J. H. A. Jenner, F.E.S. (by J. W. Taylor and W. Denison Roebuck); Rev. C. A. Williamson, M.A. (by Rev. Carleton Greene and W. Denison Roebuck); and Mr. C. II. Morris (by J. W. Taylor and T. S. Hillman).

The Decease of three prominent members was announced, Miss E. B. Fairbrass, of Faversham, Kent, one of the oldest members of the Society; Mr. William Jeffery, of Ratham, near Chichester, an ex-president, and Mr. Clifford Burkill, one of the most promising of the younger students of

British Marine Mollusca, having died recently. Of the last-named an obituary notice was read.

Donations to Library announced and thanks voted: Nine Reprints of Papers by A. de St. Simon, from Mr. J. W. Taylor; Eighteen various Reprints, from W. Denison Roebuck; the Naturalist, from the Editor; the Journal and Proceedings of Royal Society of New South Wales, 1890, vol. 24, part i, from the Society.

Donations to Collections announced and thanks voted: From Mr. J. W. Taylor: Large examples of *Limnæa auricularia* from reservoir at Levenshulme, near Manchester (collected 20. vi. 90, R. Standen), and *Helix virgata* from Athens (Mr. J. G. Milne); from Mr. T. D. A. Cockerell: *Helix nemoralis* forma nova *fulvo-tincta* T.D.A.C. (described in the 'British Naturalist') from Lewes, Sussex (C. H. Morris); *Zonites cellarius*, *Helix cantiana* and forma *nana* A. S. Fenn, from Spring Grove, Isleworth, Middlesex (the forma *nana* was described in 'Nature Notes,' 1890, and one example shows the white band of f. *albocincta* T. D. A. C., the donor having another from the same place which is well-marked *albocincta*), *H. hortensis* v. *lutea* 00000, Island of Martha's Vineyard, Mass., U.S.A. (collected J. H. Thomson), *Physa hypnorum* from near Ula, Custer Co., Colorado, nearly 8000 feet above sea-level, and *Pisidium pusillum* subsp. *abditum* Hald., Grand Mesa, Mesa Co., Colorado, 1887; from Mr. E. R. Sykes, B.A.: *Vertigo moulinsiana* from Morden, Dorset; from Mr. A. Leyn Lyell Reade: *Limnæa stagnalis*, *L. peregra*, *Sphærium corneum*, and *Planorbis spirorbis*, from a freshwater deposit near the Alt mouth, South Lanc., Nov. 1, 1885; and a number of specimens of *Philine aperta* and *Cylichna obtusa* from the shore at Blundellsands, South Lancs.; from Mr. T. S. Hillman: a large number of species from Lewes, Barcombe, Beddingham, Newhaven, and Ringmer, East Sussex, including *Helix cartusiana*, *Achatina*, *Azeca*, *Clausilia rolfii*, *Pupa secale*, *Neritina*, and numerous varieties of *H. virgata*, *H. ericetorum*, *H. caperata*, *H. aspersa*, etc., there being 23 species represented.

Papers Read:

A note by Mr. T. D. A. Cockerell on his var. *ovaliformis* of *Limnæa peregra*, and one by Mr. John W. Taylor, F.L.S., on the same were read [both printed in 'J. of C.,' July, 1891, p. 380].

A paper by Mr. J. H. A. Jenner, F.E.S., entitled 'Notes on the Land and Freshwater Mollusca of East Sussex' was read, and illustrated by the exhibition of specimens of the new forms described [printed in 'J. of C.,' July, 1891, pp. 361—364].

Exhibits:

In illustration of Mr. Jenner's paper was shown *Clausilia laminata*, v. nov. *tumidula* Jenn., and monst. nov. *decollatum* Jenn., *Cl. rolfii* var. nov. *curta* Jenn., and monst. nov. *decollatum* Jenn., *Helix virgata* var. nov. *picta* Jenn., *H. aspersa* var. intermediate between *exalbida* and *undulata*, *H. cartusiana* vars. nov. *alba* Jenn. and *major* Jenn., and *H. ericetorum* var. nov. *subpellucida* Jenn. [but this is the same as var. *grisescens* Colb.], all from near Lewes. Specimens of *Bulimus acutus* from Eastbourne, Sussex, a locality where it is now extinct, were also shown.

On behalf of Mr. Lionel E. Adams, B.A., were shown an example of *Vertigo substriata* from Gunthwaite, near Penistone, South-West Yorkshire.

On behalf of Mr. Frank Turton, a distorted example of *Limnaea peregra* from Gunthwaite.

Discussion on Nomenclature :

The Chairman called the attention of the Society to some remarks by M. J. R. Bourguignat in a paper upon the genus *Conulus*, in which that author intimated his intention of adopting recommendations made by the International Zoological Congress to carry the starting-point of Zoological nomenclature further back than Linnæus, which entailed the adoption of the works of Lang, dating 1722. Strong objection was urged against this proposition, and the Meeting was emphatically of opinion that no alteration of the hitherto generally received practice of adopting the tenth edition (1758) of the 'Systema Naturæ' of Linnæus as the starting-point should be made.

189th MEETING, WEDNESDAY, 6th MAY, 1891.

Mr. John W. Taylor. F.L.S., Vice-President, in the chair.

New Members elected :

Lady Lyons, Kilbrough, Swansea.

Mr. Gerald Eliot Hadow, South Cerney Vicarage, Cirencester.

Mr. William James Farrer, Orange Court House, Virginia, U.S.A.

Mr. César Felix Ancy, Administrateur-Adjoint, Boghari, Algeria.

Mr. James Herbert Augustus Jenner, F.E.S., 4, East Street, Lewes, Sussex.

Rev. C. Arthur Williamson, M.A., Paradise Villa, Longwood, Huddersfield.

Mr. Cecil Herbert Morris, Lewes, Sussex.

Candidate Proposed for Membership :

Rev. J. W. Horsley (proposed by L. E. Adams and J. W. Taylor).

Donations to Library duly announced and thanks voted : From Mr. Chas. Ashford : Montagu's 'Testacea Britannica,' 1803, with supplement, 1808, in one volume; from Mr. J. R. Bourguignat : 'Bulletins de la Soc. Malac. de France,' tome 7; from Museu Nacional do Rio de Janeiro : 'Archivos,' vol. 7, 1887, and Paper on the Museum, by its Director; from their respective authors : R. B. Newton 'On the Necessity for Abandoning Cyclostoma as a Genine Name'; T. D. Cockerell, 'Notes on Slugs'; R. J. Lechmere Guppy 'On a Specimen of *Pleurotomaria* from Tobago'; J. C. Melvill and J. H. Ponsouth Africa, with observations on *Helix huttonia*; from W. Denison Roebuck : 'J. R. Bourguignat sur les Mollusques Recueillis à Miranda-de-Ebro'; from the respective editors and societies, 'The Naturalist,' 'Feuille des Jeunes Naturalistes,' 'Bulletin de la Société d' Etudes Scientifiques de Paris,' and 'Catalogue de la Bibliothèque de la Feuille des Jeunes Naturalistes.'

Donations to Collections announced and thanks voted : From C. O. Pickard-Cambridge : *Vertigo moulinsiana* from Morden, Dorset; from J. C. Smith : *Clausilia laminata* from Edenhall, Cumberland, *Cl. rugosa*, *Zua lubrica*, *Vitrina pellucida*, *Helix arbustorum*, *Zonites altiaris* and var.

viridula, *Z. nitidulus*, *Z. purus* var. *margaritacea*, *Vertigo edentula*, *Z. fulvus*, and *Z. crystallinus* var. *contracta*, all from Aberlour, Banff; *Unio margaritifera* from River Lowther, Westmorland, and River Spey, Banff; and *Anodonta cygnea* from Great Salkeld, Cumberland, Bisley, Surrey, and River Spey, Banff—several being new county records; from Rev. John McMurtrie: the full series of Shells illustrating his Paper on the 'Land and Freshwater Shells of Eigg,' most being new county records.

Donations to Cabinet Fund received since the last acknowledgment in the Journal, announced and thanks voted :

	£	s.	d.
Rev. S. Spencer Pearce, M.A. ...	10/-	and 15/6	1 5 6
Rev. R. Boog Watson, B.A., F.R.S.E. ...	..	..	1 1 6
Mrs. A. Evans	5/-,	5/-,	5/-
Mr. W. Denison Roebuck, F.L.S.	0	10	6
Mr. T. Stanton Hillman... ..	0	10	0
Mr. Edward Collier	0	10	0
Mr. B. Sturges Dodd	0	5	0
Rev. Carleton Greene, M.A.	0	5	0
Mr. Ernest Ruthven Sykes, B.A.	0	5	0
Mr. Clifford Burkill	0	5	0
Mr. I. H. Burkill	0	5	0
Rev. John McMurtrie, D.D.	0	5	0
Rev. C. Crawshaw	0	5	0
Miss Laura C. Jones	0	5	0
Mr. Wm. Whitwell	0	5	0

Special thanks to the last-named were voted for his kind offer to add 5/- to his subscription each year for this purpose, in the hope that other members would follow the example.

Donation to Photograph Album announced and thanks voted :

Cabinet Portrait of himself, from Rev. Canon A. Merle Norman, D.C.L.

Papers Read:

'Eigg Shells: Notes on the Land and Freshwater Mollusca of the Island of Eigg' (illustrated by the full series of specimens), by Rev. John McMurtrie, M.A., D.D.

'The Viviparous Nature of *Balea*,' two notes, by A. E. Craven, F.L.S., and Edgar A. Smith, F.Z.S.

'Note on *Helix arbustorum* var. *canigonensis* Boub.,' by J. W. Taylor, F.L.S.

'Note on *Helix lapicida* var. *subangulata*,' by John W. Taylor, F.L.S.

The specimens were exhibited in illustration of Mr. Taylor's two notes; and all the papers will be printed in the 'Journal of Conchology.'

Exhibits:

On behalf of Mr. Wm. Duncan was shown a living example of *Arion ater* var. *alba*, from the North Esk, at Morphie, Kincardineshire.

Mr. John W. Taylor, F.L.S. showed several examples of *Sphrarium ovale* from Blue Bridge, York, sent by Rev. W. C. Hey, M.A.; *Helix*

arbustorum var. *luteofasciata* D. & M., from Matlock (H. E. Craven), and var. *canigonensis* Boub. from Bishopthorpe, near York (J. E. Morland); *H. lapicida* var. *subangulata* Pasc. from Dovedale (C. T. Musson); *Succinea putris* var. *virescens* from Guernsey (B. Tomlin); *S. stagnalis* Gass. from the Canal at Bath (Miss F. M. Hele); *Physa hypnorum* var. *rubra* V.d.B., from Lake Carberry, Manitoba (R. M. Christy); *Limnæa truncatula* var. *picta* Taylor, from a mountain stream at Pont Fadoc, Wales (G. W. Shrubsole); *L. truncatula* var., from Winster, Derbyshire (H. Milnes); and shells of *Geomalacus maculosus* from Lough Caragh, Kerry, sent by Dr. R. F. Scharff.

