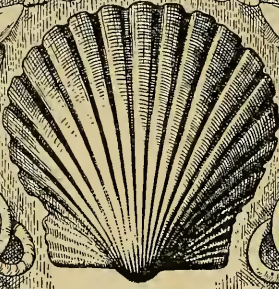


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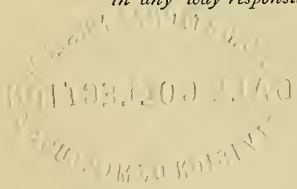
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THE  
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MARINE SHELLS OF SOUTH AFRICA, COLLECTED  
AT PORT ELIZABETH, WITH DESCRIPTIONS  
OF SOME NEW SPECIES.

By G. B. SOWERBY, F.Z.S.

**Argonauta kochiana** Dunker,—The smallest species of the genus, from an inch to an inch and a half long. It is allied to *A. hians*, but much more closely ribbed, and with the surface crisply granulated.

**A. argo** Linnæus.—Some of the largest specimens of this species are found at the Cape. Although tolerably abundant in the Mediterranean, the specimens never attain to so large a size.

**Murex uncinarius** Lamarck (= *M. capensis* Sowerby).—A remarkable little species with fronds curiously hooked.

**M. dunkeri** Krauss.—A small species rather like a *Purpura*.

**M. kieneri** Reeve.—Another small species, characterised by a deep suture, numerous raised crenulated varices, abruptly terminating, and leaving a deep channel near the base.

**M. purpuroides** Dunker.—With strong transverse nodulous ribs.

**Fusus robustior** Sowerby ('Thesaurus Conchyliorum, vol. iv., p. 82, fig. 63). Hardly ever found excepting in very imperfect condition.

**Cominella capensis** Dunker.—Orange colour. The specimens are mostly worn.

**C. lagenaria** Deshayes.—Not uncommonly found alive, clad in dark-brown scabrous epidermis.

**C. porcata** Gmelin (= *C. ligata* Reeve).

**C. elongata** Dunker.—Like *C. capensis* in form, but of a greyish colour, mottled and spotted with brown.

**C. tigrina** Kiener (*Buccinum*).—Allied to *C. lagenaria*.

**C. puncturata** Sowerby, nov. sp.—*Testa elongata, tenuicula, pallide lutea, interdum fusca, fascia pallida balteata; spira elata, acuta; anfractus 6, superne declives, deinde biangulati, ubique spiraliter costata; costis numerosis, parum elevatis, interstitiis puncturatis; anfractus ultimus convexus, vix angulatus, inferne attenuatus; apertura ovata, mediocriter lata, canali brevi, leviter recurva. Long. 15, maj. lat. 5 mill.*

Shell elongated, rather thin, pale yellow, sometimes brown, with a pale band; spire elevated, acute; whorls sloping above, then bi-angulated, spirally ribbed throughout; ribs numerous, but very slightly raised, interstices punctured; last whorl convex, scarcely angulated, attenuated below; aperture ovate, moderately wide, canal short, slightly recurved.

A delicate gracefully formed species.

**Euthria fusco-tincta** Sowerby, nov. sp.—*Testa elongata, solidiuscula, alba, fusco irregulariter tincta; spira elata, acutiuscula, sutura impressa; anfractus 7, lævissime convexi, spiraliter obscurissime sulcati; anfr. ultimus convexus, medio fusco balteatus, inferne attenuatus; apertura ovata, mediocriter lata, canali brevi, columella leviter reflexa. Long. 20, lat. 7½ mill.*



Shell elongated, rather solid, white, irregularly tinged with brown; spire elevated, rather acute, whorls very slightly convex, very obscurely spirally grooved; last whorl convex, with a brown band, attenuated towards the base; aperture moderately wide, canal rather short, columella slightly reflexed.

Not having the operculum, I cannot place this species with certainty, but it appears to be an *Euthria*, somewhat allied to Hutton's *E. bicincta* from New Zealand.

**Bullia lævigata** Martini.—A broad heavy species.

**B. achatina** Lamarck.

**B. rhodostoma** Gray.—Has little to distinguish it from *B. achatina*, excepting the red lip, and an orange-coloured spiral rib at the base.

**B. digitalis** Meusch.—Narrower and more sharply acuminate than *B. achatina*.

**B. semiusta** Reeve.—In form like *B. digitalis*, but with the lower half of the whorls dark brown.

**B. annulata** Lamarck.—A very well defined species stouter than *B. achatina*, with an angular keel at the top of the whorls, and the whole surface spirally grooved.

**B. callosa** Gray.—Rarely found at Port Elizabeth.

**B. tenuis** Gray.—A rather light species, with a broader body-whorl, and wider mouth than *B. achatina*.

**B. pura** Melvill ('Journal of Conchology,' vol. iv., p. 316).—A newly described species, smaller than *B. achatina*, with a much more slender spire, and with the entire surface strongly grooved.

**B. diluta** Krauss.—A partially grooved species of slender form, with a row of brown dots above the middle of the whorl, and faint longitudinal flames.

**Cominella unifasciata** Sowerby, nov. sp.—*Testa ovata, albida vel pallide lutea; spira acutiuscula, anfractus 6, superne*

*fascia fusco-aurantia ornati, medio angulati nodoso plicati; anfr. ultimus inferne attenuatus; apertura mediocriter lata, fauce costata. Long. 13, lat. 7½ mill.*

A short angular species, distinguished by a reddish-brown belt at the top of the whorl joining the suture. The specimens received are all in worn condition.

- C. angusta** Sowerby, nov. sp.—*Testa anguste acuminata pallide fulva, punctis rufis sparsim picta; spira elata; anfractus 8, convexi, cancellati; apertura brevis; columella sinuata. Long. 14, lat. 4 mill.*

An elegant little species with a long narrow spire, of a pale reddish yellow, with a few red spots. The spots are in most cases arranged in a single or double row just below the middle of the whorl.

- Nassa pulchella** A. Adams.—A pretty, well-known species.
- N. cerotina** A. Adams.—Closely allied to *N. pulchella*, of a uniform red or yellow colour, light at the base.
- N. coccinea** A. Adams.—Shorter than *N. cerotina*. Colour red, orange, or pale yellow, sometimes banded.
- N. plicosa** Dunker (= *speciosa* A. Adams).—A fine whitish species, tinged with reddish-brown at the base.
- N. kraussiana** Dunker.—A species approaching very closely to the sub-genus *Cyclops*.
- Desmoulea abbreviata** Wood.—This is the largest species of the genus. When adult it is almost always decollated.
- D. retusa** Lamarck.—A prettily coloured species, varying from bright orange to crimson and purple. Always decollated, excepting when quite young.
- D. pyramidalis** A. Adams.—Of pyramidal form, more like a typical *Nassa*, than the two preceding. Usually palish orange colour, with a brown columella.
- Purpura squamosa** Lamarck.
- P. cingulata** Linnæus.—A very curious white species, of a screw-like appearance.

- P. cataracta** Chemnitz.
- P. capensis** Petit.—Mr. Tryon in his 'Manual of Conchology' quotes this species as a variety of the Japanese *P. luteostoma*. In this I can hardly agree with him.
- Pleurotoma sinuatum** Deshayes (= *P. buccinoides* Kiener).—A more or less ribbed species with a brown or black epidermis, which has been made the type of a genus (*Clionella* Gray), and erroneously classed with the family *Melaniidæ*.
- P. rosaria** Reeve.—A smaller species resembling *P. sinuatum* in form, but orange or rose colour.
- P. kraussi** Smith.—Another species of the *Clionella* section; whitish, with waved brown lines.
- P. subventricosus** Smith.—Somewhat like *P. kraussi*, but much less prominently ribbed.
- P. semicostata** Kiener.—Whitish, with prominent ribs in the middle of the whorls.
- P. castanea** Reeve.—The specimens are of a darker colour than Reeve's type. It is a small dark-brown species of the *Drillia* section.
- P. hottentota** Smith.—A small species with a long spire and short mouth, generally white below and light-brown above, with a brown band at the top of the whorls.
- P. caffra** Smith.—An orange-coloured species with rather a large body-whorl, and comparatively open mouth.
- P. diversa** Smith.—This pretty little species seems to be rarely found. It is allied to *P. caffra*, but the longitudinal ribs are made conspicuous by the intervention of dark brown flames.
- P. capensis** Smith.—A species of the *Defrancia* section, with a crisply cancellated surface, reminding one of the British *P. reticulata*, &c.
- P. tripartita** Smith.—A fine species, very rarely found in good condition.

- P. rousi** Sowerby, nov. sp.—*Testa oblonga, albida, atro-fusco grandimaculata, lineis fuscis transversis et hic illic longitudinalibus reticulata; spira mediocriter elata, apice? (decollato); anfractus superne leviter concavi, deinde convexi, longitudinaliter costati; costis conspicuis, rotundatis, superne angulatis, basin versus evanidis; apertura latiuscula, sinu latiuscula superne emarginata canali brevissimo. Long. 20, lat. 8 mill.*

Shell oblong, whitish, with large dark-brown blotches, and reticulated with transverse and here and there longitudinal brown lines; spire moderately elevated, apex? (decollated); whorls concave above, then convex, longitudinally ribbed; ribs conspicuous, rounded, angled above, fading away towards the base; aperture rather wide, with rather a wide sinus at the upper part, and a very short canal.

Specimens in poor condition.

- P. bairstowi** Sowerby, nov. sp.—*Testa fusiformis, atro fusca; anfr. 7, convexiusculi, costis brevibus albidis (in anfr. ult. circ. 12) ornati; apertura elongata, mediocriter lata, sinu latiusculo marginata; canali brevissimo. Long. 14, maj. lat. 5 mill.*

Shell fusiform, very dark brown; whorls 7, ornamented with short whitish ribs (about 12 on the last whorl); aperture elongated, moderately wide with a rather broad sinus at the upper part, and a very short canal

**Melapium bulbosum** Wood.—This species is distinct from the *M. lineatum*, with which it has been confounded. The shells, which are longitudinally streaked with numerous brown lines, are scarcely ever more than  $1\frac{1}{4}$  inches in length. *M. lineatum* is a species of very rare occurrence and probably inhabits a different part of the world. The specimen of it in the British Museum is nearly  $2\frac{1}{2}$  inches

long ; compared with *M. bulbosus* it is of lighter growth, the longitudinal lines are broader and more distant, and a sharp prominent keel crosses the columella.

**Eburna papillaris** Sowerby.—This very rare species has not yet been discovered in perfect condition.

**Separatista grayi** A. Adams.—A very curious shell, rarely found.

**Ancillaria obtusa** Swainson.—A very remarkable, and, when in good condition, handsome species.

**A. obesa** Sowerby.—This pretty little species seems to be plentiful at Port Elizabeth, but as is the case with most of the species, perfect specimens are not so common.

**A. lineolata** A. Adams.—Not common.

**A. cinnamomea** Lamarck.—Generally smaller than the Red Sea specimens.

**Triton doliarius** Lamarck.—A well-known, but curious species, having as much the appearance of a *Dolium* as of a *Triton*.

**T. africanus** A. Adams.—Although of very different appearance, I strongly suspect that this belongs to the same species as the last ; the upper whorls are identical, but the last whorl is elongated and without spiral ribs. In one specimen before me the strong raised spiral ribs reach a varix just after the commencement of the last whorl, up to which point anyone would pronounce the shell to be *Triton doliarius*, after which its character is entirely changed.

**T. klenei** A. Adams.—A species allied to the Australian *T. exaratus* (Reeve).

**T. nodiferus** Lamarck.—Of rather more compressed form, and with more clouded markings than the Mediterranean species. I think that to separate Reeve's *T. saulix* from this species, is to draw too fine a distinction.

**Ranella leucostoma** var. — (?).—Constantly distinguished from the Australian typical form by the lip being bordered with dark brown blotches.

**R. argus** Gmelin.

**Fasciolaria heynemani** Dunker (= *purpurea* Jonas). — Specimens all imperfect, mostly much worn and broken.

**Latirus bairstowi** Sowerby nov. sp.—*Testa turrata, atro-fusco; anfractus 8-9, leviter convexi, longitudinaliter plicati, liris pallidis spiraliter cingulati; anfr. ultimus maj. convexus, ad basin productus, attenuatus; apertura parva, ovata, intus lirata; canalis longiuscula, leviter recurva. Long. 27, maj. lat. 8 mill.*

Shell turrited, dark brown; whorls 8, slightly convex, longitudinally plicated, encircled with pale spiral ridges; last whorl more convex produced at the base; aperture small, oval, interior ridged; canal rather long, slightly recurved.

**L. rousi** Sowerby, nov. sp.—*Testa turrata; spira acutiuscula; anfractus 9, leviter convexi, longitudinaliter plicati, liris numerosis confertis planulatis atro-fuscis (interstitiis fulvis) cingulati; anfractus ultimus convexus, ad basin contractus; apertura ovato breviuscula, intus lyrata; canalis brevis recurva. Long. 30, maj. lat. 10 mill.*

Differing from *L. bairstowi* in the shortness of the canal, and in the spiral ridges being dark brown, flattened and broader than the interstices, which are light fulvous brown.

**Voluta (Callipara) bullata**, Swainson.—A remarkable species, mostly found in very worn and broken condition.

I believe no living specimen has ever been obtained.