190th MEETING, WEDNESDAY, 3rd JUNE, 1891.

Mr. John W. Taylor, F.L.S., Vice-President, in the chair.

New Member Elected:

Rev. J. W. Horsley, Holy Trinity Vicarage, Woolwich.

Candidate duly Proposed for Membership:

Bryant Walker (by John W. Taylor and W. Nelson).

Donations to Library announced and thanks voted: From their respective authors: T. D. A. Cockerell, 'Notes on Slugs' (No. 6); H. H. Higgins, 'List of Liverpool Land and Freshwater Mollusca'; from Mr. J. W. Taylor, E. A. Smith 'On the Nomenclature of Certain Genera of British Land and Freshwater Shells', and G. B. Sowerby's 'Price List of Shells'; from the respective Editors, Societies, and Institutions—'Report of the Manchester Museum'; 'Proceedings of Linnean Society of New South Wales'; 'Naturalist'; 'L'Echange' and 'Feuille des Jeunes Naturalistes.'

The addition by purchase of Rhind's 'Edinburgh Excursions,' second edition, 1836 (with list of shells), and of part 64 of the 'Encyclopædia Britannica' (containing Ray Lankester's article on 'Mollusca,' was also announced.

Donations to Collections announced and thanks voted: From Mr. T. D. A. Cockerell: *Pupa arizonensis* W.G.B. and *P. marginata* var., from Round Mountain, Custer Co., Colorado; *P. (Vertigo) ingersolli* Ancey ms., *Patula cronkhitei* Newc., and *Conulus fulvus* var., from Micawber Mine, Custer Co., Colorado; *Physa* (vel *Limnæa*?) *castanea* Oliv., and *Planorbis rossiteri* Cr., from Kanala, New Caledonia, collected by F. Swift; *Omphalia friabilis* W.G.B., from Mooresville, Falls County, Texas; the type specimen of *Helix hortensis* forma *bicolor* T.D.A.C. ms., from Petersfield, Hants, collected by Mrs. M. E. Cusack; *H. rotundata* from the Great Skelling, off the coast of Kerry, collected by A. H. Delap; an example of a variety of *Clausilia rolfhii* from Plumstead, Kent, collected by Rev. J. W. Horsley (with a suggestion that if new it might be called var. *nitida*); *Helix caperata* var. *nana* T.D.A.C. ('Brit. Nat. Cat.,' p. 8) from Teddington, Surrey; *H. nemoralis* var. *libellula* 12345 and *carnea* 12345 from near Loch Eck, Argyleshire; *H. hor'ensis* var. *lutea* 1(23)(45), *H. lapicida*, *H. cantiana*, *Limnæa truncatula*, *Zua lubrica*, *Zonites cellarius*, and *Z. nitidulus*, all collected by Mrs. M. E. Cusack, near Petersfield, Hants; *Z. nitidulus*, *Z. fulvus*, *Zua lubrica*, *Clausilia rugosa*, *Helix rotundata*, *H. rufescens*, *H. caperata*, and *Vitrina pellucida*, all from near Poole, Dorsetshire.

From Mr. J. H. Ponsonby: A large and valuable series of shells, including *Helix balearica*, from the Balearic Isles; *Trochus erythraeus* and *Bulla persica* from the Persian Gulf; *Helix lactea* var., from Morocco; *Syrnopsis carinifera* Sm., *Ragnondia minor* Sm., and *R. tanganyicensis* Sm., from Tanganyika; *Helix boissyi* Terv., from Palma; *H. filimargo* Kryn., *Bulinus clessini* Rct., *B. merduenensis* Kryn., and *Clausilia detera* L., from the Crimea; *Turritella bicingulata* var., from the Azores; *Leucochroa cariosula* var. *depressa*, *L. kobeltiana* Deb., *Helix alabastrites* Mich., *Cyclostoma (Leonia) mamillaris* Lam., *Helix hieroglyphica* Mich., and *H. dupotetiana* Terv., from Oran; *H. jaylei* Pal., *Hydrobia gracilis* Morel., *Planorbis metidjensis* Fb., *Helix coquandi* Morel., *H. tarnieri* Morel., *H. lanuginosa* Boissy, and *H. lenticularis* Morel., from Tangier; *Bulinus tournefortianus* Friv. from Koktebel, Crimea; *Clausilia corcyrensis* Mss., from Corfu; *Helix caesus* Cox, from Tasmania; *Truncatella truncatula* Dp., *Helix scherzeri* Zel. and *H. dauthezi* Kob., from Gibraltar; *H. aberrans* Mss., from Patras, Greece; *H. umbrosa* Partsch, from Saxony; *H. acompsia* Bgt., from Algiers; *Cyprea turdus* L., from the Red Sea; *Mactra adansonii* Phil., and *Patella cochleare* Born., from Port Elizabeth, South Africa; *Bulinus pupa* L., from Lonsa, Epirus; *Helix constantina* Terv., from Algeria; *H. melitensis* Fer. and *Cyclostoma melitense* Sow., from Malta; *Phasianella tessellata* C.B.Ad. from Jamaica; *Helix maroccana* Morel., and *H. sultana* Morel., from Tetuan; *H. turcica* Chem., and *H. dehnei* Rossm., from Mogador; and *Corbicula fluminalis* Müll., from the Upper Nile.

From Rev. S. Spencer Pearce, M.A.: *Clausilia itala*, from Cadenabbia, Lago di Como; and *Testacella haliotidea*, from Aylsham, Norfolk.

From Mr. C. H. Morris: *Testacella haliotidea*, from Uxbridge, Middlesex.

From Mr. Albert H. Pawson: *Anodonta cygnea*, from the Old Nidd Stream, at Ripley, Yorkshire.

Exhibits:

On behalf of the Rev. T. Shankland, of Mold, Flintshire, were exhibited as new county records for Flintshire: *Vitrina pellucida*, from Maes y Terwen Road, Mold; *Helix aculeata* and *H. hortensis* var. *lutea* 12345, from Caerwys; *H. arbustorum*, *H. hispida*, *Bulinus obscurus*, and *Azeca tridens*, from Gwernymynydd near Mold; *H. rupestris* from Mold; and *Balea perversa*, from Vron Hall near Mold.

On behalf of Mr. Lionel E. Adams, B.A., was exhibited an example of *Helix vermiculata*, which he had a short time ago received from Barnsley, as purporting to have come from Kent. He had tried to trace its history with the following unsatisfactory result:—‘It arrived in Barnsley in January in a parcel of horehound, consigned to a chemist there. The said horehound is of reputed Kentish growth, but was purchased in the ordinary way of business from a herbalist in London who deals largely in foreign herbs, and as the horehound may have been in the warehouse several months, the chances are the *Helix* got on to the horehound in London from foreign herbs.’

On behalf of Rev. Herbert Milnes were shown *Helix aspersa* from Jersey, and numerous *H. arbustorum* from Winster, Derbyshire, including

the type and vars. *cincta* and *flavescens*, one of the specimens of the last-named showing at the mouth three beginnings of bands.

The Chairman showed a most beautiful series of anatomical drawings by Mr. Charles Ashford, illustrating the alimentary canal and the genital apparatus of most of the British slugs.

191st MEETING, WEDNESDAY, 8th JULY, 1891.

Mr. John W. Taylor, F.L.S., Vice-President, in the Chair.

New Member Elected :

Mr. Bryant Walker, 18, Moffat Building, Detroit, Michigan, U.S.A.

Candidates Duly Proposed for Election :

Mr. R. Bullen Newton, F.G.S. and Rev. Canon Alfred Merle Norman, D.C.L., F.R.S. (both proposed by Edgar A. Smith, F.Z.S., and B. B. Woodward, F.G.S.).

Donations to Library announced and thanks voted: From the respective Editors—'The Naturalist,' 'L'Échange,' 'Feuille des Jeunes Naturalistes'; from the respective societies—'Bulletin de la Soc. d'Études Scientifiques de Paris,' and 'List of Exchanges of Royal Society of New South Wales'; and from the author—R. B. Newton's 'Reply to Canon Norman's Views on the Abandonment of the Generic Name *Cyclostoma*.'

Donations to Collections announced and thanks voted: From Rev. Herbert Milnes: Numerous varieties of *Bulinus acutus* and *Helix virgata* from Tenby.

From Mr. W. Denison Roebuck: Miscellaneous shells collected at Asenby, Cundall, &c., North-West Yorkshire.

From Mr. R. Barnes: Numerous shells from Askrigg, Kisdon Woods, Round Howe, and Billy Bank near Richmond, North-West Yorkshire, and from Winston.

From Rev. R. A. Summerfield, B.A.: *Limnaea stagnalis*, *Planorbis carinatus*, and *Bythinia tentaculata*, found at North Stainley near Ripon, in cleaning out an old pond.

From Mr. T. D. A. Cockerell: *Zonites nitidulus*, *Helix hispida*, *H. concinna*, and *H. rotundata* from Swanage, Dorset; *H. rupestris*, *Pupa umbilicata* and var. *albina* from Corfe Castle, Dorset; and *H. rufescens* from Winchester, Hants.

From Mr. J. Burt Davy: *Limax maximus* var. *fasciata* from Aby, dead *Cyclostoma elegans* from Swaby, *Helix lapicida*, *H. ericetorum*, *H. arbustorum* and *Clausilia rugosa* from South Thoresby, all in N. Lincolnshire.

Papers Read :

'The habitat of *Montacuta ferruginosa*,' by Mr. J. T. Marshall [printed in J. of C., Oct. 1891, vol. vi., p. 399].

'Descriptions of Eleven New Species of Shells of the Genera *Columbarium*, *Pisania*, *Minolia*, *Liotia*, and *Solarium*,' by Mr. J. Cosmo Melvill, M.A., F.L.S. [printed in J. of C., Oct., 1891, vol. vi., p. 404, with plate].