**Mitra picta** Reeve.

**M. latruncularia** Reeve.

**M. patula** Reeve.

**Marginella mosaica** Sowerby.—A beautiful species of great rarity.

- M. poucheti** Petit (= *M. vittata*, Reeve).—Very rarely found in good condition.
- M. piperata** Hinds.—Several varieties.
- M. piperata** var. *albocincta* Sowerby.
- M. lineolata** Sowerby, nov. sp. — *Testa pyriformis, lævis cærulescente-cinerea, punctis tenebrosis unbratis hic illic conspersa, lineis numerosis tenuissimis undulatis longitudinaliter notata; spira conica, apice obtuso; anfractus superne concavo-declives, deinde convexi; anfr. ultimus convexus, superne sub-humerosus, inferne leviter attenuatus; apertura latiuscula; labrum reflexum, albidum; collumella rectiuscula, quadriplicata. Long. 30, lat. 15.*

Shell pyriform, smooth, bluish ash colour, with here and there a sprinkling of dark shaded spots, and marked with numerous very thin longitudinal waved lines; spire conical, with an obtuse apex; whorls concavely sloping above, thence convex; last whorl convex slightly shouldered above and a little attenuated towards the base; aperture rather wide; lip reflexed, whitish; columella rather straight four-plaited.

Beach-rolled specimens of this species have been familiar to me for some time, but a perfect specimen having now come to hand, I describe it, as I could not have done previously.

- M. bairstowi** Sowerby, nov. sp.—*Testa sub-ovata, albida, maculis umbratis, griseis undulatis picta; spira abbreviato-conica, apice obtuso; anfractus superne concavo declives; anfr. ultimus superne obtuse angulatus, infra angulum lævissime convexus, basin versus aliquanto attenuatus; apertura mediocriter lata; peristoma simplex; labrum reflexum, incrassatum, album vix arcuatum; columella rectiuscula, quadriplicata. Long. 15, maj. lat. 9 mill.*

Very like *M. mosaica* in form, but much smaller, and without the transverse rows of oblong dark brown spots so characteristic of that species.

- M. paxillus** Reeve.—A whitish shell of the *Volvaria* section.
- M. pellicula** Marrat.—A white species with the apex entirely immersed, looking much like a *Bulla* of the *Atys* group.
- M. zonata** Kiener.—A smallish species of the *Volvaria* section, encircled with two narrow brown bands.
- M. dunkeri** Krauss.—Much like *M. zonata*, and probably a variety of it, with a broad central brown zone.
- M. capensis** Dunker.
- Columbella albuginosa** Reeve.
- C. cerealis** Menke (*Buccinum*).
- Alcira elegans** H. Adams.
- Cassis achatina**, Lamarck.
- Dolium favanni** Hanley.
- Natica genuana** Reeve.—I have only recently obtained specimens of this species with their opercula. The operculum is white, smooth, and shining, with a short curved rib near the basal margin.
- N. forata** Recluz.—I have not yet seen the operculum of this species.
- Scalaria lactea** Krauss.—A small white finely-ribbed species.
- S. clathrus**, Linnæus (*coronata* Lamarck).
- Terebra capensis** Smith.—A small white species, with a pale brown band at the top of the whorls, and at the base.
- Chemnitzia candida** A. Adams.
- Eulima solida** Sowerby.—A small species, rather broad at the base and slightly flexuose towards the apex.
- Conus rosaceus** Chemnitz.—A very variable and beautiful species, comprising *C. aurora* (Lamarck), *C. loveni* (Krauss), and *C. tinianus* (Hwass).
- C. infrenatus** Reeve.—An exceedingly beautiful species, of which there are several varieties.
- C. pictus** Reeve.—A pretty species, very rarely found.
- C. lautus** (Reeve) var. — (?) —Rare, only worn specimens.
- C. caffer** Krauss.—Rare, only worn specimens.



- C. jaspideus* Kiener.—Rare, only worn specimens.
- C. algoensis* Sowerby.—Rare, only worn specimens.
- Cypræa* (*Cypræovula*) *capensis* Gray. — This curious species has recently been found in very good condition.
- C. fusco-dentata* Gray. —A rare species, only found in more or less worn condition.
- C. edentula* Sowerby.—Very fresh specimens recently to hand.
- C. (Trivia) oniscus* Lamarck.—The largest and handsomest species of the *Trivia* section.
- C. (Trivia) ovula* Lamarck.
- C. (Trivia) formosa* Gaskoin.—Rare.
- C. (Trivia) pellucidula* Gaskoin.
- Cancellaria foveolata* Sowerby.
- C. semidisjuncta* Sowerby.—A curious species of very distinct type, very rarely found in good condition.
- Littorina africana* Philippi.
- Turritella carinifera* Lamarck.—A curious strongly keeled species.
- Trochita helicoidea* Sowerby ('Thesaurus Conchyliorum').
- Crepidula aspersa* Dunker.
- C. aculeata* Gmelin.
- C. hepatica* Deshayes.
- C. lentiginosa* Sowerby.
- Phasianella capensis* Dunker.
- P. kochii* Philippi.
- P. elongata* Krauss.
- Turbo natalensis* Krauss.
- T. cidaris* Gmelin.
- T. sarmaticus* Linnæus.—Operculum very curious.
- Trochus (Ziziphinus) ornatus* Lamarck. — In curious colours.
- T. (Ziziphinus) euglyptus* A. Adams.—Rare.
- T. (Gibbula) granulosa* Dunker (*Delphinula*).
- T. (Oxysteles) impervia* Menke.

- T. (*Oxysteles*) *merula* Chemnitz.  
T. (*Oxysteles*) *tabularis* Krauss.  
T. (*Gibbula*) *capensis* Gmelin.  
*Stomatella cancellata* Krauss.  
*Haliotis midæ* Linnæus.  
H. *sanguinea* Hanley.  
H. (*Padollus*) *parvus* Linnæus.  
*Clanculus carinatus* A. Adams.  
*Fissurella calyculata* Sowerby.  
F. *incarnata* Krauss.  
F. *natalensis* Krauss.  
F. *cruciata* Krauss.  
F. *australis* Krauss.  
F. *concatenata* Crosse and Fischer.  
*Fissurellidia hiantula* Lamarck.  
*Pupillia aperta* Sowerby.—Shell like that of *Fissurella*, but  
with a very large orifice.  
*Patella capensis* Reeve.  
P. *cochlear* Born.  
P. *compressa* Linnæus.  
P. *argenvillei* Krauss.  
P. *granatina* Linnæus.  
P. *rustica* Linnæus  
P. *tabularis* Krauss.  
P. *oculus* Born.  
P. *plicata* Born.  
P. *umbella* Gmelin.  
P. *dunkeri* Krauss.  
P. *echinulata* Krauss.  
P. *exarata* Nuttall.  
P. *granularis* Linnæus.

- P. variabilis** Krauss.  
**P. (Nacella) pruinosa** Krauss.  
**P. (Helcion) pectinatus** Linnæus.  
**Gadinia costata** Krauss.  
**Chiton gigas** Chemnitz.  
**C. tulipa** Quoy.  
**C. spiculosus** Reeve.  
**Tornatella alba** Sowerby.



## LAND AND FRESHWATER SHELLS IN NORMANDY.

By SYDNEY C. COCKERELL, M.C.S.

During the summer of the present year (1885) I paid a short visit to Normandy, and though I was unable to devote much time to collecting, I secured a fair number of species, with two exceptions indigenous to the British isles. Most of my observations were made at Veules-en-Caux, fifteen miles west of Dieppe. The shore was unfavourable to marine shells, and I only noticed a few littoral kinds such as *Littorina rudis*, *Trochus umbilicatus*, and *Purpura lapillus*. To judge from the heaps of the last-named outside the cottages it would appear that it is largely used as an article of diet.

I append a full list of the land and freshwater species, with localities and remarks :—

- Sphærium corneum** (L).—Rouen.  
**S. rivicola** (Leach).—River Seine, Rouen.  
**S. lacustre** (Müll.).—Sotteville, near Veules, in the hardened mud of the ponds, which were all dried up owing to the excessive drought.  
**Pisidium pusillum** (Gmelin).—Veules.  
**Paludina vivipara** (L.).—Rouen.  
**Bythinia tentaculata** (L.).—Rouen.  
**Valvata piscinalis** (Müll.).—Rouen.  
**Planorbis complanatus** (L.).—Rouen.

- P. corneus* (L.).—Rouen.
- P. contortus* (L.).—Rouen.
- P. vortex* (L.).—Rouen.
- Physa fontinalis* (L.). — Abundant in the *cressonière* at Veules.
- Limnæa peregra* (Müll.). — A stunted variety occurs in abundance on the banks of the Seine at Rouen, with a small form of *L. palustris*, similar to the var. *conica* Jeff.
- L. peregra* var. *ovata* Drap.—Veules.
- L. palustris* (Müll.).—Near Dieppe.
- L. palustris* var. *tincta* Jeff.—Veules.
- Ancylus fluviatilis* var. *albida* Jeff.—Abundant, but small, in the *cressonière* at Veules.
- Arion ater* var. *rufa* (L.).—Rouen and Veules. Abundant.
- A. hortensis* Fér.—Veules.
- Amalia gagates* var. *plumbea* Moq.—This variety occurs in a garden at Veules.
- Limax maximus* L.—With *A. gagates*.
- L. agrestis* L.—Veules and Rouen.
- L. lævis* Müll.—On an old water-mill at Veules.
- L. arborum* B.-Ch.—Abundant after a shower on the beeches in the Château Grounds at Veules. They seem to cling very loosely and fall to the ground when touched.
- Succinea putris* (L.).—Veules.
- S. elegans* Risso.—I found two examples of this species on a steep bank near Dieppe. There was no water near.
- S. Pfeifferi* Rossm.—Rouen.
- Vitrina pellucida* Müll.—Puys, near Dieppe.
- Zonites cellarius* (Müll.).—Veules.
- Z. draparnaldi* Beck.—Veules and Rouen.
- Z. alliarius* (Miller).—Veules.
- Z. glaber* Stud.—Veules and Rouen.
- Z. nitidulus* var. *nitens* Mich.—Veules.
- Z. radiatulus* (Alder).—Veules.
- Z. nitidus* (Müll.).—Near the Seine at Rouen.

**Z. crystallinus** (Müll.)—Veules.

**Helix pomatia** L.—Dieppe.

**H. aspersa** Müll.—Everywhere. The most common form at Veules was the dark one with no distinct bands. I also noticed there one specimen each of the vars. *grisea* Moq. and *conoidea* Picard.

**H. nemoralis** L.—Dieppe, Puy, Veules, and Rouen. I have only one specimen from Dieppe, which is var. *rubella* 10345. From Veules I have several including *rubella* 00300, 12345, and *libellula* 00000, 12345, 12045. At Rouen I took var. *castanea* 00300, var. *rubella* 00000, 00045, and var. *libellula* 00000, 00300, 00045, 00345, 02335, 12345, 123(45). The most abundant form was that with the two first bands missing. Curiously enough I found this form predominant at Brussels in 1883—it appears to be rather local in England.

**H. hortensis** var. *lutea* Moq. 00000, Dieppe. Veules yielded several interesting varieties including *lutea* 00000, 00300, 00305, 10305, 1(234)5, 10305, *arenicola*, and *incarnata* 00000 *fuscolabiata*.

**H. cartusiana** Müll.—Rouen, Puy, and Dieppe, some being as large as small *H. cantiana*.

**H. concinna** Jeff.—Rouen.

**H. hispida** L.—Puy and Veules.

**H. virgata** Da Costa and var. *albicans* Grat. Puy and Veules.

**H. caperata** Mont.—Puy.

**H. ericetorum** Müll.—Rouen.

**H. rotundata** Müll.—Rouen and Veules.

**H. pulchella** Müll.—Veules.

**H. pulchella** var. *costata* Müll.—Rouen.

**H. limbata** Drap.—Rouen; with vars. *albina* and *minor*. The animal appears to be light and dark according to the colour of the shell.

**Bulimus obscurus** (Müll.)—Veules and Rouen.

*Pupa secale* Drap.—Rouen.

*P. umbilicata* Drap.—Rouen and Veules.

*P. marginata* Drap.—Rouen and Veules.

*Balea perversa* (L.).—Veules.

*Clausilia rugosa* (Drap.).—Veules.

*Clausilia rugosa* var *gracilior* Jeff.—Veules.

*C. parvula* Stud.—Extremely abundant on the coarse grass of the chalk hills at Rouen.

*Cochlicopa lubrica* (Müll.).—Veules.

*Achatina acicula* (Müll.).—Rouen.

*Carychium minimum* Müll.—Rouen and Veules.

*Cyclostoma elegans* (Müll.).—With *Cl. parvula* and *H. ericetorum* at Rouen. All shades of colour from light grey to deep purple (v. *violacea*).

I may mention that in the Museum at Rouen, I noticed specimens of *Unio pictorum*, *U. batavus*, and *U. littoralis* from the Seine, but I had no opportunity of searching for them at low water.

Of the fifty-seven species given above, eleven, viz., *A. gagates*, *L. lævis*, *S. elegans*, *Z. alliarius*, *Z. glaber*, *Z. radiatulus*, *Z. crystallinus*, *H. concinna*, *H. pulchella*, *Pupa umbilicata*, and *Balea perversa*, are not in the Amiens list published by the Linnean Society of the North of France.



**Helix nemoralis** and **H. hortensis** in Dorset.—Mr. A. Belt has sent me a number of both these species from Chideock, near Bridport. Some of the banded-varieties are sufficiently unusual to be worth recording. They are:—*H. nemoralis* var. *petiveria*, 123<sub>x</sub>45 and (123<sub>45</sub>); *H. hortensis* var. *roseozonata* (12345), *baudonia* (12)3<sub>x</sub>(45), (12)3(45), (123)(45), and (12345), *arenicola*(12)34<sub>5</sub>, 10345<sub>x</sub>, *lutea-roseolabiata* 123(45), *lutea* 00300, 12345, and 12345. By *roseozonata* I mean the pink-banded variety somewhat allied to *arenicola*. Mr. Belt also sent some very characteristic examples of *Limnæa peregra* var. *intermedia* Fér., and a broken *H. arbustorum* from the same locality.—  
T. D. A. COCKERELL, M.C.S.

NATURE AND DEVELOPMENT OF THE HAIRS  
OR BRISTLES ON SOME LAND AND FRESH-  
WATER SHELLS, &c.

BY WILLIAM JEFFERY.

BEING HIS VALEDICTORY ADDRESS AS PRESIDENT OF THE CONCHOLOGICAL SOCIETY  
FOR THE YEAR 1885.

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GENTLEMEN,—Just about the time when you did me the honour of electing me President of the Conchological Society, the subject of the manner of formation and the uses of the hairs or bristles with which the shells of some of our land snails are covered had attracted my attention, and I went so far as to ask our secretary (Mr. Bell) if any information had been published on the subject. His reply was in the negative, so far as he and Mr. Taylor were aware, and he advised me to make the matter a subject of study.

Since then I have been urged by these gentlemen, and other members, to make it the subject of an address to you on the termination of my year of office.

I then felt that it would be out of my power altogether in the short space of time at my disposal to do so, but having paid some attention to the subject through the past summer, I have, not without much diffidence, decided to lay before you such ideas and facts as have occurred to me, with the hope that they may lead to a farther elucidation of the subject, by others, when once started.

We have not many species to deal with. The late Dr. Jeffreys notes this peculiarity in six species only, viz. *Helix rufescens*, *H. concinna*, *H. hispida*, *H. sericea*, *H. revelata*, and *H. obvolvata*.

I. In *H. rufescens*, Dr. Jeffreys states that 'the young are really hispid up to four whorls.' I cannot endorse this statement, in fact I take it to be an error. This is a very common species here—far too common in my garden, and having examined a great many during the summer, in no single instance have I found a trace of hair or bristle.

II. Of *H. concinna* he says 'epidermis sparsely covered with short white hairs which are easily rubbed off'; and further, comparing it with *H. hispida*, 'more scattered and easily shed.'

III. *H. hispida*. 'Epidermis closely covered with short recurved white hairs, which are persistent and not easily rubbed off.'

IV. *H. sericea*. 'Epidermis closely covered with rather long and very fine white downy hairs, which are persistent, and when rubbed off leave their sockets very perceptible, giving the surface in that case a finely granulated appearance.'

V. *H. revelata*. 'Epidermis covered with short white hairs, which are easily rubbed off.'

VI. *H. obvolvata*. 'Epidermis very thick, closely covered with stiff reddish-brown hairs.'

My protest against including *H. rufescens* thus leaves us with five species having hairs or bristles. I may say of *H. revelata* I have not had an opportunity of examining specimens.

In addition, however, to these, we may mention *H. aculeata*, *H. pulchella* var. *costata*, amongst the land, and *Planorbis nautilius* var. *cristata*, amongst the freshwater, as affording somewhat analogous formations.

*H. aculeata* has a series of laminated plates, rising at regular intervals, from the surface of the shell across the whorls, and terminating in short thick bristles.

*H. pulchella* var. *costata* and *P. nautilius* var. *cristata* have similar plates, and in one of the specimens of the latter, in the micro-slide, they may be seen approaching to something like a spine.



In the case of *H. pulchella* v. *costata*, I am setting aside the verdict of the referees of the Conchological Society, under the impression that the specimens I sent them on October 16th, 1882—the same as now exhibited in the micro-slide—were examined under unfavourable circumstances, and are really of that variety.

*H. lamellata* would probably also come in with these, but I am not acquainted with it.

And now with regard to the way in which these bristles are formed erect, or nearly so, on the surface of the shell—the point to which my attention was at first attracted—I think I may say I have a clue.

Many plants, perhaps we may go so far as to say most plants, have hairs, some of stellate and other forms interesting as microscopic objects, and here the enquiring mind may ask, how are they formed? and what purpose do they serve?

Why are thistles generally spiny? or why is the nettle supplied with a poisonous spine-like hair?

But this is a matter of growth, which may be compared with that of the mollusc rather than of its shell.

The snail grows according to the amount of food supply and surrounding influences, but the shell of the snail is generally understood to be formed by matter deposited by the mantle as the mollusc requires it, and probably at its own will and perception of the necessity.

The Holly-leaf is spiny, and is said to become more so about the lower parts of the bushes that are browsed by cattle. This appears as a wise provision in nature to prevent the destruction of the plant by being constantly fed off, until it has got above the browsing line (where the leaves become less fully armed with spines), and would appear also to be reactionary on the browsing.

But in our mollusca, so far as our land and freshwater species are concerned, we fail, I think, to trace either protection by the bristle or the necessity for it.

Observations made of the lip of snails' shells while in the process of formation have, I believe, revealed to me the fact that the bristles are formed in the first place not in a perpendicular, but in a horizontal, position, *i.e.*, in a line with the continuation of the whorl.

We will suppose, as I think is the generally accepted theory, that the whole thickness of the shell is formed in several layers. If we take a snail with its shell in the process of formation, we find the extreme edge of the mouth very thin and fragile, and we may take it that the epidermis being the outer coating, is the first formed, and with that the epidermal hairs or bristles, which I imagine to be formed in a line with the growth, a fringe as it were on the edge, lying on the surface of the mantle, and of course in the earliest stage in a state of thick mucus, which fringe gradually hardening with the epidermis is by the formation of the under layer next following, which probably includes in most cases some calcareous matter, gradually forced into a perpendicular position, or one nearly approaching it, while the points of the fringe, being last formed, are least hardened, thus accounting for the drooping of the points of the bristles.

Probably other collectors, as well as myself, have noticed that if on coming home from a day's collecting too late, or too tired, to pay proper attention to the molluscs collected, they will be found next day, where huddled together in the box, bottle, or bag, to have made considerable depredations on the shells of each other by gnawing off patches of the epidermis, either in exasperation at the confinement or from hunger, and in such cases those which have bristles are quickly denuded of them. This has happened to me with *H. obvolvata*.

We are here brought to another point illustrating the same process of denudation. As each succeeding whorl of a shell being formed overlaps the preceding the bristles have to be stripped from the periphery, for they would be objectionable on the inner wall of the molluscan home, and this must be the work of the jaw of the mollusc itself.

With regard to the inclination of the bristles, so far as I have been able to ascertain, they appear in *H. hispida* to be directed forward towards the mouth of the shell on the left periphery, and of course, following the whorl round, they point backwards on the right side.

In *H. sericea* they are nearly perpendicular, with no regular inclination, except that on the recurved and thickened portion of the mouth of the shell, the curvature of the shell here causes them to point backwards.

In *H. obvoluta* the tendency seems to be rather the reverse to that in *H. hispida*, but I cannot speak positively without more time and further observation.

The only species in which the bristles are decidedly persistent, and we may say permanent, is *H. sericea*.

I have not seen a specimen in which any great amount of denudation has taken place and the bristles are not easily detached in any quantity with a penknife.

Of the uses of these bristles, I will not attempt to offer an opinion, it is a subject which cannot be treated on by one whose study of the mollusca has been confined to our own land and freshwater forms, at all events in so short a space of time as I have had at my disposal during the past year.

A botanical friend of mine tells me that what I have called spines on the Holly and Thistle are considered by botanists as hairs only, and that spines are such only as contain a portion of woody substance, as in the case of the Whitethorn, Blackthorn, &c.

Therefore with the impression that these epidermal hairs, formed with the first or outside layer of shell, are composed of the same matter only as the epidermis, and would, from a botanist's point of view, be designated simply as hairs and not spines, I have contented myself by writing of them as hairs or bristles.

Having recently had an opportunity of seeing the general or foreign portion of the conchological department (which is all that is at present on view) in the South Kensington Museum, I noticed that in several families we have spine-like formations of considerable proportions which appear to be of a shelly nature, and may be compared with the spines proper of the botanist, *e.g.*, the Muricidæ, Neritinidæ, Trochidæ, Tridacinidæ, Pinnidæ, and notably Spondylidæ. These spines no doubt have their uses, but I should only be getting farther out of my depth were I to hazard an opinion as to what they may be.

The whole question of the formation and uses of the shells of our mollusca, from the rudimentary internal form as seen in the Cuttle and the Slug, to the handsome shell-homes which we see allotted to others, is well worthy of investigation by the conchologist. The abnormal forms of our common shells and the reasons and causes which lead to the change of form, together with the variable bandings and other markings, should engage the attention of those who have the opportunity with regard to elucidation.

Two small artificial ponds in my garden have produced some interesting forms of *Limnæa auricularia* and *L. stagnalis*, some of which I exhibit this evening, others have been shown before.

The latter species (from the same stock) has quite a different form of shell when grown in another pond, as will be seen by my examples. The garden ponds are, without doubt, supplied with water from our chalk hills, and conveyed some distance by an iron pipe, while the other water is from another spring, which I think *may be* derived from our clay hills.

The shells in the garden ponds are generally coated thickly with a lime deposit from the water, on which deposit there may often be seen a lengthened confervoid growth, which sometimes entirely impedes the progress of the snail, occasionally causing its death.

All my specimens from the garden ponds, which are anything like clean, have been subjected to a scraping and brushing process, while those from the other pond were clean without it.

The extended, and in many cases, labiate growth seen in these shells, as I have before remarked (J.C., vol. iv., p. 263), occurs in the late summer when the season of reproduction is mostly over, and when we may suppose that the mollusc is endeavouring to 'lay on flesh,' in order to meet the period of fasting through the coming winter, and that expansion of body would require extension of shell is palpable.

Some of my specimens, it will be seen, have double lips. The second or inner lip is formed in the spring following; and here we may note that the body probably suffers emaciation through the period of hibernation, and hence the contraction of the home by the formation of the inner lip in the spring.

Before leaving these ponds I will allude to two specimens of *L. auricularia* which I have taken in them this past summer, which seem to agree in form with the var. *labiata* of *L. stagnalis*. I send them for exhibition.

There are two specimens in the South Kensington Museum, from Kashmir, very like them, but I forget if the variety is there named or not.

I will here bring my paper to a conclusion by calling attention to two errors, as I take them, in published works, with regard to the formation of shells.

Firstly, Dr. Jeffreys, in his introduction to 'British Conchology,' p. 48, states on the authority of Mr. E. J. Lowe, respecting the growth of shells, that 'most species bury themselves in the ground to increase the dimensions of their shells.'

I cannot help thinking there is some mistake in this statement. That many species, *H. aspersa* for instance, do excavate a hole in the ground and partly bury themselves for the purpose of depositing their ova I have had frequent evidence. Mr. Lowe may have been misled by this.

And secondly, Mr. Adams in his 'Collector's Manual' (see J.C., vol. iv., p. 318) credits *Planorbis albus* with the possession of 'rows of minute hairs, running in a spiral direction,' and gives a special figure illustrating them as seen under a powerful lens. I fail to detect them with the aid of my microscope, and cannot help thinking that Mr. Adams must be mistaken.

To illustrate my paper, I send micro-slides, roughly mounted, as follows:—shells of *H. aculeata*, *H. pulchella* var. *costata*, and *P. nautilus* var. *costata*; portions of shells of *H. rufescens*, *H. hispida*, and *H. sericea*; hairs of *H. sericea* and *H. obvoluta*; also twelve specimens of *L. stagnalis*, from garden ponds; two *L. stagnalis* and two *L. peregra*, with conferva attached; three *L. auricularia* var? also from garden ponds; and three *L. stagnalis* from the other pond, in which latter the shells are naturally clean, some with whitish markings. And I trust that with these you may be able to follow my ideas, and agree with my theory on the hair formation, so far as I have been able to form one with the time at my disposal and the opportunities at hand, and if I have stirred up a desire in any member to go further into the matter (or to correct me where I may be in error), I shall consider that some little good may result from my investigations and the explanation of them.

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Mr. L. E. Adams has kindly sent me a hispid specimen of *Planorbis albus*, and I note that Dr. Jeffreys in describing this shell writes, "epidermis thick, sometimes hispid or bristly," while in Gray's Turton it is figured as bristly. There would appear, therefore, to be two forms of this shell, and it would be interesting to ascertain which is the more widely distributed.

Mr. Adams has also called my attention to the fact that the young of *H. cantiana* are hispid, this I have formerly noticed, but it escaped my attention at the time I was writing my address.

The young of *Paludina vivipara* and *Planorbis corneus* are also said to be hispid, but these hairs are probably of a very delicate nature, and do not seem to be retained in cabinet specimens.

WILLIAM JEFFERY.

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CORRECTION.—Referring to my List of the Mollusca of Western Sussex, (J.C., April, 1882—vol. 3, p. 307), a typographical error occurs, and I regret has hitherto escaped my notice, which destroys the meaning of my words. In the twelfth line of the foot note, after “here therefore the shorter” the words *and thinner* should be omitted.—WILLIAM JEFFERY.