A note by Mr. T. D. A. Cockerell on his 'Var. *ovaliformis* of *Limnæa peregra*,' with reference to the notes upon it by himself and Mr. Taylor, published in J. of C. for July, 1891, vi. 380—381, was read, as follows: 'I am quite surprised and puzzled by Mr. Taylor's paper on this form. I found the sketch I sent among my papers, labelled as *ovaliformis*, and was decidedly of opinion that it represented the type specimen. If all Mr. Taylor says is accurate (and it appears to be so) it would seem probable that my figure represented another specimen from the same locality, and not the real type. Certainly, I should not have drawn the peculiar form of aperture figured, had it not been in the shell before me! However this may be, it is very fortunate that Mr. Taylor has gone into the matter in detail, so that all mistaken impressions may be cleared up.' Mr. Cockerell's note then goes on to enquire whether the type specimen figured by Mr. Taylor is in the Conchological Society's Collection at Leeds, for he does not seem to possess, and thinks he must have given it either to the Conchological Society or the British Museum.

Exhibits:

On behalf of the Rev. W. L. W. Eyre, M.A., was shown a small collection of land shells from Swanage, Dorset, including *Cyclostoma elegans* and *Helix hortensis* and varieties.

On behalf of Mr. E. G. Ingold was shown a small collection of land and freshwater shells from the neighbourhood of Bishop's Stortford, being the specimens upon which his list for that district, published in a recent number of 'The Essex Naturalist,' was based, and including specimens of *Paludina vivipara*, *Anodonta cygnea*, *Pupa marginata* var. *edentula*, *Limnæa auricularia*, *Planorbis cornutus*, *Sphærium vivicola*, *Unio pictorum*, etc.

On behalf of Mr. W. H. Heathcote were shown *Helix virgata* from Rossall Point, West Lancs.; *Limnæa peregra* var. *picta* and *Pisidium henslowianum* from Grimsargh Reservoir near Preston, West Lancs.; and *Planorbis dilatatus* from the canal at Blackburn, South Lancs.

Mr. W. Denison Roebuck, F.L.S. exhibited a number of shells collected at York Dale near Sledmere, S.E. Yorkshire, including *Zonites radiatulus*, *Helix ericctorum*, *H. virgata*, and numerous other species.

192nd MEETING, TUESDAY, 15th SEPTEMBER, 1891.

Held at the Philosophical Hall, Park Row, Leeds.

Mr. John W. Taylor, F.L.S., Vice-President, in the chair.

New Members Elected:

Mr. Richard Bullen Newton, F.G.S., Natural History Museum, South Kensington.

Rev. Canon Alfred Merle Norman, M.A., D.C.I., F.R.S., etc., Burnmoor Rectory, Fence Houses, co. Durham.

Donations to Library announced and thanks voted: From the Trustees of the British Museum—R. B. Newton's Systematic List of British Oligocene and Eocene Mollusca in the British Museum; from the author—J. C. Melvill's Historical Account of the Genus *Latirus*; from the respective societies and editors—Bulletin de la Société d'Etudes Scientifiques de Paris, Avril,

1891; Proceedings of Linnean Society of New South Wales, June, 1891; Naturalist for August and September, 1891; L'Echange for January to August, 1891; Feuille des Jeunes Naturalistes for July and August, 1891, with Catalogue de la Bibliothèque, fasc. 12; and Proceedings of the Royal Society of New South Wales.

Other Library Additions announced as follows: Reeve's British Land and Freshwater Mollusks (1863), Ruddy's Natural History of County Dublin (1772), and Maton's Natural History of Ten Miles round Salisbury (1843).

Donations to Collections announced and thanks voted: Collection of the Shells of the Penistone District, sent by R. Nash and S. Elley; Shells from Wainfleet, Linc. North, sent by J. Burt Davy; etc.

Papers Read:

A note on *Achatina acicula* in a Roman Cemetery at Ventimiglia, in the Italian Riviera, by Rev. J. E. Somerville, B.D., and a short note 'On some Testacellæ,' by Dr. Heinrich Simroth, were read, and will in due course be printed in the Journal of Conchology.

Exhibits:

On behalf of Rev. George Gordon: *Limax cinereo-niger* and *L. arborum* from Banffshire.

On behalf of Mr. Charles Oldham: numerous gatherings of *Pisidium*, including *P. roseum*, *P. fontinale*, and *P. nitidum* from Rhos Neigia, Anglesea, *P. fontinale* and *P. pusillum* from Marston, *P. nitidum* from Jesmond near Newcastle, *P. roseum* from Budworth Mere, and *P. pusillum* from Swalwell near Gateshead.

On behalf of Mr. Bickerton Morgan: *Sphærium rivicola* from the Shropshire Union Canal, Pool Quarry, Welshpool.

On behalf of Mr. Thomas Scott, F.L.S.: *S. lacustre* from a pond near Dunbar, N.B.

On behalf of Mr. Hubert Elgar: *Planorbis marginatus* from Snodland Marshes, Kent.

On behalf of Mr. J. Grafton Milne: spirit specimens of *Amalia carinata* from the bed of the River Helisson at Megalopolis in Arcadia, Greece.

On behalf of Rev. Herbert Milnes: A scalariform specimen of *Helix arbustorum*, and *Limnæa truncatula*, both from Winster, Derbyshire, and *Sphærium lacustre* from Filey.

By the Chairman: A number of British Shells for which he had obtained M. J. R. Bourguignat's determinations, including *Limnæa rubella*, *L. acutalis* f. *minor*, *L. langsdorffii* f. *major*, *L. lineata* Bean, *L. fusca*, *L. fragilis*, *Clausilia taylori* (new species, a form of *Cl. dubia*), *Pisidium obtusale* aff., *P. casertanum*, *Sphærium pallidum*, *S. pisidioides*, *Helix tacapica*, *H. men-dozeæ*, and *H. heripensis*.

The Chairman also showed examples of *Succinea elegans* from various Hampshire and Dorsetshire localities whose specific identity had been established by Mr. Charles Ashford from anatomical examination of the animal; remarking on that gentleman's authority that the difficulties of

separating this species from *S. putris* vanish when recourse is had to an autopsy, the anatomical differences between the two species being very marked.

On behalf of Mr. R. Wigglesworth: Varieties of *Helix arbustorum* from Simonstone and Clitheroe; and of *H. hortensis* from Altham and other localities.

Mr. William Nelson exhibited some photographs of *Pupa umbilicata* taken by Mr. J. Madison, which well showed the characteristic features of the species; also some examples of *Planorbis albus* which were noteworthy on account of peculiarities in their sculpture.

Mr. W. Denison Roebuck, F.L.S., exhibited numerous slugs, including *Limax maximus* var. *mulleri*, *Analia gagates* and varieties, *A. carinata*, *Arion hortensis*, *A. ater* and varieties, *A. subfuscus*, *A. bourguignati*, and *Agriolimax agrestis* from St. Sampson's, Guernsey, sent by Mr. J. R. B. Tomlin; *L. maximus* var. *fasciata*, *Arion bourguignati*, and *A. hortensis*, from Tomintoul, Banffshire, sent by Mr. Wm. Evans; *A. ater*, *A. minimus*, *A. subfuscus*, *A. bourguignati*, *Limax arborum*, and *Agriolimax agrestis* from the banks of the Avon above Ballindalloch, Banffshire (W. Evans); *A. minimus* and *Limax arborum* from Cromdale, Elginshire, also from Mr. Evans; and *Limax levis* from Sandwich, Kent East, sent by Mr. Lionel E. Adams.

Mr. Roebuck also mentioned the capture of examples of *Limax cinereoniger* in Banffshire, by Rev. George Gordon and Mr. W. Evans, from both of whom he had received specimens.

193rd MEETING, WEDNESDAY, 7th OCTOBER, 1891.

Mr. John W. Taylor, F.L.S., Vice-President, in the chair.

Donations to the Library announced and thanks voted: From Dr. Scharff—a copy of his important paper on 'The Slugs of Ireland'; from Mr. F. W. Wotton—a copy of the British Association Handbook to Cardiff, containing his local lists of Mollusca; from Mr. Taylor—W. Nelson's list of the Limnæidæ of North America; from the U. S. National Museum—R. E. C. Stearns' list of North American shells received from the U. S. Department of Agriculture, and W. H. Dall on some new and interesting West American Shells obtained from the dredgings of the U. S. steamer Albatross in 1888; and from the respective Societies and Editors: Jahrsheft des Naturwissenschaftlichen Vereines des Trencsiner Comitates, 1890-91; Feuille des Jeunes Naturalistes for October; Naturalist for October; and Proceedings of Liverpool N.F. Club for 1890 (containing H. H. Higgins' list of Land and Freshwater Shells of Liverpool District).

Donations to Collections announced and thanks voted: Various species from Edlington and Wadworth Woods, near Doncaster, from Mr. W. Denison Roebuck, F.L.S., others from Snowdon, Llyn Ogwen, and Little Orme's Head, presented by Mr. H. P. Marshall, and *Zonites nitidulus* from Withernsea, from Mr. J. Darker Butterell.

Exhibits :

On behalf of Mr. G. K. Gude : *Amalia gagates* var. *rava*, a fine adult, from Crouch Hill, Middlesex.

Mr. Edgar R. Waite, F.L.S., showed several examples of *Testacella scutulium* which he had taken in his garden, with eggs and juvenile examples, these being the first West Riding Testacellæ which have been specifically determined, although 'Testacellæ' have already been known to occur at one or two places.

On behalf of Mr. Sydney C. Cockerell were exhibited : *Paludina contecta* and *P. vivipara* from Mantua, Northern Italy, where they have been found occurring together, each species being very plentiful, and the last-named nearly all as large as or larger than the specimen shown, which measured over 52 mill. in length.

Mr. O. Marsden, of Leeds, who was present as a visitor, showed microscopic slides of molluscan odontophores.

On behalf of Mr. Alex. Shaw were shown a large number of Scottish land shells, of which the following were new county records : *Helix hortensis*, *H. aspersa*, *H. hispida*, *Zua lubrica*, *Balea perversa*, all from Dunblane, South Perthshire (vice-county 87).

The Recorder exhibited a number of shells, nearly all new county records, which have been submitted by the Rev. T. Shankland, of Mold : These included *Helix fusca*, *H. pygmea*, *Physa fontinalis*, *Planorbis nautilus*, *Zonites glaber*, *Z. purus* and var. *margaritacea*, *Limnaea peregra*, *Ancylus fluviatilis*, *L. truncatula*, *Planorbis contortus*, *Pl. spirorbis*, *Pl. albus*, *Sphaerium lacustre*, *S. corneum*, and *Physa hypnorum*, from various localities in Flintshire ; and *Amalia carinata*, *Limax flavus*, *Bulinus obscurus*, *Pisidium pusillum*, *Planorbis spirobis*, *Pl. contortus*, *Physa fontinalis*, *Limnaea palustris*, and *L. truncatula* from various places in Carnarvonshire ; and *Pisidium pusillum* and *Pupa marginata* from Anglesea and Puffin Island respectively. The Recorder also showed, on behalf of Mr. F. W. Fierke : *Limnaea peregra* from the wolds at Riplingham near Hull, where they swarmed in the dirty water of a cattle-pond in which there was no vegetation nor any other species of shells ; *Vertigo edentula* and *V. pygmea* from Speeton, and the latter species also from Drewton Vale ; a *Helix hortensis* var. *castanea* 00300 from Cottingham near Hull, and *Helix nemoralis* var. *libellula* 00300 *hyalozonata roseolabiata*, and *libellula* 12345 *hyalozonata roseolabiata* from Burstwick near Hull.—W.D.R.

The Council desire to draw the attention of the Members to the Society's Library and Collections.

The series of British Marine Shells has now been set out, and is displayed for inspection at the Leeds Museum, by kind permission of the Leeds Philosophical and Literary Society ; the series is, however, far from complete, and the Council would be extremely pleased to receive donations for its extension from Members.

Portraits and Autographs (both of Members and of Conchologists generally) are desired for the Society's Albums, and will be very acceptable.

All donations to be addressed to the Secretary, at the Philosophical Hall, Park Row, Leeds.

THE HABITAT OF *MONTACUTA FERRUGINOSA*.

By J. T. MARSHALL.

(Read before the Conchological Society, July 8th, 1891).

COLLECTORS have experienced a difficulty in finding this species in a living state. Valves are plentiful on many parts of our shores, and also from dredgings in muddy sand, but a living example has hitherto been considered a rarity. I have obtained several perfect examples from fish stomachs, but never dredged one alive.

Forbes and Hanley pronounce it 'a scarce shell,' and Jeffreys says it 'is seldom found in a perfect state.' This is, however, owing to its habitat having been entirely overlooked. Jeffreys gives as its habitat 'muddy ground on all our coasts, from 7 to 85 fathoms,' and Forbes and Hanley 'sublittoral.' Alder, who described the animal and gave many interesting details of its habits in captivity, did so from a single specimen found in the stomach of a haddock, *still alive*, so that evidently these writers at least were ignorant of its true habitat.

In 1870, while at Guernsey, I was one day collecting *Montacuta substriata* from the spines of *Spatangus purpureus* at a very low tide, which does not allow much time for observation, but I then occasionally observed a specimen of *Montacuta ferruginosa* on the spines of the *Spatangus*, and eventually procured about a dozen examples, though I did not take much note of the fact at that time beyond mentioning it to Dr. Jeffreys, who recorded it in the Proceedings of the Zoological Society, in his 'Lightning' Report (No. xlv., p. 698). Although I have frequently visited the Channel Islands since, I could never renew my acquaintance with the *Montacutæ* until the Spring of 1888, when, being at Guernsey again during an unusually low tide, I found some very fine *Spatangus purpureus* containing its usual companion *Montacuta substriata*, with the interesting addition of

M. ferruginosa, of which I obtained several dozen. Both species occupy the same echinoderm, but the most remarkable thing is that while (as is well known) *M. substriata* occupies the spines at the ventral end of the *Spatangus*, and nowhere else, *M. ferruginosa* as rigidly keeps to the spines at the opposite end, near which the mouth is situate, without a single exception, and never occur on the back or sides. Hence its supposed rarity; for this being its usual habitat, examples would rarely occur to the dredger, though valves might of course be plentiful.

In Guernsey almost every *Spatangus* had its attendant *M. substriata*, but only about every third one contained *M. ferruginosa* as well, the latter varying in number from two to six—rarely more than one adult, and the rest immature though of different ages.

Spatangus purpureus lives at extreme low water mark in the Channel Islands, in shelly or gravelly sand, buried two or three inches deep, but it tilts itself up on the approach of the returning tide, and so reveals its whereabouts. The spines at both ends are about half-an-inch in length, with sufficient space between to allow of the free movement of the *Montacutæ*, who attach themselves by a strong byssal thread to near the extremity of the spines. In this locality the *Montacutæ* are beautifully clean, owing to the sand containing no muddy sediment, unlike specimens procured elsewhere, which are generally coated more or less thickly with a ferruginous deposit.

Both *Montacuta ferruginosa* and *substriata* are found under precisely the same conditions in the Scilly Islands, and probably in other places.

On my return to Torquay I endeavoured to find *Spatangus purpureus* on the South Devon coast, to see if it harboured the *Montacutæ* as at Guernsey; but it does not appear to live there so far as I have observed, its place being taken by another echinoderm (*Echinocardium cordatum*, Pennant), whose habits are somewhat different, though for the purpose of providing a

most for the *Montacuta* it is not very much unlike *Spatangus burpureus*.

The *Echinocardium* in Torbay buries itself six or eight inches deep in fine muddy sand, leaving no clue after the receding tide as to its whereabouts, nor does it rise to the surface on the approach of the returning tide, but it keeps up a communication with the outer world by a burrow having an opening like a three-cornered star. The sandy mud in which it dwells is very tenacious, and its spines are so short and close set as to be unable to afford a nestling place for *Montacuta ferruginosa*.

However, lately digging up some *Echinocardium* in Torbay, I accidentally found a pair *M. ferruginosa* in close proximity to one of them, which set me searching further, when I was gratified by finding *M. ferruginosa* a regular attendant upon it. On carefully dissecting a spadeful of sand containing one of these echinoderms, I found a burrow leading from its ventral end running irregularly in a sloping direction for three or four inches, and in this burrow or track dwelt the *M. ferruginosa*. They were not in actual touch with its host, but followed at an interval of an inch or so. This track is made by a current from the echinoderm, and is almost exactly the width of *M. ferruginosa*, enabling it to approach or recede, but not to turn round. Owing to the clinging, tenacious character of the muddy sand, with a little care the whole burrow and its denizens can be accurately exposed.

For the purposes of this paper I have dug up at least 100 *Echinocardium cordatum*, and quite 60 per cent. had its attendant *M. ferruginosa*; where absent, I concluded it was owing to my not hitting the line of cleavage of the burrow, and that every echinoderm probably has its attendant or attendants—usually one adult, then a string of from three to five immature examples, always ranging from the largest, about an inch off the echinoderm, and tailing down to the smallest, which probably dwindle to the mere fry, but obviously are difficult to detect in the rough-and-ready way of turning over a spadeful of sand. It

is only by the lump of sand breaking open in a favourable position that the whole arrangement can be seen, and it scarcely ever varies from this ; but on one occasion I found a wandering *Montacuta* in a spadeful of sand without an echinoderm near it, and it was probably seeking a host or admission into a family of its own kind. I also on another occasion found a *Montacuta* actually within the small circle of spines fringing the ventral end of its host, but not adherent.

I have no doubt the remaining 40 per cent. also had their followers, but they could not be found owing to the difficulty of opening the sand exactly in the line of the burrow, and of course if not parted exactly at the right angle it is almost impossible to find it afterwards by breaking up the sand further or by stirring it about, especially with a rising tide at one's heels.

Again, from another part of South Devon, where the sand is soft and sloppy, I find the *Echinocardium* affords a home for *Montacuta ferruginosa* ; but here the former rise to the surface on the approach of the tide. They not only rise to the surface, but if the sun is hot and the tide low, they appear impatient for its return, and will travel about on the surface for a yard or two, in a very ungainly fashion, dragging the *Montacutæ* in its track by a byssus about half-an-inch in length, though the immature ones are more closely attached, or embedded at the base of its spines. They are also more plentiful in this district, a dozen being sometimes met with on a single echinus, and in one instance I counted eighteen, but never more than one adult to each echinus. In this locality the latter may be leisurely watched creeping about on the sloppy surface, drawing in and ejecting sand and water, and dragging the larger *Montacutæ* in its track, but sometimes leaving younger ones on the way. It will thus far be noted that in four separate localities *M. ferruginosa* adopts methods of seeking its living in close proximity to echinoderms.

I have alluded to the curious circumstance that no two of each group of *Montacutæ* are of the same size. They cannot

be the progeny of one adult, as in that case they would be not only more numerous, but also of the same age and size ; but they graduate in the most methodical way in the Torbay habitat—the largest or adult example being next the echinoderm, then the next largest, and so on.

I have not been able to find *Montacuta substriata* in connection with the *Echinocardium* in Torbay, and their shells do not occur in the drift sand of the shore as do those of *M. ferruginosa*, and I take it that the conditions are not so favourable to it as to its congener ; moreover, it has not been recorded as found on this species of *Echinus*.

The sand of Torbay contains a large admixture of reddish mud from the triassic rocks, and, as may be expected, the *Montacutæ* are thickly coated with it, probably, as Jeffreys supposes, 'by a continual deposit and accumulation of fæcal matter from the animal, which is not carried off in consequence of its sedentary habits and of the water in which it lives being free from currents.'

The Torbay locality also indicates that *M. ferruginosa* is not parasitic, but that it merely dwells on or near the echinoderms to intercept its food, in the same way as Jeffreys observes with regard to *M. substriata*. He also says of the latter, which may be taken as correct of the former, that 'in one sense only can it be said to live on echinoderms. The food of *Spatangus* appears to be animalculæ, and to obtain this it swallows large quantities of sand, causing thereby a strong and frequent current in the neighbourhood of its mouth. The *Montacutæ* probably avails itself of this indraught to partake of the sustenance intended for the *Spatangus*, placing itself with its alimentary tube in the right direction. . . . It has no suckorial organ, such as is possessed by all animal parasites, . . . nor has it once been detected on the back or sides, or elsewhere than in the ventral region of its associate.' (B.C., Vol. II., p. 208.)

It will be noted that while at Guernsey *M. ferruginosa* occupies the end of the echinoderm at which the mouth is

situate, it follows at Torbay the anal region, which is not in this case pre-occupied by *M. substriata*; but probably this does not greatly matter, its primary object being to get in the way of a current charged with its sustenance.

Jeffreys' description of the animal, copied from Alder, must be altered in some respects. Instead of the body being described as 'clear white,' the mantle only is so, but the large foot is pink; and instead of the 'margins being produced considerably beyond the shell,' they are very slightly so; the filaments are produced, but the fringed mantle extends very little beyond the margin of the shell—less than one-twentieth of an inch.

M. ferruginosa is very active, and not at all shy. The foot is large and muscular, and exceeds in length the breadth of the shell. It will sometimes crawl out of the water contained in a saucer, and stay for hours on the sloping side until put back, when it immediately begins crawling again. In travelling the valves gape, the filaments are produced, and the large foot extended its whole length; the filaments are then withdrawn, the valves are partially closed, and the animal pulls itself up, swaying from side to side rather awkwardly—a process very similar to what Clark has described of *M. bidentata*. If the sea-water becomes stale and the animals sluggish, a little bubbling of the water rouses them to action again, and they may be kept alive thus for many days if away from the sea-side.