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**Helix pulchella at Niagara.**—My brother (Mr. D. B. Cockerell) writes that he has found *Helix pulchella* and *H. alternata* on the very brink of the Niagara Falls, close to where the lighthouse formerly stood, on the American side. He also finds *H. pulchella* common near Goderich, Canada.—T. D. A. COCKERELL.

**Note on “Planorbis subangulatus at Malta.”**—Mr. T. D. A. Cockerell (‘Journ. Conch.’, 1885, vol. iv., p. 366) is not the first to record the existence of this species at Malta. Issel (‘Bulletino Malacologico Italiano,’ 1868, vol. i., p. 24) has already cited it as an inhabitant of that island, it having been found by him in a small spring near Valetta. Mr. Cockerell’s statement that “there are six shells in the British Museum labelled *subangulatus* Phil., Malta,” seems to me to imply that that is the extent of the Museum series (which is not the case), and that the identification and locality may or may not be correct. In conclusion, I would observe that the shells referred to are Maltese specimens and are correctly assigned to *P. subangulatus* of Philippi, which has also been recorded from Italy, Sicily, Algiers, and Egypt, and may only be (as suggested by Paulucci, Westerland, and others) a variety of the well-known *P. umbilicatus*, Müller (= *P. complanatus* (Linné ? ?) Jeffreys, &c.).—EDGAR A. SMITH, January, 1886.

## NOTES ON THE PARMACELLA OF GIBRALTAR.

By T. D. A. COCKERELL, M.C.S.

Mr. Ponsonby has kindly sent me three individuals of *Parmacella* (in spirit) which he collected at Gibraltar, and from the examination of these I am able to offer a few remarks which may tend to throw light on their identity. It has been catalogued under the following names:—

*Parmacella calyculata* Sby? Kobelt, 'Journ. Conch.', 1883.

*P. valenciennii* Webb and Vanbeneden. Hesse, Ponsonby, and Crosse, 'Journ. de Conch.', 1884, and *Jahrb. Mal. Ges.*

*P. deshayesii* Moq.-Tand. Darbshire, 'Journ. Conch.', 1885.

**External Appearance.**—Moquin figures *P. valenciennii* as clear reddish, without markings, and Webb and Vanbeneden's figure ('Mag. de Zool.', 1836, pl. 76) is of the same colour. Hidalgo ('Moll. Terrest. de Espana,' vol. ii., pl. 1) figures it as red-brown, but with several small black spots on the fore part of the mantle. Locard ('Moll. de France,' p. 17) calls Moquin's species *P. moquini* Bourguignat, and considers it distinct from *P. valenciennii* Webb and Vanbeneden. The three Gibraltar examples all differ from the above, two of them in having the ground-colour a very dark brownish-green, and all of them in their markings. The two dark specimens have small spots and a little dark marbling on the anterior part of the mantle and also two dark bands on the posterior half, placed one on each side in such a position as to nearly form a dark **V** on the mantle, with the apex pointing towards the tail. They do not join in the median line, however, and so the lower portion of the **V** is wanting. The third example is brownish, and differs only from Hidalgo's figure in the presence of the **V**-shaped mark above described.



**Shell.**—Apex pale greenish and very shiny. The rest of the shell whitish and slightly iridescent, the edges are very thin and pale greenish. Fairly good figures of the shell are given by Chenu ('Man. Conch.', vol. i., p. 426) and by Moquin ('Moll. de France'), but Hidalgo's figure (*loc. cit.*) is much too narrow, if it is intended for the same form. Sowerby ('Genera of Shells,' vol. i., pl. 157) represents his *P. calyculata* as brown above and whitish within, which does not agree with the Gibraltar species. He gives no description of the soft parts.

**Anatomy.**—The *alimentary canal* consists of a buccal portion, with a rather small and somewhat triangular odontophore, and a simple jaw of a dark colour, a large stomach, a rather long and swollen mid-gut, and a short (shorter than in Moquin's figure) and narrow hind-gut. The inner surface of the stomach is much corrugated, that of the intestine smooth. In the stomach and mid-gut I found four large "thorns," apparently the scales of the involucre of some composite plant allied to the artichoke. It is surprising that they did not perforate the intestine and so cause death, but I suppose the *Parmacella* is used to them. There are two salivary glands. The liver is large and extremely complex; I counted twenty-six lobes of various sizes.

The *organ of respiration* is very remarkable, and reminds one of the lungs of certain lizards. There is an excellent figure given by Simroth ('Jahrb. Mal. Ges.,' 1883, pl. i., fig. ii.) of the same organ in the closely allied *P. olivieri* Cuv.

**Reproductive Organs.**—The 'stylet' is extremely curious, it is well figured by Webb ('Mag. de Zool.,' 1836, pl. 76, fig. ii. and fig. v.) and by Simroth (*loc. cit.*). The Hermaphrodite gland and duct are black, while the albumen gland and uterus are brownish ochre. For other details see the figures by Simroth and Moquin, which, although perhaps of different species, represent all the important characters of the present form.



ADDITIONS TO THE LIST OF LAND AND FRESH-  
WATER MOLLUSCA OF LLANDUDNO.

By J. R. BROCKTON TOMLIN.

Having paid two visits to Llandudno during the last six months, it will be of interest to supplement Mr. Roebuck's article in the J.C., vol. iv., no. 7 (July, 1884). I have seven new species to add to the list.

**Limnæa truncatula.**—Ditch on the Morfa and pond in Happy Valley.

**Zonites fulvus.**—One specimen in Gloddaeth woods.

**Z. cellarius** var. **albida.**—One specimen with *H. aculeata*.

**Helix aculeata.**—Ten specimens in moss on the Great Orme, a little above the Happy Valley, with *Carychium minimum* and *Z. crystallinus*.

**H. ericetorum.**—Plentiful but local in various parts of the Morfa, with var. *alba*.

**H. ericetorum** var. **alba.**—With type.

**H. nemoralis** var. **roseolabiata.**—Three specimens on the Morfa.

**H. nemoralis** var. **hyalozonata.**—Three specimens on the Morfa.

**Vitriina pellucida.**—A few on Great Orme; plentiful under stones in one part of the Morfa, alive and dead.

**Vertigo antivertigo.**—In a road leading over Gloddaeth Mountain; rather plentiful in a dry ditch on the Morfa.

**V. pygmæa.**—Under stones on the Great Orme; also near Penrhyn Farm, by Little Orme.

**Clausilia rugosa** var. **tumidula.**—Gloddaeth Mountain.

**Cochlicopa lubrica** var. **hyalina.**—One specimen on Great Orme.

**C. tridens**, is given at Llandudno in "Rimmer"—as found by a Mr. Thomas.

I am rather surprised that Mr. Roebuck missed *H. ericetorum*, as it seemed well disseminated, though not ubiquitous on the Morfa.

I spent about a week each time, and devoted all my energies to land shells, as the shore seemed absolutely barren, even at the lowest tides. I only got a few small shells off the Laminaria beds, and those common species.—May 10th, 1885.

[At the time I worked at the Llandudno shells I was—like Mr. Tomlin—surprised I did not meet with *H. ericetorum*, and am glad it has fallen to the lot of a more fortunate collector.—W. DENISON ROEBUCK.]

THE Projectors of the New “Monograph of the Land and Freshwater Mollusca of the British Fauna” desire to express their thanks for the following assistance lately rendered :—

**Prof. Spencer F. Baird**—Promise of Photograms from the type specimens of such of Dr. Jeffreys’ Varieties as have not yet been figured.

**Lionel E. Adams**—Living Slugs from Staffordshire.

**R. D. Darbshire**—Loan of Rossmässler Iconographie, vol. i.—ii.

**H. P. Fitzgerald**—Loan of ‘Lives of Philosophers,’ published 1717.

**J. H. Thompson, C.M.Z.S.**—Living specimes of Arion and Limax, from New Bedford, Massachussets.

**J. H. James**—Shells from Truro, Cornwall.

**B. Tomlin**—Shells from Channel Isles.

**F. G. Fenn and Miss F. M. Hele**—Living Testacella scutulium.

**A. Somerville, B.Sc.**—Shells from various Scottish localities.

**F. W. Wotton**—Various species of Glamorgan and Brecon shells and curious distortion of *P. vortex* alive.

**W. Gain**—North Devon and Notts. Shells

**L. E. Adams**—Additional species from Derry and Stafford.

**G. T. Rope**—Shells from E. Suffolk.

**G. W. Shrubsole**—Living *T. scutulium* from Chester.

ASSISTANCE REQUIRED IMMEDIATELY—Specimens of Testacellæ from any locality. Extracts from, or loan of any work to which we have not access, having reference to Testacellæ.

Co-operation is invited from all Conchologists interested in the above subject. Any information or specimens illustrating the LIFE HISTORY—Structure, Development, Variation, Distribution, etc.—will be welcomed and carefully acknowledged.

ADDRESS : Mr. J. W. TAYLOR, Office of the *Journal of Conchology*, Hunslet New Road, Leeds.

## BIBLIOGRAPHY.

List of British Marine Shells, comprising those of the Brachiopoda and Mollusca (Proper), after the arrangement in Jeffreys' "British Conchology," with alterations and additions to 1885, by A. SOMERVILLE, B.Sc., F.L.S., &c.

A list of our Marine Shells at a reasonable price has long been desired, and the one now before us, prepared by Mr. Somerville, is excellently produced. In addition to specific names, those of varieties are given, but in smaller type, these however range in line with the specific names; it would we think be an improvement in future editions to indent the varietal names, this would bring the specific names into greater prominence and render reference more easy. The list is well printed on good paper, and fills four pages of Foolscap. The price is 3d. each, or 2/6 per dozen post free from the Publisher, A. STENHOUSE, University Avenue, Glasgow.—J.W.T.

**Les Mollusques Marins du Roussillon**, par E. BUCQUOY, PH. DAUTZENBERG, and G. DOLLFUSS,—parts v.—x.

The six fascicules of this beautiful work continue to maintain the high standard of the previously published parts. The photographic illustrations are excellent, and the text is marked by carefulness, precision, and exactitude. The fifth part is devoted to the family Cerithiadae, which is divided into five genera, and a new sub-genus Biforina is established for *T. perversus* L. The variation of each species is treated in a full and elaborate manner. The *Cerithium vulgatum* having twelve named varieties of form, and three variations of colour. The sixth and seventh fascicules are devoted to the Turritellidae and the Littorinidae. Turritellidae is divided into five genera and four sub-genera. The Littorinidae are divided into three sections, the first containing two genera—Littorina and Fossarus, the former with the sub-genus Melaraphe. The second section has only the genus Solarium. The third section contains eleven genera and fourteen sub-genera, of which two Schwartzia established for *Rissoa monodonta* Bivona, and Massotia of which *Rissoa lactea* is the type, are new.

The eighth part treats of Neritidæ and Turbinidæ. The family Neritacea contains only a single genus and species, *Smaragdia viridis*, of which four varieties are described and figured, two of them for the first time. The Turbinidæ embraces the genus Turbo, containing the sub-genera Bolma and Collonia, each with a single species. The genus Phasianella has the sub-genus Tricolia with three species and many varieties. The Trochidæ is arranged under three genera, and seven sub-genera, and is very elaborately worked out, the variation being carefully noted, and each form illustrated by a good figure. This work is a most excellent one, and in a very many respects is a model of what such a work should be.—  
J.W.T.

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**Manual of Conchology—Structural and Systematic**, with illustrations of the species, by GEO. W. TRYON, JR., Conservator of the Conchological Section of the Academy of Natural Sciences of Philadelphia.

Part xix. of this exhaustive work is a continuation of the Columbellidæ, and deals with the Sections Mitrella, Atilia, Anachis, Seminella, Mitropsis, Conidea, Meta, and Strombina, almost every species being figured, and in some cases the animal and operculum.

Part xx. The genus Engina commenced in last part is continued in this, and the genus Columbellina is also worked out. Seventy-eight pages of this part consists of an useful index to the generic and specific names used in the volume, which in all embraces sixty-three plates full of figures.

The sixth volume of this great work is devoted to the Conidæ and Pleurotomidæ, and contains 413 pages and sixty-five plates, the execution of which is admirable and much superior to those of previous volumes. In the classification of the Cones, Dr. Weinkauff's arrangement is adopted of seventeen sections named after the typical species in each group, viz.:—Marmorei, of which *C. marmoreus* L., is the type ; 2, Literati, of which

*C. literatus* is type ; 3, Figulini, of which *C. figulinus* is type ; 4, Arenati, of which *C. arenatus* Hwass, is type ; 5, Mures, of which *C. mus* Hwass, is type ; 6, Varii, of which *C. varius* L. is type ; 7, Ammirales, of which *C. ammiralis* L. is type ; 8, Capitanei, of which *C. capitaneus* L. is type ; 9, Virgines, of which *C. virgo* L. is type ; 10, Dauci, of which *C. daucus* Hwass, is type ; 11, Magi, of which *C. magus* L. is type ; 12, Achatini, of which *C. achatinus* Chemn., is type ; 13, Asperi, of which *C. asper* Lam., is type ; 14, Terebri, of which *C. terebra* Born., is type ; 15, Bulbi, of which *C. bulbus* Reeve, is type ; 16, Tulipæ, of which *C. tulipa* L., is type ; 17, Texti, of which *C. textile* L., is type. The Synonymy and Index fills fifty-six pages. The Pleurotomidæ which fill up the volume is divided into sixteen genera, five sub-genera, and twenty-one sections. The Synonymy is very full and with the Index fills ninety-seven pages.—J.W.T.