Calliostoma (vel Zizyphinus) haliarchus.—Mr. G. B. Sowerby thinks this may turn out to be but a larger, thinner, and deep sea form of his *Z. jucundus*, described three or four years ago in P.Z.S. and with which I compared this shell originally and differentiated it by certain characters. Should this opinion turn out eventually to be correct, the whole aggregate species must still bear this name (*Calliostoma haliarchus*), since it has been proved by Pilsbry (Man. Conch. *Trochidæ*) that Gould had already on a previous occasion used the name *jucundum* for another species of *Calliostoma*. As an alternative, Mr. Pilsbry in 1890 proposed for *C. jucundum* (Sowb.) the name *Sowerbyi*, but this is however antedated by *haliarchus* (1888); the generic name, *Zizyphinus* (Gray) is also antedated by *Calliostoma* (Swainson).—J. C. MELVILL.

DESCRIPTIONS OF ELEVEN NEW SPECIES
 BELONGING TO THE
 GENERA *COLUMBARIUM*, *PISANIA*, *MINOLIA*,
LIOTIA, AND *SOLARIUM*.

By J. COSMÒ MELVILL, M.A., F.L.S., &c.

(Read before the Conchological Society, July 8th, 1891).

Columbarium distephanotis sp. nov. (Pl. ii, fig. 4).

C. testâ gracillimâ, fusiformi, albâ, anfractibus septem. ad suturas angulato-compressis, ordine spinarum duplicato decoratis, spinis elevatis, coronulatis, dentiformibus, canali longo, obliquè tenuisulcato, haud spinescente, aperturâ pyriformi, labro simplici, margine columellari planato.

Long.: 19.50 mill. *Lat.*: 5.25 mill.

Hab.: Torres Straits, Nov. Guinea mer.

A very delicate, pure white little shell. From the three known species of *Columbarium* (rightly dissevered by Prof. E. von Martens from *Fusus* owing to the toxoglossate dentition), the *C. distephanotis* differs in several important points.

From the type *C. pagodus* (Less), and *C. pagodoides* (Watson), in the double row of spines on the body whorls; from *C. spinicinctum* (von Martens), which to some extent possesses this attribute, in the complete absence of all signs of spines on the canal. The specimen, although perhaps not quite full grown, is yet in very good condition for diagnosis. It has all the appearance of molluscs procured from abysmal depths, and this was noted as having been obtained by dredging off the south shores of New Guinea in the Torres Straits, at a depth of seventeen fathoms. It forms part of the Cholmondeley collection, now in the museum, Owens College, Manchester, and is at present the only specimen known.

Pisania gaskelli sp. nov. (Pl. ii, fig. 5).

P. testâ fusiformi, gracili, fulvo-brunneâ, anfractibus novem, convexiusculis, ad suturas compressis, longitudinaliter costis regularibus cinctis, liris transversim brunneo-nigris, circumambientibus, aperturâ prolongatâ, canali ad basim subrecurvo, labro exteriore denticulato, incrassato, columellari recto, lævi.

Long.: 28 mill. *Lat.:* 11 mill.

Hab. ?

This species seems distinct from all others; the nearest approach in form I can find appears to be *P. billeheusti* (Petit), a species placed in *Metula* by some authors. It is a shell of elegant fusiform shape, of a warm brown hue, with transverse lines of a dark grey crossing the longitudinal ribs at regular intervals, the ribs being very numerous; the outer lip is denticulated internally, the beak being somewhat prolonged and slightly recurved. It has been for years unique in my collection.

I have much pleasure in associating with this interesting shell the name of a college friend of very old standing, Roger Gaskell, Esq., M.A., of Highgate, Middlesex, the possessor of a choice collection of shells.

Minolia malcolmia sp. nov. (Pl. ii, fig. 6).

M. testâ solidiusculâ, depresso-conicâ, angustè umbilicatâ, albido-ochraceâ, maculis et flammis rubrobrunneis conspersis decoratâ, anfractibus $4\frac{1}{2}$, lævibus, nitidis, ad suturas subdepressis, infrâ suturas indistinctè crenulatis, striisque superficialibus cinctis, ultimo ad basim albescente, aperturâ parvâ, trigono-ovatâ, labro crassiusculo, margine columellari subcallosa.

Long.: 3.50 mill., *spec. majoris.* *Lat.:* 6 mill.

Hab.: *Ad insulas Philippinenses.*

I possess two specimens of this shell, both from the Lombe Taylor collection. A small, subconical, solid species, not so shining as some of its allies, with red-brown speckled markings, and with no angle at the periphery, slightly depressed and crenulated at the sutures, mouth small, triangular.

Minolia pompiliodes sp. nov. (Pl. ii, fig. 7).

M. testâ profundè et latè umbilicatâ, conico-depressa, circâ umbilicum rotundata, nitidissima, lævi, anfractibus quinque, ad suturas canaliculatis, læte-gilvâ et regulariter albomaculatis-ultimo ad peripheriam albescente, flammis albisparsis circumambientibus, ad basim, circa umbilicum, albescente, flammis brunneo-gilvis cinctis, apertura subcirculari, intus margaritacea, planata, labro exteriore tenui, margine columellari ad angulum apud umbilicum reflexo.

Long.: 6 mill., *spec. majoris.* *Lat.*: 9 mill.

Hab.: *Ad insulas Philippinenses.*

A most beautiful species, smooth, shining, ornamented with a beautiful regular series of white spots upon a bright fawn-coloured ground. At the periphery, which is not angled, the shell is whitish, with another line of zigzagged pale-brown markings more flame-shaped at the base; around the deep umbilicus, the margin of which is very slightly angled, a row of dark-brown flames alternates with the white. Interior of mouth smooth, beautifully margaritaceous.

Two specimens, both in my collection, almost exactly resembling each other. From Mr. Lombe Taylor's collection, the whole of whose *Minolæ* and *Solariellæ* I acquired in 1880.

Minolia gilvosplendens sp. nov. (Pl. ii, fig. 8).

M. testa conica, lævi, nitida, profundè umbilicata, circa umbilicum angulata, transversim lineis sulcatis sculpturata, margine umbilici pulchre radiato-sulcato, anfractibus quinque, ad suturas canaliculatis et nodulis coronulatis cinctis, ultimo ad peripheriam subangulato, albis, maculis flammis nitidis cinereo-gilvis decoratis, basi pallidiore, albescente, apertura lineari, tenui, margine columellari ad angulum breviter reflexo.

Long.: 6.50 mill.

Lat.: 8 mill.

Hab.: *Ad insulas Philippinenses.*

Of this most exquisite small conical species, I received two specimens from Mr. Lombe Taylor's collection, marked '*Solariella, sp. nov.*' One of these two is now in the national collec-

tion. The whorls are smooth, channelled at the sutures, ornamented just below them with a row of raised coronated nodules, less distinct on the front of the basal whorl—this materially aids in giving the shell a slightly angled appearance.

It is white, with many flame-like markings, the umbilicus deep, very slightly contracted, the umbilicus itself being decorated with transversely-channelled sculpture, almost as in a Solarium, substance margaritaceous, interior of mouth pearly, smooth; mouth round, simple.

Minolia ceraunia sp. nov. (Pl. ii, fig. 11).

M. testa depressa, alba, profunde umbilicata, solidiuscula, transversim tenuiter sulcata, anfractibus quatuor, ultimo rapide accrescenti, ad basim lævi, nitente, anfrac. rufolineatis, lineis angulatis, longitudinaliter rotatim dispositis, ad basim circa umbilicum convenientibus, annulo puniceo formato, apertura ovato-trigona, labro simplici, margine columellari incrassato.

Long.: 3 mill.

Lat.: 5 mill.

Hab.: Ad insulas Philippinenses.

A very beautiful shell, though of small size, distinguished by regular longitudinal flame markings becoming small, paler, and more zigzagged, below the somewhat angled periphery, and all uniting round the umbilicus in a red band. It resembles *M. edithæ* in several points, but is distinct specifically.

One specimen, unique in my collection, originally in Mr. T. Lombe Taylor's cabinet.

Minolia edithæ sp. nov. (Pl. ii, fig. 9).

M. testa subconica, alba, angustè umbilicata, undique transversim tenuiter lirata, anfractibus 4½, rufis fulgetrinis lineis dispositis, ad peripheriam pallidè olivaceis, basi circi umbilicum albescente, concentricè lirata, apertura ovato-trigona, labro exteriore simplici, margine columellari reflexo.

Long.: 4 mill.

Lat.: 6 mill.

Hab.: Ad insulas Philippinenses.

The two species—*M. edithæ* and *M. ceraunia*—are undoubtedly near each other, but the following characters amply distinguish them.

M. edithæ has the whole surface of the shell, including the base, finely concentrically lirate, whilst the base of *M. ceraunia* is smooth; that species being also very depressed, while this is conical in form. The disposition of markings, while the same round the whorls, has an arrangement of zigzag rufous lines, edged with white, regularly disposed, as if originating from a common axis (the apex), and towards the base becoming quite different, for, while in *M. ceraunia* a very beautiful crimson band is formed by the junction of these lines, in *M. edithæ* this is absent, and the base is almost white. This species is at present unique in my collection.

Minolia eilikrines sp. nov. (Pl. ii, fig. 13).

M. testa conico-pyramidata, umbilicata, tenui, delicatula, pallido-ochracea, anfractibus quinque, ad suturas angulatis, transversim gracillime liratis, liris irregularibus, majoribus articulatis, minoribus simplicibus, ultimo anfractu ad peripheriam angulato, apertura ovato-trigona, labro simplici, margine columellari subangulato.

Long.: 8 mill.

Lat.: 9.50 mill.

Hab.: Ad insulas Philippinenses.

An extremely delicate, angled-whorled shell, conical, the upper whorls all being well angled and raised, the lower whorl not so depressed or effuse as in *M. vitiliginea* (Menke), next to which this species must stand in our lists. The markings on this species also are more delicate and not so well defined, and the shell is of a more cinereous tinge.

This, and the next species to be described, *M. henniana*, belong to the old genus *Minolia*, as originally understood. The rest of those described in this paper would till lately have been called *Solariella* (Searles Wood), but as shown by Mr. Pilsbry in Tryon's Manual, this latter genus has been misunderstood.

Minolia henniana sp. nov. (Pl. ii, fig. 14).

M. testa depresso-conica, profundè umbilicata, fulvo-brunnea, angulata, anfractibus quatuor, biangulatis, spiraliter tenui-sulcatis, fuscis flammis regulariter longitudinaliter decoratis, apertura subtrigona, labro simplici, apertura ovato-trigona.

Long.: 3.25 mill.

Lat.: 4.50 mill.

Hab.: *Magnetic I. Queensland* (Arnold Umfreville Henn, Esq.).

This little shell, of the *pulcherrima* section of the genus, is most allied to *M. angulata* (A. Ad.). It was obtained with a hundred or more other small species by sifting shell-sand, kindly brought home at my request from two or three stations in the Eastern Tropics, by Arnold Henn, Esq., of Manchester. Five specimens were found altogether, of which two are now in the National Collection, South Kensington, the remainder in my own.

Liотia calliglypta sp. nov. (Pl. ii, fig. 10).

L. testa obliquo conica, obtectè umbilicata, alba, solida, undique mirè sculpturata, anfractibus quatuor, longitudinaliter multicostratis, interstitiis transversim densiliratis, ad medium ultimi anfractûs fortiter uniconstratis, apertura rotundata, labro exteriori subreflexo, margine columellari calloso.

Long.: 4.50 mill.

Lat.: 5.25 mill.

Hab.: *Thursday Island* (A. Umfreville Henn, Esq.).

A very beautiful shell. The single specimen found in shingle obtained by A. U. Henn, Esq., from Thursday Island, was to some extent injured by a greenish deposit, not enough, however, to injure the marvellous sculpture and design. The shell is extremely oblique, four-whorled, with many oblique ribs crossed by one very strange median line in the last whorl, the interstices between the longitudinal ribs being densely lirate; mouth circular, umbilicus half-covered.

After I had drawn the figure of this shell, unique in my collection, it has been most unfortunately mislaid, and it is in-

possible to say whether it will be now found. I have, however, requested Mr. Henn kindly to obtain me some more shingle from the same source, and it is to be hoped that other much better specimens of this beautiful addition to the genus will reward the searcher.

Solarium (Torinia) enoshimense sp. nov. (Pl. ii, fig. 12).

S. testa depresso-discoidea, solida, profundè umbilicata, fusco-castanea, anfractibus quatuor, spiralliter sulcatis, papillis moniliformibus, regulariter transversim decoratis, apud suturas depressis, ultimo anfractu rapidè accrescenti, ad peripheriam tribus costis crenulato-carinatis, ad umbilicum pulchrè crenulato, apertura circulari, labro simplici.

Long.: 2.50 mill., *sp. majoris*.

Lat.: 5 mill.

Hab.: Enoshima, Japonia.

Shell flattened, pale-brown chestnut, moderately and deeply umbilicated, whorls four (the last very rapidly increasing, with spiral channels of unequal breadth covering the whole surface, forming regular rows of moniliform papillæ. At the periphery these spiral channels have a very boldly defined semblance of angularity, the concentric spaces below the sutures are double the width of the three intervening spaces between them and the periphery. At the base, the crenulations round the umbilicus are boldly defined, and the next concentric space is twice the breadth of those, in their turn, intervening between this and the angle of the periphery—four in all.

Of this small species, obtained in a native box of Japanese shells sent direct, and which contained several novelties, I have two specimens precisely similar, and in one of the drawers of the national collection at the Natural History Museum, South Kensington, have found two or three others, unnamed, labelled 'Japan.'

CONTRIBUTIONS TOWARDS A LIST OF
IRISH MOLLUSCA.

By J. G. MILNE.

II.

NOTES ON THE LAND AND FRESHWATER MOLLUSCS
OF ACHILL ISLAND.

(Read before the Conchological Society).

THE land and freshwater molluscs of Achill Island—especially the former—present several points of interest; not only as inhabiting almost the most westerly part of the British Isles, but, because, as I hope to show, the fauna has been materially altered in, geologically speaking, recent times. These Notes embody the results of two visits—in August, 1886 and September, 1888—when, from the Slievemore Hotel, at Dugort, as head-quarters, I worked the northern half of the island, and the neighbouring islet of Innishbiggle, supplemented with passing remarks on a few gatherings from the shores of Clew Bay.

The geological formation at Achill shows rocks of the metamorphosed lower silurian, which give place at Achill Sound to the old red sandstone. This forms the north shore of Clew Bay, while the east end, from Newport to Westport, is limestone. In Achill, however, the collecting grounds of the conchologist are limited by the peat which covers the greater part of the island. The north coast is a series of cliffs and precipices, from five hundred to two thousand feet in height, backed by a ridge which runs for about five miles from Achill Head to Slievemore, where it reaches its highest point, 2,204 feet. On the south this slopes down more gently, and by the villages of Keem, Dooagh, Keel, Slievemore, and Dugort are small patches of cultivated land. East of Keel there is a small extent of level sandy ground, and a similar sandy warren forms

the north-east corner of the island. Resulting from this, the localities cited will be few:—the fields and gardens at Dugort, the Colony, Slievemore, and the Signal Tower; the sandhills on the Warren, and at Ship Point, and on Keel Common; and the beaches of Dugort and Annagh Bay.

But there are, besides, indications to be found of the nature of the fauna before the reign of peat, when the island was covered with forest, in a small portion of old surface uncovered in the banks of a stream, near Lough Nambrack; and a few land shells mixed with the *debris* of bones, limpets, whelks, periwinkles, and charcoal, on the shellmounds of Keel.

From these sources I will endeavour to get some light on the reasons of the rather peculiar distribution of Achill mollusca.

The freshwater species are neither numerous nor particularly important, and may be disposed of first.

Pisidium pusillum.—The only bivalve found was *P. pusillum*, which, however, was very plentiful in its localities. It occurs on the mainland in peat dykes, near Newport; and in Achill I found it in wet moss on the shore at Annagh Bay, where the overflow of Lough Nakeeroge dripped down to the sea; and in immense numbers in a ditch of a field by the Colony, as dry a spot as it could have chosen in that very damp locality; besides these localities on land, there were a few in a brook below Dugort.

None of the Pectinibranchiate snails seem to inhabit the island; though *Bythinia tentaculata* and *Valvata piscinalis* swarm in every ditch and brook from Westport to Newport; they stop with the limestone.

Among the Planorbis,

P. albus and **P. contortus** are just as numerous within just the same limits; *P. nautilus* gets nearer Achill, as far as Bunnamucka Lough at Molrhany, but on the island their places are filled by *P. glaber*, which occurs in two lakes on the warren—Lough Nambrack and Lough Doo. As

Physa hypnorum only lives in the tributaries of the Risson river, near Newport, the *Limnæa* come next. Of these *Limnæa peregra* is plentiful and fine in Lough Doo; smaller specimens are found in a ditch near Dugort village, and still smaller in Lough Nakeeroge. It also occurs in brackish water on Keel Strand; the specimens there are, however, of a fair size. The variety *ovata*, which is the usual form on the mainland, seemingly only inhabits a brook below Dugort.

- L. auricularia* var. *acuta* is found sparingly in Lough Doo.
- L. palustris* does not advance beyond the limestone; but
- L. truncatula*, which takes its place on the sandstone, continues into Achill, where it occurs in the brook below Dugort and with *P. pusillum* in the dry ditch, the latter being fine specimens, while those from the water were small enough to be referable to var. *minor*.

This brief list, I believe, exhausts the species of fresh-water snails found in the north of Achill Island; the number of land-dwellers is much larger.

Arion ater.—To take the slugs first, *Arion ater* occurs in great numbers, especially in half-reclaimed peat fields, but extending thence on to the heather, all over Slievemore mountain—from the colony up to the top and down again to Annagh Bay—where it is accompanied by var. *nigrescens*, and also in the fields at Dugort.

A. hortensis, true to its name, sticks to the gardens at the Colony and the little patch of reclaimed land at the Signal Tower.

A. subfuscus was taken in a ruined cottage at Slievemore village, and its var. *cinereo-fusca* at the Colony.

Amalia marginata.—Both species of *Amalia* occur. *A. marginata* was represented by a half-grown specimen from Dugort village; while of the

A. gagates I sent Mr. Roebuck, he named one from Dugort

as the type, and of three from Slievemore village one was var. *plumbea* and two the brown form.

Limax agrestis is plentiful; the type at Annagh Bay, under stones on the shore; with which are associated the vars. **tristis** and **sylvatica**, the latter, the commonest form, also occurring at the Signal Tower, the Colony, and Dugort, besides being the usual one taken on the mainland at Westport and Newport.

L. arborum var. **nemorosa** is also found at Newport, where it seems much more in place on the mountain-ash trees than crawling up and down the heather stems on Slievemore mountain, as I often saw it, looking, as indeed it is, the mournful relic of a past age.

Succinea putris.—First among the Helicidæ, *Succinea putris* occurs in great numbers, though of small size, in two localities: in fields below the Colony, and on the shell-mounds and strands at Keel. In both of these places, especially the latter, it must get a fair quantity of salt; a south-westerly wind will bring the waves over the shell-mounds, but, though this may have stunted their size, it does not seem to diminish their numbers.

S. elegans was only found on the mainland near Newport.

Vitrina pellucida is apparently an old inhabitant, as it occurs in the deposits on the warren, where it still flourishes. A small colony at Ship Point were noticeable for their very dark colouring. It is also found on Innishbiggle.

Six species of Zonites were discovered on the island.

The first two

Zonites cellarius and

Z. alliarius are so ubiquitous in Ireland that it was not surprising to find both at the Colony, and the latter also at the Signal Tower, Annagh Bay, and Dugort, besides its occurrence in the deposits. The var. **alba** of *Z. cellarius* which I had taken at Westport, did not turn up on the island.

- Z. radiatulus**, however, though a common Irish species, I had not expected; its occurrence in the fields at the Colony may be a relic of old times, as the cultivation of the land there seems of long standing—Dugort, close by, getting its name of the meadow village therefrom—and it is found in the deposits; so that it may have retreated before the peat, which supplanted the forests, into this little patch of cultivated ground. The same process may have applied to
- Z. crystallinus** which also occurs in the fields at the Colony, as well as in the deposits; also on Innishbiggle; and to
- Z. fulvus** which, however, has not the same proof of its antiquity, as it is not found in the deposits, but lives at the Colony; the form is a small one referable to var. **Alderi**. These three species were all plentiful in their locality; another, which might seem to be dying out, is
- Z. nitidus**, of which only one specimen was to be found on the warren, and which above all would appear to be a survival of forest times.

To proceed to the Helices.