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PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY.  
Meeting

HELD OCTOBER 1ST, 1885.

Mr. Wm. Nelson presided.

The minutes of the September meeting were confirmed.

NEW MEMBER.

Mr. S. C. Cockerell was nominated for Membership.

DONATIONS.

“ Abstract of the Proceedings of the Linnean Society of New South Wales,” for June and July, 1885.—The Society.

“ Synonymy of and Remarks upon the Specific Names and Authorities of Four Species of Australian Marine Shells.”  
—J. Brazier, C.M.Z.S.

“ List of some Recent Shells found in layers of Clay on the Maclay Coast, New Guinea.”—J. Brazier, C.M.Z.S.

“ Critical List of Mollusca from North-West Coast of Australia.”  
—J. Brazier, C.M.Z.S.

Two examples of *Bulimus obscurus* var. *albinos* from Bromley, Kent; and a specimen of *Limnæa peregra* monst. *sinistrorsum* from a pond near Tooting, Surrey, where several were found and the type was abundant.—S. C. Cockerell.

A *Bulimus* from the Valley of Death, Tchernaya, opposite Inkerman, collected in 1854, by Rev. C. B. Norliffe.—W. Denison Roebuck, F.L.S.

Examples of *Helix personata*, *Clausilia parvula*, and *Pomatias septemspirale* from Weggis, Switzerland, collected by Mr. G. F. Payn.—T. D. A. Cockerell.

#### SPECIMENS EXHIBITED.

From Mr. Lionel E. Adams a specimen of *Limax flavus* from Stafford. A collection of shells from several French localities were shown on behalf of Mr. S. C. Cockerell; and also a collection of Succineæ from various localities.

Mr. W. Denison Roebuck showed examples of *Limax arborum* vars. *nemorosa* and *bettonii* sent from Holmsby, South Hants., by Mr. C. Ashford; *Unio pictorum* from the Tweed at Berwick, from Mr. H. Marsh; *Limax arborum* var. *nemorosa* and type from Enniscoll, Crossmollina, West Mayo, sent by Mr. W. F. de Vismes Kane, M.A., M.R.I.A.; and a number of shells collected by Mr. G. W. Oldfield, M.A., F.L.S., at New Milford, county Pembroke, including *Helix aspersa* var. *undulata* and *H. caperata* var. *fulva*.

Mr. J. W. Taylor exhibited a collection of the shells of the county of Montgomery, collected by Mr. J. Bickerton Morgan, and a few shells from Muckcross, Killarney, collected by Mr. J. Ray Hardy, including *Pupa ringens* var. *pallida*, and *Clausilia rugosa* var. *gracilior*.

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## Meeting

HELD NOVEMBER 5TH, 1885.

At the Leeds Mechanics' Institute. Mr. Wm. Denison Roebuck, F.L.S., occupied the chair.

Correspondence was read from several members.

## NEW MEMBERS.

Mr. Sydney C. Cockerell, 51, Woodstock Road, Bedford Park, Chiswick, was elected a member. Mr. H. E. Quilter, 4, Cedar Road, Leicester, and Mr. J. R. Redding, 103, Seville Place, Dublin, were nominated for membership.

## DONATIONS.

“Proceedings of the Linnean Society of New South Wales,”  
vol. x., part 2.—The Society.

A Road Map of New South Wales.—Mr. J. Brazier.

## SPECIMENS EXHIBITED.

Mr. J. W. Taylor showed a number of shells collected by Mr. F. W. Wotton last August in Brecknockshire, including *Pisidium amnicum*, *Planorbis marginatus*, *Physa hypnorum*, and others. A small collection of shells were shown on behalf of Mr. S. C. Cockerell, amongst which were examples of a peculiarly shouldered form of *Limnæa palustris* from W. Kent, and *Limnæa peregra* var. *candida* from Middlesex.

Mr. W. D. Roebuck showed several species of slugs sent by Mr. W. Gain from North Devon; and from Bowdon, Cheshire, sent by Mr. J. G. Milne.

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## Annual Meeting

HELD THURSDAY, DECEMBER 10TH, 1885.

Mr. Wm. Denison Roebuck, F.L.S., presided. Minutes of the last meeting were read and confirmed.

## NEW MEMBERS.

Mr. H. E. Quilter and Mr. J. R. Redding were elected members. Mr. H. Coates, Pitcullen House, Perth, was nominated for membership.

## DONATIONS.

“Proceedings of the Perthshire Society of Natural Science,”  
1884-5.—Mr. H. Coates.

Smithsonian Report, 1883.—The Trustees.



*Physa acuta* from Ostend, *Helix limbata* and *Cyclostoma elegans* from Rouen.—Mr. S. C. Cockerell.

A vote of thanks was heartily accorded the donors.

REPORTS.

The Secretary presented the Annual Report of the Society, which stated that the Society was making fair progress in its special work. The Report was adopted.

The Treasurer presented the Annual Statement of Accounts, which showed a satisfactory balance.

The Recorder next presented his Annual Report, which was of a very gratifying nature. A larger number of species and varieties and localities had been recorded than during any previous year.

PRESIDENTIAL ADDRESS.

The President, Mr. W. Jeffery, of Ratham, sent an address, which was presented by the Secretary. The subject of the address was "The Nature and Development of the Hairs or Bristles on some Land and Freshwater Shells." Numerous specimens of *Limnæa stagnalis* and other shells, and specially prepared Microscopic Slides were shown in illustration of the President's remarks.

ELECTION OF OFFICERS.

The following officers were elected for 1886 :—

*President*.—Mr. Wm. Denison Roebuck, F.L.S.

*Vice-Presidents*.—Mr. Wm. Jeffery ; Dr. W. H. Evans ; Mr. R. Scharff, Ph.D., B.Sc. ; Mr. Baker Hudson.

*Treasurer and Secretary*.—Mr. Thos. Wm. Bell, 10, Reuben Place, Leeds.

*Recorder*.—Mr. J. W. Taylor.

*Council*.—Mr. Wm. Cash, F.G.S. ; Mr. J. W. Davis, F.S.A., F.L.S., &c. ; Mr. Edward Collier ; Mr. Geo. Roberts ; Mr. J. W. Taylor ; and the Rev. H. Milnes.

THE ANNUAL REPORT.

YOUR committee have pleasure in reporting that the Society is making considerable progress in attaining the objects for which it was established.

During the year there has been a gratifying accession of members, and numerous enquiries have been made respecting the work and scope of the Society. Several members, notably Mr. Baker Hudson, have ably assisted in increasing the number of members and extending the influence of the Society by urging its claims on their Conchological friends. Papers have been contributed by Mr. Robert Scharff, Ph.D., B.Sc. ; Mr. J. C. Melville, M.A. ; Mr. J. W. Taylor ; Mr. Wm. Denison Roebuck, F.L.S. ; and Mr. Baker Hudson.

Our Systematic Recording of all specimens exhibited at our meetings tends greatly to increase our knowledge of the distribution of British Land and Freshwater Mollusca.

The numbers of specimens recorded have been much in excess of previous years, and have included several that were new to the list of British Mollusca ; and many new localities have been entered during the year.

The Proceedings of the Linnean Society of New South Wales ; and the Proceedings of the Royal Society of Queensland for the year 1885 ; the Bulletin of the Brookville Natural History Society ; and the Smithsonian Report for 1883 have been added to the Library. Donations have also been made by Mr. Jno. Brazier, C.M.Z.S. ; Mr. Bryce Wright ; Mr. Chas. Ashford ; and Mr. H. Coates.

Specimens have been presented to the Society's collection by the president, Mr. Wm. Jeffery, and Messrs. R. D. Darbishire, S. C. Cockerell, W. D. Roebuck, and T. D. A. Cockerell.

The Cash Account is so far satisfactory that the Treasurer is left with a balance in hand, and the overdue Subscriptions are less in amount than on some previous occasions.

The question of providing sufficient accommodation for the Society's Library and Collection has not yet been dealt with, and call for immediate attention.

#### REPORT ON THE RECORDS MADE TO DEC. 31ST, 1885.

It has again to be noted that the number of authenticated records made during the twelve months which have just expired

nearly equals the combined total of those for the eight preceding years, and that they are nearly double the number of those authenticated in 1884. During the eight years ending with 1884 records were authenticated to the number of 10,051, being an average of 1,256 per annum; while during 1885 no less than 7,069 were placed on record, bringing the annual average up to 1,893.

For this gratifying result your recorders and referees are indebted to the zeal and kindness of numerous conchologists and others throughout the British Isles—and the fact that records have been made for no less than 107 counties, that is for more than two-thirds of the whole number, is ample evidence of the continued wide spread interest which conchologists generally take in the authentication principle.

Where so many have assisted to the best of their power it would be somewhat invidious to mention names, but it may be stated that the counties for which more than a hundred records each have been made during the year are (in the order of the number of records):—Mid-West York, 632; Notts, 621; Derbyshire, 298; North Hants., 276; South Lancashire, 232; North-East York, 216; South Hants., 170; Durham, 163; Leicester and Rutland, 158; Glamorgan, 148; South-West York, 147; Stafford, 140; Cheshire, 138; Middlesex, 137; Surrey, 135; Pembroke, 135; Shropshire, 132; North-West Yorkshire, 132; West Kent, 128; East Gloucester, 118; West Cornwall, 115; Forfar, 106; South-East York, 106; West Gloucestershire, 102; Warwickshire, 101; and East Kent, 101. Continuing the details of the Yorkshire records for comparison of the figures for previous years, it may be stated that 1,233 records have been made for the five divisions of that county, as against 602 in 1884, 821 in 1883, 830 in 1882, and 200 in 1881, and that the total number is now 4,792.

An examination of the numbers of records again shows that those for England and Wales immensely preponderate in comparison with those for Scotland, Ireland, and foreign

countries. No less than 15,517 out of the whole total of 17,041 records are for England and Wales, while there are but 948 for Scotland and Ireland, and only 576 for foreign countries. Looked at in another aspect, it will be found that for the 72 counties of England and Wales the average number of species (not records) seen is over 40 each, while for the 77 Scotch and Irish counties it scarcely reaches 12 each.

Of English counties there only remains one (North Wilts) from which no records whatever have been made, and only one Welsh county (Cardigan), while there are no less than fourteen counties in each of the sister kingdoms for which this has to be said. The fourteen Scottish counties are:—Wigton, Peebles, Selkirk, Kincardine, North Aberdeen, South Aberdeen, Elgin, Easternness, Westernness, Cantire, West Ross, East Ross, and the Orkneys. The fourteen Irish counties are:—Monaghan, Fermanagh, Cavan, Louth, Carlow, Kilkenny, Queen's County, Longford, Leitrim, East Mayo, East Galway, Limerick, and North Tipperary.

The recorders and referees of the Conchological Society are anxious that these blanks in their knowledge of distribution should be filled up, and would feel much gratified if Scottish and Irish Naturalists would assist them in the same generous and liberal manner that the English and Welsh Naturalists have been doing for the past few years.

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## Meeting

HELD FEBRUARY 4TH, 1886.

The President, Mr. W. D. Roebuck, F.L.S., presiding.

### DONATIONS.

The following donations were announced:—

1. "The Proceedings of the Linnean Society," New South Wales, vol. x., pt. 1.—The Society.
2. "On Land and Freshwater Mollusca of Dorsetshire," by J. C. Mansel-Pleydell, F.L.S., F.G.S.—The Author.

3. "A List of British Marine Shells," by Mr. A. Somerville, B.Sc., F.L.S.—The Author.

The thanks of the Society was accorded the Donors for their donations.

HONORARY MEMBER.

Mr. J. R. Bourguignat, of St. Germain-en-Laye, was nominated as an Honorary Member.

NEW MEMBERS.

The following gentlemen were nominated for membership:—Messrs. Thos. Stanton Hillman, Lewes, Sussex; Alexr. Somerville, B.Sc., F.L.S., Glasgow; J. R. B. Tomlin, Cambridge; Dr. C. W. Viner, Bath; Mrs. Fitzgerald, Folkestone; Jno. Hy. James, Truro; Frank Coulson, Glasgow; F. W. Wotton, Cardiff; Geo. Wm. Shrubsole, Chester; G. B. Sowerby, London; Thos. Rogers, Manchester; Edgar A. Smith, London; Miss Helen L. Taylor, Derby; B. B. Woodward, F.G.S., F.R.M.S., London; Rev. R. W. J. Smart, Ross, Herefordshire; Rev. Jno. McMurtrie, M.A., Edinburgh; R. D. Darbishire, B.A., F.G.S., Manchester; Theo. Godlee, Walthamstow; Chas. Jeffery, Tenby; Thos. Scott, Greenock; W. D. Crick, Northampton; and W. A. Gain, Tuxford, Newark.

The President called attention to the new list of British Marine Shells by Mr. A. Somerville, B.Sc., F.L.S., of which a copy was on the table. A list of this kind had long been wanted and Mr. Somerville's was calculated to be of much use. In the preparation of it, he had had the assistance of Dr. J. A. Henderson, lately biologist to the Scottish Marine Station at Granton (now Professor of Biology at the Christian College, Madras), Mr. J. T. Marshall, of Torquay, and—as regards the Cephalopoda—of Mr. W. E. Hoyle, M.R.C.S., at present the Naturalist to the Challenger Commission, Edinburgh. Three species have been omitted which Jeffreys included in the body of his work on the strength of dead shells, namely *Arca obliqua*, *Neæra rostrata*, and *Torellia vestita*, and some which Dr. Jeffreys in his appendix recommended for insertion have likewise been left out.