Helix aspersa occurred in great plenty on a confined space, on the shell-mounds at Keel; the shells were all rather dark, ranking under the vars. **flammea**, **undulata**, and **obscurata**. Now this species was not found in the deposits—either on the warren or in the shell-mounds—on the top of which it was living; and as by reason of its size it could hardly have been missed had it been there: from this and from its occurrence in such numbers over a small area, I judge that it is a recent introduction which has not had time to spread. It is found in spots here and there on the mainland near, and similarly throughout Ireland, so far as my observation goes, it is, though generally distributed, only numerous within confined boundaries, so that possibly the spreading process is going on throughout the island. On the other hand,

- H. nemoralis** is, I take it, dying out—though only in Achill—for there is no question as to its extinction on the central limestone plain; but towards the west it gradually thins out; and in Achill it only occurs in a few heaps of stones on Ship Point, whereas formerly, the deposits show it to have been extended all over the warren to Dugort, and again to have been plentiful on the shell-mounds of Keel. None, by the way, of the shells of *H. nemoralis* in the mounds bear traces of cooking, as do those of the marine species; they seem rather to have got mixed up in the debris and covered with sand; and so the Achill natives now regard the use of snails as food with disgust. The band-formula of all the Ship Point specimens was much the same—all five bands being present, and the first three more or less coalescing—this prevalence of a single type being possibly another evidence of gradual extinction. The living shells are noticeably smaller than the sub-fossil ones. One specimen of
- H. hortensis** occurred with the *H. nemoralis*, with a similar band-formula.
- H. rufescens** is found at the Colony, in the gardens and on the walls, and with it its var. **alba**. This is also, I think, a spreading species, as it does not occur in the deposits, while its centre at the Colony seems to be in the gardens, where it may well have been introduced at the founding of the Colony fifty years ago. The next species,
- H. ericetorum**, seems to have reached the limits of its territory, being extended all over the sandy flats of the warren and Keel Common; it also occurs in some of the deposits. The usual form is a small, dark one, the size of which is that of var. **minor**, though in some respects it would suit Jeffreys' var. **instabilis**, which seems distinctively western in its distribution. A small colony under Dugort village among the boulders on the cliff belonged to var. **alba**; the reason of the variation being abundantly manifest in their

dwelling-place, which was simply dry white sand without vegetation.

H. rotundata is another of the vanishing species; plentiful in the deposits, it is now restricted to Slievemore village, and there is scarce; whereas on the mainland it is still numerous, as far as the limestone extends, being associated with

H. rupestris, and beyond this living in large colonies by itself.

As to the two last species, I offer no opinion whether their prosperity is decreasing or waning; they are

H. pygmaea which is found under stones on the walls of the fields near the Colony, and

H. pulchella, which is fairly plentiful on the warren.

Bulimus acutus is, I think, a new comer; it is plentiful on the warren by Lough Nambrack, but does not extend far, though the whole neighbourhood looks suitable for it; nor does it occur in the deposits.

Pupa umbilicata is ubiquitous; it is the only one of the Helicidæ which ventures on to the peat; it is found all along the shores of Clew Bay; and in Achill it occurs from the sea level at Annagh Bay and the Colony up to the Signal Tower, 890 feet above the sea. The Achill examples all look stunted; some from Innishbiggle, on the contrary, are high, but belong to var. **edentula**.

At the Colony occur four species of *Vertigo*; three in the dry ditch, where *P. pusillum*, *L. truncatula*, and *S. putris* are found, viz:

V. antivertigo, which is exceedingly numerous;

V. substriata, which also extends up into the field, while *Antivertigo* does not travel beyond the thick moss of the ditch; and

V. edentula.

The fourth species prefers the walls of the gardens and fields; this is

V. pygmæa, a snail common throughout Ireland.

Cochlicopa lubrica is almost as ubiquitous as *P. umbilicata*; I have specimens from the Colony, from Annagh Bay, and from the Warren; also from Innisbiggle; and sub-fossil ones from the Warren. It keeps off the peat, however, and is not so numerous either on the island or the mainland, except at Westport, where the var. *fusca* is also found.

Alone of the shells found in the deposits,

Clausilia rugosa has utterly vanished from Achill with the trees; this commonest of Irish snails now stops where the trees stop, at Molrhaney.

Carychium minimum survives in vast numbers, though only in one locality, with the *Vertigos* in the ditch at the Colony; so that, though it is generally supposed to be a forest-loving species, it seems to manage to withstand extermination.

This ends the list of Achill shells, and I think there is justification in it for concluding that a new fauna is taking the place of an old one. The destruction of the forests has produced a change such that species like *Clausilia rugosa*, *Helix nemoralis*, and *H. rotundata*, and *Zonites nitidus*, *Z. radiatulus*, and *Z. crystallinus* are dying out, those that can accommodate themselves to changed conditions—such as *Zonites alliarius*, *Pupa umbilicata*, and *Cochlicopa lubrica*—are meanwhile flourishing and filling the land, and new immigrants more suited to the changed soil—such as *Helix aspersa* and *H. pulchella* and *Bulinus acutus*—are coming in to take the vacant places. If this be at all true, it surely gives some light on the life of species.

TABLE OF ASSOCIATED SPECIES.

FRESHWATER.

<i>L. peregra</i>	} Lough Doo, 40 feet.
<i>L. auricularia</i> var. <i>acuta</i>	...	...	...
<i>Pl. glaber</i> ...	...	...	...
<i>L. peregra</i>	} Lough Nambrach, 30 feet.
<i>Pl. glaber</i> ...	...	...	...

<i>L. peregra</i> var. <i>ovata</i>	}	Dugort Brook, 10 feet.
<i>L. truncatula</i> var. <i>minor</i>		
<i>P. pusillum</i>		
<i>L. peregra</i>	}	Lough Nakeeroge, 20 feet.
<i>L. peregra</i>		
<i>L. peregra</i>	}	Dugort, 50 feet.
<i>L. peregra</i>		
<i>L. peregra</i>	}	Keel Strand, sea level.
<i>P. pusillum</i>		
<i>P. pusillum</i>	}	Annagh Bay, 10 feet.
<i>P. pusillum</i>		

LAND.

<i>Arion ater</i> and var. <i>nigrescens</i>	}	Annagh Bay, 10—20 feet.
<i>Limax agrestis</i> and vars. <i>tristis</i> and <i>sylvatica</i>		
<i>Zonites alliarius</i>		
<i>P. umbilicata</i>		
<i>Coch. lubrica</i>		
<i>Arion ater</i>	}	Slievemore Mt., 50—1000 feet.
<i>L. arborum</i> var. <i>memorosa</i>		
<i>P. umbilicata</i>		
<i>A. hortensis</i>	}	Signal Tower, 890 feet.
<i>L. agrestis</i> var. <i>sylvatica</i>		
<i>Z. alliarius</i>		
<i>P. umbilicata</i>		
<i>A. hortensis</i>	}	Gardens, the Colony, 50 feet.
<i>A. subfuscus</i> var. <i>cinereo-fusca</i>		
<i>L. agrestis</i> var. <i>sylvatica</i>		
<i>Z. cellarius</i>		
<i>Z. alliarius</i>		
<i>H. rufescens</i> and var. <i>alba</i>		
<i>P. umbilicata</i>		
<i>Coch. lubrica</i>		
<i>A. subfuscus</i>	}	Slievemore Village, 150 feet.
<i>Am. gagates</i> var. <i>plumbea</i>		
<i>H. rotundata</i>		
<i>Am. marginata</i>	}	Dugort Village, 30—50 feet.
<i>Am. gagates</i>		
<i>L. agrestis</i> var. <i>sylvatica</i>		
<i>Z. alliarius</i>		
<i>P. umbilicata</i>		
<i>S. putris</i>	}	In ditches
<i>L. truncatula</i>		
<i>P. pusillum</i>		
<i>Z. radiatulus</i>		
<i>Z. crystallinus</i>		
<i>Z. fulvus</i> var. <i>alderi</i>		
<i>V. antivertigo</i>		
<i>V. substrata</i>		
<i>V. edentula</i>		
<i>Coch. lubrica</i>		
<i>Car. minimum</i>	}	Fields, the Colony, 20—40 feet.
<i>H. rufescens</i> and var. <i>alba</i>		
<i>H. pygmaea</i>		
<i>V. pygmaea</i>		
	}	On walls

<i>S. putris</i>	}	Keel Strand, sea level.
<i>H. aspersa</i> vars.		
<i>Vit. pellucida</i>	}	The Warren, 20—70 feet.
<i>Z. nitidus</i> (one)		
<i>H. nemoralis</i> (limited)		
<i>H. ericetorum</i> var. <i>minor</i>		
<i>H. pulchella</i>		
<i>B. acutus</i> (limited)		
<i>Coch. lubrica</i>		
<i>Z. crystallinus</i>	}	Innishbiggle, 20 feet.
<i>Vit. pellucida</i>		
<i>P. umbilicata</i> and var. <i>edentula</i>		
<i>Coch. lubrica</i>		
<i>H. ericetorum</i> and var. <i>minor</i>		Keel Common, 20 feet.
<i>H. ericetorum</i> var. <i>alba</i>		Dugort, 10 feet.



NOTES ON THE VIVIPAROUS NATURE OF *BALEA*.

BY A. E. CRAVEN, F.L.S., AND EDGAR A. SMITH, F.Z.S.

(Read before the Conchological Society, May 6th, 1891.)

IN October, 1890, I found great numbers of specimens of *Balea perversa* (Lin.) among the ruins of Vianden Castle, in the Grand Duchy of Luxemburg. Nearly every specimen contained two or three young. These were already sufficiently developed as to possess about three whorls. This mollusk has, I believe, been hitherto considered as laying numerous eggs, which take several days to hatch; it, therefore, seems an interesting fact to note that it is ovo-viviparous.—ALFRED E. CRAVEN.

THE above is not the first record of the viviparous nature of *Balea perversa*. It is, however, none the less important, as it confirms the statement of Mr. Rich as given in Rimmer's 'Land and Freshwater Shells of the British Isles,' p. 169.

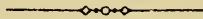
This discovery is in direct contradiction to the account (the only account, I believe) of the propagation of this species.

Bouchard-Chantereaux† says that it deposits from twelve to fifteen comparatively large eggs, which are whitish and globular and about $1\frac{1}{4}$ mill. in diameter. Deposited at the beginning of autumn, they hatch on the fifteen to the twentieth day, and the young arrive at maturity at the end of the first year. These observations have been reproduced by Moquin-Tandon and Jeffreys.

I fail to discover any way of reconciling these two contradictory accounts. Both are equally explicit and, doubtless, conscientiously given. There can be no questioning the accuracy of Mr. Craven's statements, as I have before me a series of adult specimens and of the minute shells taken from the apertures of the old ones, which he has presented to the British Museum.