The deep sea species obtained in the 'Porcupine' and 'Lightning' expeditions have not been included, as to do so would involve taking in a multitude of species which few collectors are ever likely to possess. Mr. Somerville's list takes cognizance of varieties, the names of which are given in smaller type, and the list is calculated to be the standard one for marine Conchologists.

#### SPECIMENS EXHIBITED.

The President showed slugs from South Hants., sent by Mr. Chas. Ashford. The number of specimens sent by members and others from various localities were considerable, and included the following:—*Vertigo pygmæa*, *V. antivertigo*, &c., from the river Alde rejectamenta, shown by Mr. Taylor, on behalf of Mr. G. T. Rope; *Limnæa palustris* var. *corvus* from N. Essex, sent by Mr. L. E. Adams; a number of shells from Surrey, Tipperary, and Stirlingshire, sent by Mr. T. D. A. Cockerell; Mr. F. W. Wotton sent a curiously elongated example of *Planorbis vortex* alive, and a number of specimens from Brecon and Glamorgan; a number of species from Torquay, a banded variety of *Limnæa truncatula* from Denbighshire, and a specimen of *Azeca tridens* were exhibited on behalf of Mr. G. W. Shrubsole.

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## Meeting

HELD MARCH 4TH, 1886.

In the Society's Room, Leeds Mechanics' Institute and Literary Society. The President, Mr. W. D. Roebuck, F.L.S., occupied the chair.

The minutes of the previous meeting were read and confirmed.

A considerable amount of correspondence was brought before the meeting by the Secretary.

#### DONATIONS.

The following donations were laid on the table:—  
 "Proceedings of the Linnean Society of New South Wales,"  
 vol. x., pt. 3.

“Abstracts of Proceedings of the Linnean Society, N.S.W.”  
for August, September, and October, 1885.

## NEW MEMBERS.

The following gentlemen were elected members of the Society :—Messrs. T. S. Hillman, A. Somerville, B.Sc., F.L.S., J. R. B. Tomlin, Mrs. Fitzgerald, Dr. C. W. Viner, Miss H. L. Taylor, Rev. R. W. J. Smart, Rev. Jno. McMurtrie, Messrs. J. H. James, Associate Royal Inst., Cornwall, F. Coulson, F. W. Wotton, G. W. Shrubsole, G. B. Sowerby, Thos. Rogers, E. A. Smith, F.Z.S., B. B. Woodward, F.G.S., F.R.M.S., R. D. Darbishire, B.A., F.G.S., T. Godlee, Chas. Jeffery, Thos. Scott, W. D. Crick, and W. A. Gain.

The following gentlemen were nominated for membership : Rev. R. Boog Watson, Cardross ; Mr. Fred. R. Coles, Kirkcudbright ; Mr. Wm. Duncan, Montrose ; Rev. S. Spencer Pearce, Woodbridge ; Mr. Wm. Baillie, Brora ; Mr. Jas. Steel, Glasgow.

## SPECIMENS EXHIBITED.

Mr. J. W. Taylor showed a series of shells on behalf of the Rev. R. W. J. Smart, from Herefordshire and N. & S. Wiltshire ; on behalf of Mr. T. S. Hillman, a number of land shells from Lewes, East Sussex ; for Mr. Wm. Jeffery, a number of shells, including *Planorbis glaber* and *Helix cartusiana*, from Shoreham, W. Sussex ; and a series of shells on behalf of Mr. J. Saunders, from Luton Hoo Park, Bedfordshire.

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#### Occurrence of *Cyclostrema nitens* at Margate.—

Mr. J. T. Marshall has kindly identified as above two little shells which I found in Margate shellsand, associated with *Lepton clarkie*, *Aclis unica*, *Cæcum glabrum*, *Odostomia dolioliformis*, *O. plicata*, and other local species. I am not aware of any previous record for the South East Coast.—S. C. COCKERELL.

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ON THE DISTINCTNESS OF  
THE GENERA *TURTONIA* AND *CYAMIUM*.

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

Zoological Department, British Museum.

The genus *Cyamium* was proposed by Philippi for a small shell which was collected by his brother at Gregory Bay, Patagonia. The animal or soft parts are unknown. Philippi's description runs thus :

'*Testa transversa, subinæquilatera, equivalvis, tenuis, vix hians; dentes cardinales in utraque valva duo, dentes laterales nulli; ligamentum duplex, internum in foveola triangulari pone dentes cardinales; impressiones musculares duæ; sinus palliaris nullus.*'—[Wiegmann's Archiv. Naturgesch., 1845, p. 50].

The name *Turtonia* appears to have been first cited by Alder in his 'Catalogue of the Mollusca of Northumberland and Durham,'\* where he refers to it the *Venus minuta* of Fabricius. The genus was however properly described by Forbes and Hanley thus :

'Shell minute, fragile, equivalve, very inequilateral, closed at both ends, transversely oblong; surface concentrically striated or nearly smooth. Ligament external; hinge with two adjacent teeth in front, the anterior one laminar. Pallial sinus simple.'—[BRIT. MOLL. vol. ii. p. 80].

On comparing these two descriptions it will be noticed that the principal distinction consists in the ligament in the one case being double, that is, partly internal and partly external, and in the other external only.

Notwithstanding Philippi's statement that his genus possessed an internal ligament, Jeffreys† unites with it the little *Turtonia minuta*, which certainly has no internal cartilage. He says that the type of *Cyamium* is a small shell from the Falkland Isles (*C. antarcticum*) and that he had several times examined a series of specimens of that species in the British

\* Trans. Tyneside Nat. Field Club, vol. i. (1848), p. 189.

† Brit. Conch., vol. ii. p. 257.



Museum. This series of specimens I do not consider belong to Philippi's *C. antarcticum*, which I have already stated was found at Gregory Bay, Patagonia, but, although specifically distinct, I believe them to belong to the same genus. I have very carefully examined them under the microscope and can positively assert, notwithstanding Jeffreys' statement to the contrary, that they *have* an internal cartilage. I have therefore no hesitation in pronouncing the distinctness of these genera, an opinion also shared by Forbes and Hanley, H. & A. Adams,\* Gould,† and others, and it may be as well to remark that Weinkauff‡ and Stoliczka§ have united *Cyamium* and *Turtonia* relying merely on the statement of Jeffreys. It seems most likely that Sars|| has also been similarly misled.



**Zonites draparnaldi in Captivity.**—The result of keeping a few *Z. draparnaldi* in captivity, was an innumerable colony. These the first summer flourished—living on cabbage, coltsfoot (*Tussilago farfara*,) broad-leaved dock (*Rumex obtusifolius*). The shells were very fine and of a medium texture. I found they would not hibernate even during the severest frosts, and as no sort of outdoor food could be procured, I fed them on chopped beef. I fear I degenerated their appetites, for the following spring and summer they constantly devoured each other, the weaker snails of course falling the victims to their stronger relations. I found also that during the second season the young shells were of a very thin texture, much smaller, and in an unhealthy condition, so I let the whole colony go free on an ivied bank we have planted with ferns. I have not seen one since, so conclude this sickly generation never attained to the age of their forefathers, which is, I believe, about two or three years.—(Miss) F. M. HELE, 1885.

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\* Genera Rec Moll., vol. ii. p. 651. † Invert. Massachusetts ed. 2 p. 85.

‡ Conch. Mittelmeer, vol i. p. 96. § Paleont. Indica, vol. iii. p. 266.

|| Moll. Reg. Arct. Norweg., p. 65.

## ON SOME BRITISH VARIETIES OF LIMNÆÆ.

By SYDNEY C. COCKERELL, M.C.S.

I have in my cabinet a few interesting forms of *Limnæa* which it may perhaps be worth while to record. This is, in my opinion, the most engrossing of all British genera on account of the enormous variation in size, thickness, contour, &c., which the commoner species undergo. Scarcely any two examples from different localities are alike; and the gradations which unite one species to another are so numerous and imperceptible that one is often at a loss to know where to draw the line between closely allied forms. Every conchologist must have met with specimens of *L. auricularia* var. *acuta* on the one hand, and *L. peregra* var. *labiosa* on the other, which he has found it difficult to refer with perfect confidence to either species. Some *L. palustris* of the *conica* type bear a greater resemblance, both as regards habits and appearance, to *L. truncatula* than to the parent stock; small examples of the var. *elongata* Moq. can scarcely be distinguished from *L. glabra*; var. *corvus* is like the stunted *L. stagnalis*; and the vars. *tincta* and *globosa* are in extreme cases very similar to aberrant forms of *L. peregra*.

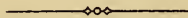
The exact causes of all this variation are at present very much matters of speculation. We know that running water tends to foster a light and slender form of shell, and stagnant water a stronger and more expanded one, but why, for instance, a small pond at Chislehurst should produce among its stunted inhabitants five scalariform *L. stagnalis*, or another small pond in the neighbourhood of Tooting a proportion of sinistral *L. peregra*, is a very difficult and debatable problem. The same causes act in a similar manner on all the species, and we find, as might be expected, corresponding varieties in most of them. Thus, to omit albinisms and variations in size, the var. *reflexa* of *L. auricularia*, the var. *labiosa* of *L. peregra*, and the var. *labiata* of *L. stagnalis* are all parallel. I have moreover a

specimen of *L. palustris* from Minster, near Sandwich, with the same expanded lip. The characteristic spiral lines in *L. peregra* var. *picta* appear frequently in *Physa fontinalis* and other species. Dr. Jeffreys mentions a *L. truncatula* affected in the same way, and I have streaked *L. glutinosa* from Reading, and *L. palustris* from Barnes and Shortlands, W. Kent.

I have already recorded in the 'Zoologist' the occurrence of *L. peregra* var. *candida* in the pond at Hampton Court and of *L. auricularia* var. *ampla* in the Thames at Hampton. There is in my collection a specimen of *L. truncatula* var. *ventricosa* which I took at Bickley, Kent, and Mr. Lionel E. Adams has generously given me a fine example of *L. palustris* var. *corvus* from Coggeshall, Essex. My brother (L. M. Cockerell) found two interesting monstrosities of *L. peregra* at St. Mary Cray, Kent, the one being scalariform, and the other furnished with a triple lip. Similar to the last is a specimen from Chislehurst which has a double lip. Some specimens of *L. palustris* procured last summer at Shortlands, Kent, are an extremely interesting form, for which 'angulata' would be an appropriate name. With a description of this I will bring these notes to a close.

**Limnæa palustris** var. **angulata** n.v. Shell turreted, with five tumid whorls bluntly angulated at the periphery. Suture deep. Length 16 mill., breadth 10 mill. Aperture, which is oblong and nearly twice as long as the spire, length 10 mill., breadth 6 mill.

There is a stream running through the pond which also contains *Limnæa peregra*, *Sphærium corneum*, *Planorbis contortus*, and *Physa fontinalis*.



**Vertigo moulinsiana** in Notts.—Among a number of minute shells gathered by Mr. C. T. Musson of Nottingham, in April, 1883, from the rejectamenta at Carlton-on-Trent, I found specimens of this species. In the same lot were a few *Vertigo pygmæa*, *V. pusilla*, &c.—J. W. TAYLOR, Mar. 23, 1886.

NOTES ON  
THE LAND AND FRESHWATER MOLLUSCA OF  
THE LOWER TEES.

By BAKER HUDSON, M.C.S.

[Read before the Conchological Society.]

In the Journal of Conchology (vol. ii., p. 236 *et seq.*), Mr. Chas. Ashford gave a list of the Land and Freshwater Shells, observed by himself during the early part of 1879, supplemented by notes by the Rev. W. C. Hey and my friend Mr. J. W. Watson. Mr. Ashford has suggested to me that I should embody my own observations of the Mollusca of the Lower Tees and immediate district, in a supplemental list. In the interests of our Society I have thought it well to adopt Mr. Ashford's suggestion, and I now beg to offer the following, not indeed as completing the list for the district, but in order to bring it up to date.

I have met with nearly all the species, recorded in Mr. Ashford's list, in other localities, but confine my notes to those species and varieties not included in that list.

**Helix arbustorum** L.—This is a decidedly woodland species with us, but though local, is not uncommon where it occurs. I have taken it near Guisborough, at Skelton, Saltburn, Wilton, and Thornaby.

**H. hortensis** Müll.—Until recently I believed that this shell did not occur in the delta of the Tees (by "the delta" I mean the flat alluvial lands lying between the Cleveland Hills and the Durham Hills above Greatham). I have however recently taken it at Thornaby,—and a week ago I found a broken shell near a thrush's altar in Airey Holme Wood, which belonged to the var. *lutea*. It also occurs sparingly near Skelton, and in the vicinity of Stokesley.

**H. virgata** var. **albicans** Grat. This variety is even more abundant than the type on Coatham Sand Hills. It

gradually passes by almost insensible degrees of colouration into a sub-variety somewhat approaching var. *leucozona* Taylor.

**H. virgata** var. **subalbida** (Poiret).—Occurs sparingly with var. *albicans*.

**H. caperata** var. **fulva** Picard.—I have taken a few specimens on Redcar Sand Hills, which I think are referable to this variety.

Another variety somewhat more abundant occurs between Marske and Redcar on the sea banks, and also at Coatham. It is entirely without trace of banding, of a dirty white or yellowish hue with the apex black as in the type. In form, the shell is variable, but in general, resembles the type. I have not seen any varietal description which agrees with this.

**Zonites nitidulus** var. **Helmii** (Alder).—I have taken this pretty variety in a lane leading from the Spring Gardens to Marske Road, between Redcar and Marske. Though not uncommon it is exceedingly local, being confined to about fifty yards of a somewhat dry ditch.

**Succinea elegans** Risso.—Until last year this species was moderately abundant in a ditch near Coatham brick ponds, but the ditch has now been enlarged and deepened and I am afraid the species will be lost to the locality.

**Limnæa peregra** var. **lineata** Bean.—Two or three of this variety have occurred to me at Marton.

**L. peregra** var. **acuminata** Jeff.—Common in brook running from old fish ponds at Kirkleatham.

**L. truncatula** var. **ventricosa** Moq.—Pond near Normanby.

**Planorbis albus** Mull.—Not uncommon in old fish ponds at Kirkleatham.

**Physa fontinalis** var. **oblonga**.—Coatham Marshes.

The slugs of the district seem very variable and but little has yet been done with them, I however append a list of those species and varieties not mentioned by Mr. Ashford.

**Arion ater** var. **rufa** (L.).—One at High Cliff near Guisborough.

**A. ater** var. **marginata** Moq.—Common in several places. Guisborough, Marton, Thornaby, Upleatham, Middlesbrough, &c., &c.

**A. hortensis** var. **grisea**.—Thornaby.

**A. hortensis** var. **fasciata**.—Thornaby ; with var. *grisea*.

**A. hortensis** var. **rufescens** Moq.—Near Middlesbrough.

**Limax maximus** var. **cellaria** Moq.—Thornaby. A curious variety of this species was found by me, in several stages of growth, in a prostrate tree trunk at Wilton Woods. The following is a short note of its peculiarities made at the time :—General body colour ashy, with two dark bands enclosing a lighter area occupying the dorsal region. Shield marbled with lighter spots, but general colour darker than the back. Head and tentacles purplish and black. Foot white with narrow and almost black margin.

**L. flavus** L.—Cellars and yards at Coatham and Redcar.

**L. flavus** var. **colubrina** Pini.—South Stockton.

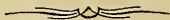
**L. flavus** var. **virescens** Fér.—South Stockton.

**L. agrestis** var. **sylvatica**.—Near Battersby and at Craythorn.

**L. agrestis** var. **tristis**.—Battersby.

**L. lævis** Mull.—I have recently found this in Airey Holme Wood at the roots and in the stems of umbelliferous plants where the ground was marshy.

Before concluding it may be advisable to state that in 1882 I placed several living specimens of *Limnæa stagnalis* and *Planorbis corneus* in a small pond on Redcar sand hills beyond the battery. Last year I observed a half-grown specimen of *L. stagnalis* in this pond, but failed to find *Pl. corneus*. As, however, both may hereafter turn up, I make this note for the guidance of future observers.



## EXHIBITION OF SHELLS AT MANCHESTER.

Upon the occasion of the opening of the New Rooms at the Literary and Philosophical Society, 36, George Street, Manchester, December 7th, 1885, the Microscopical and Natural History Section of that Society arranged that the Members and Associates should bring for exhibition certain objects of interest from their private collections, and the result was a great success. Mr. R. D. Darbishire, F.G.S., and Mr. J. Cosmo Melvill, F.L.S., were the chief contributors of mollusca for exhibition, as follows:—

By Mr. R. D. DARBISHIRE—

A series of *Fusus antiquus*, forms reversed (*contrarius*), and dextral, from the Coralline and Red Crags of Suffolk, remarkable for size and variety of facies, with recent ones of the now normal dextral form, and of what is now the reversed monstrosity, including a series from the egg-capsules and young, up to the large adults of the great white form of the Irish Sea. A series of form *contrarius* from the Drift at Worden by Leyland, was exhibited from Miss Farrington's cabinet.

Also other British species of *Fusus*, young and mature.

Also, for comparison, a series of *F. despectus* from Iceland, *F. islandicus* from Iceland and Newfoundland Banks, and *F. perversus* from Vigo.

A case of *Magilus antiquus* in and removed from masses of Meandrina Coral from Mauritius, and large series of young shells of *Magilus*, and of *Leptoconchus* of various species (forms).

Two drawers with series of Land and Freshwater Shells from Ceylon, illustrating peculiar forms and variations.

One drawer of Land and Freshwater Shells from Budapesth, collected by M. Julius Hazay, exhibiting range of variation in *Succinea* and *Limnæus*, the enormous size of certain forms of *Limnæus* and *Planorbis*, and series of the East European *Melanie* and *Lithoglyphus*.

*Comatula* and some mollusca, and egg-cases of *Loligo* and *Sepia*, mostly from Menai Straits and Conway Bay.

By Mr. J. COSMO MELVILL, F.L.S.—

Four drawers of selected foreign mollusca from his collection—of which the principal are as follows:—

Fifty species of *Conus* (L.) which included twenty-nine original types, nineteen of them being unique specimens, viz. : *C. baccatus* Sowb., *C. bockii* Sowb., *C. brazieri* Sowb., *C. catenatus* Sowb., *C. carnalis* Sowb., *C. chytrens* Melvill, *C. dianthus* Sowb., *C. du saveli* H. Adams, *C. euetrios* Sowb. and Melvill, *C. evelynæ* Sowb. and Melvill, *C. gracilis* Sowb., *C. marchionatus* Hinds,  $\beta$  *eudoxus* Melvill, *C. melvilli* Sowb., *C. multilineatus* Sowb., *C. racemosus* Sowb., *C. reflectus* Sowb., *C. sindon* Reeve, *C. traversianus* E. A. Smith, *C. wilmeri* Sowb. Of these, *C. du saveli* H. Adams is the most beautiful cone known, and differs widely in several particulars from any other species. It was found in 1870-71, in the stomach of a fish, at 60 fathoms, off the North Coast of Mauritius.

Some fine specimens of the five most highly esteemed of the genus, *C. gloria maris* Chem., *C. omaicus* Hwass, *C. cedo nulli* Chem., *C. rhododendron* Couthouy, *C. cervus* Lamarck, the last two being the original types of the species.

Also *C. fulmen* Reeve, the beautiful type figured in his 'Conchologia Iconica'; *C. ammiralis* L., *C. archithalassus* Dillwyn, *C. floccatus* Sowb., *C. magdaleneæ* Kien, *C. aurisiacus* L., *C. zonatus* Brug, *C. vidua* Reeve, *C. orbigny* Aud, and others.

In the genus *Voluta* L. several rarities were shown, perhaps the most select being *V. festiva* Lam., from E. Africa—the specimen formerly in the Dennison collection; *V. junonia* Chem., a noteworthy shell of extreme rarity from the Gulf of Mexico; *V. aulica* Sowb., *V. cymbiola* Ch., *V. sophiæ* Gray, *V. pulchra* Sowb., *V. thatcheri* McCoy, *V. papillaris* Sw., *V. fulgetrum* Sowb., *V. sclateri* Cox, *V. punctata* Sw., &c., while *V. prevostiana* Crosse must not be omitted, this being the only



specimen known in good condition, and the type, formerly in the collection of Dr. Prevost, of Alençon.

In Mitra were the unique *M. rugosa* Sowb., and *M. melvilli* Sowb., besides the rare *M. gigantea* Swm., *M. formosa* Adams, *M. macrospira* Rve., and an almost exhaustive series of the striking forms belonging to the subgenus Turricula, e.g., *T. regina* Sowb., *T. dennisoni* Reeve, *T. teniata* Lam., *T. vittata* Sowb., *T. tayloriana* Sowb., *T. berthæ* Sowb., *T. coccinea* Reeve, *T. balteolata* Reeve, *T. pullata* Reeve, &c.

In Marginella, Lam., were several types figured in Reeves' 'Conchologia Iconica'; mostly originally in the Lombe-Taylor collection, e.g., *M. mosaica* Sowb., *M. elegans* Gmelin, *M. petitiana* Duv., *M. undulata* Chem, and also a curious sinistral *M. conoidalis*, and two magnificent specimens of *M. goodalli*.

In Cypræa L. the finest of the seven specimens known of *C. guttata* Gray, also *C. nivosa* Brod., *C. aurantium* Mart, the badge of royalty among the Friendly Islanders and the Tahitians, and the unique *Trivia costispunctata* Gaskoin, &c.

Amongst the Buccinidæ, *Bullia pura* Melvill, recently described from Port Elizabeth, South Africa, the unique *Pseudoliva stereoglypta* Sowb. and Melvill, and the curious *P. ancilla* Hanley.

In Strombidæ one of the two specimens known of *Rostellaria martinii* Marrat; and a fine *R. powisii* Petit from China.

In Muricidæ *Murex bipinnatus* Reeve, the type. *M. cervicornis* Lam., *stainforthii* Reeve, *huttonæ* Wright, *falcatus* Sowb., *clavus* Kiener, &c., and an almost complete set of the genus Typhis, including two unique types, *T. expansus* Sowb., and *T. duplicatus* Hinds, both being figured in the 'Conchologia Iconica.'

Several representatives of other marine Gasteropoda—mostly types, were also shown; and in the Conchifera, a selection of the genus Pecten, including a fine series of ten varieties of *P. pallium* L., and the type specimens of *P. loxoides* Sowb. and Melvill, *P. sybillæ* Sowb. and Melvill, *P. rubidus* Hinds, and others.

LIST OF THE  
LAND AND FRESHWATER SHELLS OF CARDIFF.

By F. W. WOTTON, M.C.S.

I append a list of the terrestrial and aquatic mollusca which I have taken in this district during the past six or seven years. It will be seen that *Vertigo* and *Pupa* are very poorly represented, but I have every reason to believe other species exist here, only I have not been fortunate enough to find them.

*Sphærium corneum*.—Ditches on Leckwith Common.  
Scarce; shell small and rather globose.

*S. lacustre*.—Leckwith, East Moors, &c. Not uncommon.  
East Moor specimens are unusually large.

*Pisidium amnicum*.—River Taff and Feeder. Scarce.

*P. fontinale*.—Penylan Quarry. Rare; specimens beautifully clear.

*P. pusillum*.—Common all round the district; those which occur on the East Moors are covered with a thick, dark-brown incrustation.

*Anodonta cygnea*.—Rivers Taff and Ely. Not common.

*Bythinia tentaculata*.—Common and general.

*B. tentaculata* var. *albida*.—East Moors and Feeder.

*B. tentaculata* var. *ventricosa*.—Feeder. Rare; I have taken a banded variety of this species in the Feeder.

*Valvata piscinalis*.—River Taff, Feeder, &c. Not common.

*V. piscinalis* var. *depressa*.—Feeder. Rare.

*V. cristata*.—Taff, Feeder, &c. Local and not common.

*Planorbis lineatus*.—Feeder. Two specimens only in 1884.

*P. nitidus*.—Common in ditches at Leckwith; very rare in Feeder.

*P. nautilus*.—Very abundant in Feeder, &c.

*P. nautilus* var. *crista*.—With type. Scarce.

- P. albus*.—Taff and Feeder. Rare.
- P. spirorbis*.—Leckwith, East Moors, &c. Common.
- P. vortex*.—More plentiful than *P. spirorbis*. Large specimens occur on the moors, where I took a very peculiar distortion alive last December.
- P. carinatus*.—East Moors. Rare and local; the only habitat I know of.
- P. complanatus*.—Generally distributed, but not common.
- Physa hypnorum*.—Widely distributed. Common.
- P. fontinalis*.—Less plentiful than *P. hypnorum*. Generally distributed.
- Limnæa peregra*.—Common and general. I have taken a specimen of this with a single greenish band running round the periphery.
- L. peregra* var. *labiosa*.—East Moors.
- L. peregra* var. *acuminata*.—Various localities.
- L. peregra* var. *ovata*.—Penylan.
- L. peregra* var. *lutea* (?).—Roath Brook.
- L. auricularia*.—Cadoxton Moors. Not very common.
- L. palustris*.—East Moors, &c. Moderately common.
- L. palustris* var. *conica*.—East Moors.
- L. palustris* var. *elongata*.—East Moors.
- Ancylus fluviatilis*.—Feeder, &c. Common.
- A. fluviatilis* var. *albida*.—I took specimens of this in 1883, but unfortunately I have forgotten where, and have not seen them since.
- A. lacustris*.—Pond at Llanrummey, River Taff and Feeder. Rare.
- Arion ater*.—Common.
- A. ater* var. *nigrescens*.—St. Fagan's, Llandaff, &c.
- A. hortensis*.—Fairly distributed.
- A. hortensis* var. *sub-fusca*.—St. Fagan's.
- Limax marginatus*.—Llandaff. Moderately common.
- L. agrestis*.—Common and general.
- L. agrestis* var. *tristis*.—St. Fagan's. Not common.