I am inclined to believe that Bouchard-Chautereaux was in some way mistaken; for it seems too wild a theory to suppose, either, that after hatching the young may re-enter the parent shell, or that this mollusc has more than one mode of reproduction.—EDGAR A. SMITH.

† Cat. Moll. Terr. et Fluv. dans le Départ. du Pas-de-Calais, 1838, p. 62.



Helix lapicida v. *subangulata* Pascal.—This interesting variety, described by Pascal as similar to the type in colouring, but differing from it in the last whorl being rounded and not carinated as usual in the species, has been found in Dovedale by Mr. C. T. Musson, who kindly gave me the specimen I now possess. It has a very great resemblance in general contour and size to the *Helix cornea*, and would appear to be the same form as var. *grossulariæ* Voith. It has apparently been also noticed by Weinland, who records it as variety without keel. Perhaps more specimens may be found now that attention is drawn to its discovery in this country.—J. W. TAYLOR, *April 25th, 1891.*

ON SOME TESTACELLÆ.

BY DR. HEINRICH SIMROTH,

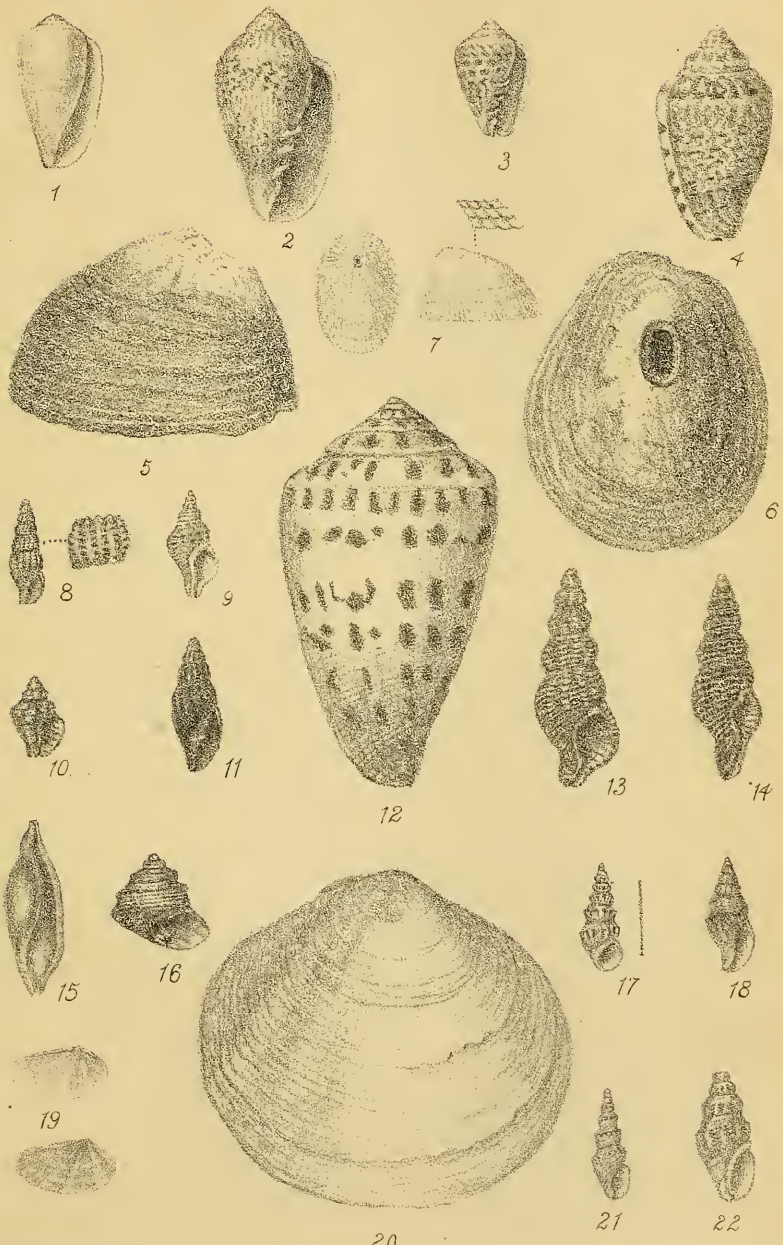
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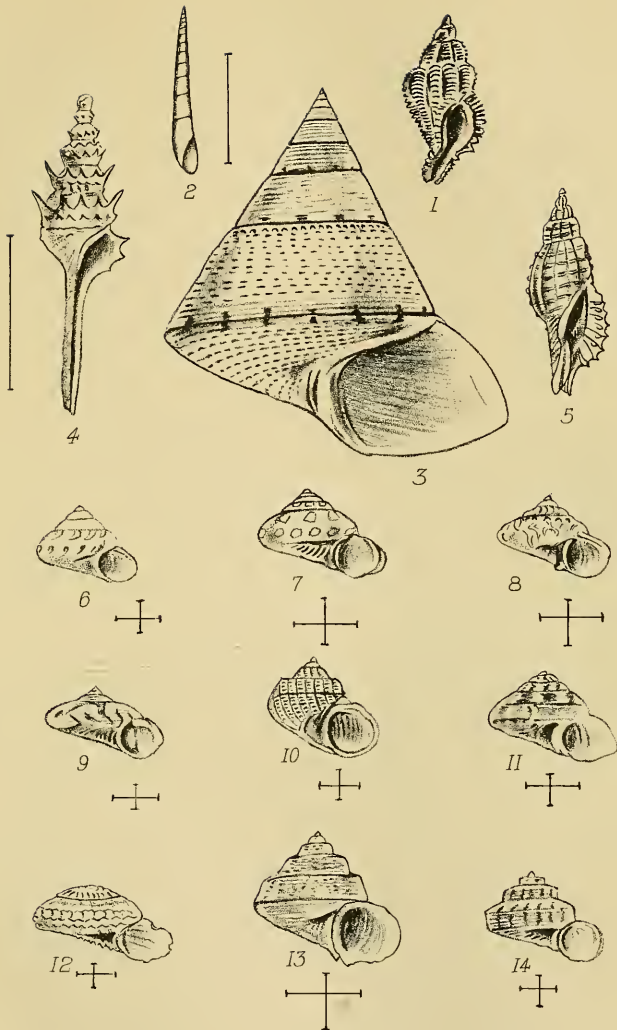
(Read before the Conchological Society, Sept. 15th, 1891).

Of the *Testacelle* sent to me from Yelverton, Norfolk, and collected by Rev S. Spencer Pearce, were three in alcohol; the other three, which had been sent alive, arrived dead and in a state of decomposition, but the dissections showed undoubtedly that all were *Testacella haliotideæ*. On this occasion I beg permission to make some remarks upon the genus in general. My treatise upon the Portuguese Slugs was written in 1887, but printed in 1891; while in the press, the work of Lacaze-Duthiers was published, and somewhat later that of Dr. Plate (*Zoolog. Jahrbücher*, bd. iv.); these treatises describe especially and in detail the *Testacelle* (and *Daudebardie*), while my attention was directed to slugs generally. The pallial organs and the integument have been treated upon in an excellent manner by Plate, and necessitate the correction of my results in several points. My studies on the reproductive system seemed to demonstrate the possibility that the new species of *Testacelle*, published by Pollonera, were mere varieties, my opinion being founded on my knowledge of the same organs in the Limaces and the comparison of Pollonera's figures. But now Plate has examined some of the new species and has found still other internal differences; and on that account I do not hesitate to acknowledge Pollonera's species. Indeed, *Testacella* is an ancient genus (and is present in tertiary deposits), but its subterranean habits give but little scope for dispersal, and it would therefore be surprising if the genus was not divided into local forms. Perhaps the *T. dubia* Poll. from Caveretto near Turin and the *T. barcinonensis* from Barcelona are only varieties of *T. haliotideæ*; the figures of the genital organs are very similar, and the English *Testacelle* I have now examined are certainly the true *Haliotideæ*, and all are in accord with the figure given by Gassies and Fischer (*Monog. Testacelle*, pl. i, fig. 15), which Mr. Taylor

has demonstrated are really those of the true *Haliotidea*, though erroneously given as *Maugei* by the learned authors; they also agree with the more exact figure of this English author (Journ. Conch., v, p. 340, July, 1888). But now arises a new difficulty, for the *Testacella haliotidea* from Trieste which I have dissected (l.c. p. ii, fig. 9) I now think should be ranged under *T. catalonica* Poll. and *T. fecchiolii* Bgt. from Settignano near Florence. The question is to be decided by malacologists resident in countries in which the species are found.

I wish to discuss still another point. As is known, in the *Testacellæ* the retractors of the pharynx and of the tentacles or ommatophores have widely separated origins. Plate has found that each of them has its own innervation. He has concluded that both are independent things. On the contrary, I have tried to derive the different muscles from the parts of the united *musculus-columellaris* of *Daudebardie*. The middle form would be the *D. saulcyi*, in which the two bundles for the pharynx and the left tentacle take rise nearly together on the left side. I think we are both right. The explanation is given by the composition of the normal *musculus-columellaris* of the *Stylomatophora*. The primary bundle is that for the pharynx only, with which the tentacle retractors unite themselves later. In *Zonites verticillus* and some *Hyalinæ* the union has not yet taken place. In other forms (*Glandina* and many *Helices*) on the other hand still more bundles for the anterior parts of the foot have loosened themselves from the integument and have been united with the *columellaris*. In the *Daudebardie* the three bundles for the pharynx and the tentacles are only a little bound together, or their origins are very close together, especially the left ones. Therefore, it is evident that the innervation of the separated muscles in *Testacellæ* cannot be an argument that they were never united with the pharynx retractor or never had the relations as in *Daudebardie*. The question is important enough with regard to other *Pulmonata* with similar separations, e.g., the *Arionidæ*, *Meghimatium*, and Caucasian *Testacellidæ*, and *Trigonochlamydina* (*Trigonochlams* and *Selanochlams*).





1. *Coralliophila andamana*, p. 31
2. *Eulima epeterion*, p. 31
3. *Zizyphinus haliarchus*, p. 32
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operculum of a Bithynia it must be wearing borrowed plumes, for the operculum of *H. similis* is altogether different; there is no similarity between the two.

Dr. Jeffreys examined Draparnaud's original type of *Cyclostoma simile* in the Montpellier Museum, and pronounced it to be our *H. similis*. (See 'British Conchology,' appendix, vol. i, p. 310).

By a printer's error, the locality Becton (or Beckton) was printed Beeton throughout Mr. Smith's notes.

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