- L. agrestis* var. *sylvatica*.—St. Fagan's. Not common.
- L. lævis*.—Llandaff, &c. Not very common.
- L. maximus*.—Whitchurch, &c. I took a specimen of this which measured when crawling  $7\frac{3}{4}$  inches.
- Succinea putris*.—Llandaff, St. Fagan's, &c. Local, but plentiful where it occurs.
- S. elegans*.—East Moors, Leckwith, &c. Less abundant than *S. putris*.
- S. elegans* var. *minor*.—East Moors.
- Vitrina pellucida*.—Widely distributed. Scarce.
- Zonites cellarius*.—Moderately plentiful in various localities.
- Z. alliaris*.—Same as *Z. cellarius*.
- Z. nitidulus*.—Generally distributed.
- Z. radiatulus*.—Whitchurch. Rare and local.
- Z. crystallinus*.—Leckwith, &c. Common, but local.
- Z. fulvus*.—Leckwith, St. Fagan's, &c. Scarce.
- Helix aspersa*.—Common and general.
- H. aspersa* var. *conoidea*.—Cogan. Rare.
- H. aspersa* var. *exalbida*.—Llantwit Major. Very scarce and local.
- H. aspersa* var. *minor*.—Llantwit Major. Rare. I have also taken varieties somewhat approaching *albofasciata*, *grisea*, and *flammea*.
- H. nemoralis*.—Common and generally distributed.
- H. hortensis*.—Common and general. A great many varieties of this and *H. nemoralis* occurs in this district, of which I will send particulars later on.
- H. arbustorum*.—Not uncommon and fairly distributed.
- H. arbustorum* var. *major*.—Llandaff.
- H. arbustorum* var. *flavescens*.—Llantwit Major. Rare.
- H. cantiana*.—Ely, &c. Local and not common.
- H. rufescens*.—Generally distributed.
- H. rufescens* var. *albida*.—With type. Common.
- H. concinna*.—Llandaff, &c. Not very common. I have seen this species feeding on the excrement of cows.

- H. hispida*.—Commoner than *H. concinna*, and fairly distributed.
- H. sericea*.—Grangetown, Greenmeadow, &c. Scarce and local.
- H. virgata*.—Plentiful on the moors, near the sea shore. At Porthcawl dead shells of this species occur in thousands, strewn over the sand hills.
- H. virgata* var. *submaritima*.—East Moors.
- H. virgata* var. *alba*.—East Moors.
- H. caperata*.—East Moors, &c. Moderately rare.
- H. caperata* var. *fulva*.—East Moors.
- H. caperata* var. *ornata*.—East Moors.
- H. rotundata*.—Common and general.
- H. rotundata* var. *alba*.—With type, near the Feeder. Very rare.
- H. rotundata* var. *turtoni*.—Same locality as var. *alba*.
- H. rupestris*.—Common on old walls in various localities.
- H. pulchella*.—East Moors, Leckwith, &c. Not common.
- H. pulchella* var. *costata*.—Leckwith. Rare.
- H. lapicida*.—Llantwit Major, &c. Local.
- Bulimus acutus*.—Grangetown. Common, but local. This used to occur on the East Moors, but lately have entirely disappeared.
- B. obscurus*.—Widely distributed, but scarce.
- Pupa umbilicata*.—Very abundant on old walls, &c., in various places.
- Balea perversa*.—Cogan, Llandaff, &c. On oak and elm trees ; scarce.
- Clausilia rugosa*.—Common and general in crevices of walls, &c.
- Clausilia rugosa* var. *tumidula*.—In old Blue Lias Quarry at St. Fagan's.
- C. laminata*.—Leckwith, Pencoed, &c. Common on trees.
- Cochlicopa lubrica*.—Generally distributed, but not common.

*Achatina acicula*.—Hedge bank at Llandaff, three inches beneath surface of ground. Three specimens only, 1882.

*Carychium minimun*.—Penarth, &c. Not uncommon in the limestone districts.

*Cyclostoma elegans*.—Llantwit Major and Penarth. At base of rocks on the shore ; moderately common.

*Vertigo edentula*.—One specimen near the Feeder, and three at St. Mellon's.

*Helix cartusiana* used to occur on the East Moors, and were localized on a small patch of raised ground, which, at the time I allude to, was covered with a luxuriant growth of ballast plants. This was some four or five years ago, since then both plants and shells have entirely disappeared, and “left not a vestige behind.”

It is near the spot referred to above that *H. villosa* was found ; I have searched closely for it very many times but never saw the slightest trace of it, and think it a certainty that both it and *H. cartusiana* were introduced with ballast, or in the case of *H. villosa* with esparto grass, large quantities of which are brought into Cardiff and stored on these moors. I may add that a brick-yard now covers the spot where *H. villosa* was taken, and various works and docks are fast occupying the ground, so that in another few years at the outside, the whole place will be covered, and the ditches, ponds, and habitats of various land shells will, alas ! be no more.

NOTE.—The “Cardiff Feeder” alluded to is an artificial river made to supply or feed the Bute Docks, for the purpose of keeping the water at the required height during the low ebb tides.

DESCRIPTIONS OF THREE NEW  
SPECIES OF FRESHWATER SHELLS FROM JAPAN.

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

Zoological Department, British Museum.

*Paludina longispira*.

*Testa angustissime rimata, elongata, obtuse conica, fusco-olivacea, strigis et lineis obliquis saturatioribus, hic illic nigrescentibus, picta; anfractus sex planiusculi, sub-gradati, carinis 2—3 obsolete cincti, lineisque incrementi striati; anfr. ultimus in medio obtuse angulatus; sutura profunda, paulo obliqua. Apertura pyriformi-rotundata,  $\frac{2}{3}$  longitudinis totius paulo superans, intus cærulescens. Peristoma tenue, in regione umbilicali leviter incrassatum, reflexum et nigro limbatum.*  
*Longit.* 50 mill., *diam. max. anfr. ultimi* 33 mill., *min.* 27 mill.  
*Apertura:* 22 mill. longa., 18 mill. lata.

*Hab.:* Lake Biwa.

This is the most elongate of the Japanese species of *Paludina*, and has a peculiarly long turreted spire which does not, however, terminate in a sharp apex. This, in specimens at all approaching maturity, appears to be constantly more or less eroded; but if such were not the case it would still present the obtuse appearance, for the gentle convergence of the sides of the spire shows that the first whorls form a blunt apex. This species has only very feeble indications of minute spiral striation, and the keels on the upper whorls, which are generally three in number, are never strongly, but as a rule only feebly, developed, and in some specimens one or more of them are scarcely traceable.

Kobelt,\* in his 'Fauna japonica extramarina,' has identified with *P. ingallsiana* a series of specimens, also from Lake Biwa, which I have little doubt belong to the present species. *Paludina ingallsiana* was first described by Lea † from specimens collected by Dr. T. R. Ingalls in Siam, and not in Japan as

\* Abhandl. Senkenberg. Naturforsch. Gesellsch. Bd. xi. p. 408.

† Proc. Acad. Nat. Sci. Philad., 1856, vol. viii. p. 110.

stated by Reeve and Frauenfeld.† This error in the locality doubtless misled Kobelt, who however has noticed the marked difference in the apices of the two species, observing that ‘sollte die Reeve’sche Art Wirklich einen spitzen Wirbel haben und derselbe nicht bloß ergänzt sein, so musste unsere Form von ihr getrennt werden.’

The specimen figured in the ‘Conchologia Iconica,’ by Reeve, is in very perfect condition and *has* the acute apex depicted in the figure. It is moreover a more solid shell, of a greener tint, with spiral colour-bands and distinct spiral striation, and the shape is very different. Whether it be the same as that characterized by Lea is a little doubtful as his description does not well apply to Reeve’s species. He says that *T. ingallsiana* is obtusely conoid and thin, that the spire is obtuse, the whorls rather flat, and that the aperture is subangulated below. On the contrary, *P. ingallsiana* of Reeve is *acutely* conical, thickish (for a Paludina), has a sharp spire, moderately convex whorls, and does not exhibit any angulation at the lower part of the aperture.

Kobelt’s figure (plate xi. fig. 2) gives a fair idea of the ordinary form of this species, but it does not indicate the presence of the faint spiral carinæ which are traceable in most specimens.

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### Melania andersoni.

*Testa parva, breviter subfusiformis, tenuis, olivaceo-flava zonis duabus nigrescentibus (in anfr. ultimo interdum tribus) cincta; anfr. circa 10, superiores 3—4 detriti, reliqui fere plani, sulcis angustis spiralibus incrementique lineis sculpti; apertura obliqua, ovato-subpyriformis, intus zonis externis saturate rufis haud ad labrum productis picta; columella arcuata, incrassata, alba.*

Longit. 20 mill., diam. 7 mill. Apertura 7 longa.,  $3\frac{2}{3}$  lata.  
 „ 18 $\frac{1}{2}$  „ 7 $\frac{1}{4}$  „ 8 „ 4

Hab. : Kiga, Japan (Dr. J. Anderson).

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\* Verhandl. Zool.-botan. Gesellsch. Wien 1864, vol. xiv. p. 617.



The above are the dimensions of two specimens, each consisting of five remaining whorls.

The species might be regarded by some as a dwarf form of *M. japonica* Reeve, which is similarly banded and transversely sculptured. *M. retifera* of Tryon is more of the same size and proportions, but that shell has rounder volutions, is more delicately striated, differently coloured, and of a thinner texture. Figure 433 (*M. grata*) of Reeve's 'Monograph of Melania' gives a fair idea of the form of some of the most elongate specimens of this species, but the majority of examples are of rather shorter and broader growth.

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### Melania mariesi.

*Testa decollata, tenuicula, nitida, olivaceo-fusca; anfractus superiores detriti, reliqui tres planiusculi, costis vel plicis longitudinalibus parum arcuatis subgranosis sulcisque spiralibus (in anfr. penult. circiter 6) sculpti; anfr. ultimus elongatus per omnes partes sulcatus, sulcis basim versus latis, liris interjacentibus latioribus, et plicis supra medium obsoletis; apertura elongate pyriformis, basi effusa, superne acuta, intus cærulescens; labrum acutum, tenue, prope medium late et haud profunde sinuatum; columella arcuata, callosa, alba, superne labro callo tenui juncta.*

*Longit. 25 mill., diam. 11 mill. Apertura: 12 mill. longa, 7 mill. lata.*

*Var. Testa sublævis, plicis longitudinalibus sulcisque spiralibus (paucis ad basim anfr. ultimi exceptis) fere vel omnino obsoletis.*

Hab. : Japan (Mr. Maries).

This species is remarkably decollated and has a long and somewhat ventricose body-whorl. The plicæ which occur in the typical form are cut across by the transverse grooves and thus rendered somewhat nodulous. The colour is a rich olive-brown varied at intervals with black wavy lines indicating former lips. If the figure of *Melania arcticava* (Reeve's 'Conch. Icon.' fig. 71) had the aperture more pointed below and the three apical whorls removed it would give a fair idea of the form of the present species.

MOLLUSCA OF THE  
NEIGHBOURHOOD OF CLAPHAM, YORKSHIRE.

By HUGH RICHARDSON.

The following list is the result of an examination of the district by J. R. B. Tomlin, M. C. Hughes, and myself during a recent geological excursion. Mr. Tomlin is responsible for most of the work; anything found by Mr. Hughes or myself is initialed.

The lake marl in Crummockdale is the bed of an old Tarn; there is little or no peat above it.

*Arion ater* (L). In Clapham Woods; uncommon.

*Arion hortensis* Fer. Generally distributed.

*Limax agrestis* L. Type common. An albino by Clapham church-yard wall.

*Limax lævis* Mull. One specimen in Kingsdale,

*Limax marginatus*. Occasional, among moss, leaves, &c.

*Succinea putris* (L.). Two specimens in lake marl, Crummockdale.

*Vitrina pellucida* Mull. Not common, though generally distributed in moss.

*Zonites cellarius* (Müll.). Ubiquitous.

*Zonites alliarius* (Miller). Kingsdale.

*Zonites purus* (Alder). Near Coombe Quarry, Ribblesdale  
M.C.H.

*Zonites nitidus* (Müll.). Occasional specimens everywhere.

*Zonites crystallinus* (Müll.). Not uncommon in moss.

*Zonites fulvus* (Müll.). One in Kingsdale, one in Clapham woods.

*Helix lamellata* Jeff. Two specimens in Farrar's grounds, Clapham.

*Helix nemoralis* L. Empty shells on the fells, H.R.  
Dead shells in Clapham Woods and Kingsdale.

*Helix hortensis* Müll.

*Helix arbustorum* L. Kingsdale and Clapham Woods.

- Helix rufescens* Penn. Extremely common, as also white variety.
- Helix hispida* L. Common.
- Helix rotundata* Müll. Not very common.
- Helix rupestris* Drap. All old walls and limestone scars.
- Bulimus obscurus* (Müll.). Kingsdale, Clapham Woods, not uncommon in moss.
- Pupa secale* Drap. Kingsdale, slopes of Ingleborough, common.
- Pupa umbilicata* Drap. Very common.
- P. umbilicata* var. *albina* Moq. Kingsdale, one specimen.
- Pupa muscorum*. Farrar's Grounds, Clapham.
- Vertigo edentula* (Drap.). Kingsdale.
- Balea perversa* (L.). Wall on road to station, a few hundred yards from Clapham, apparently feeding on *Physcia parietaria*.
- Clausilia rugosa* Drap. Generally distributed.
- C. rugosa* var. *dubia* Drap. Woods near Clapham; usually at higher altitudes than type.
- C. rugosa* var. *tumidula* Jeff. Clapham Woods; rare.
- Clausilia laminata* (Mont.). Kingsdale, Clapham, on the limestone.
- Cochlicopa tridens* (Pult.). Clapham Woods, and in Kingsdale.
- Cochlicopa lubrica* (Müll.). Ubiquitous.
- Carychium minimum* Müll. Kingsdale; Clapham Woods.
- Sphærium corneum* (L.) Lake marl, Crummockdale, H.R.
- Pisidium* ——— Lake marl, Crummockdale, H.R.
- Valvata piscinalis* (Müll.) Lake marl, Crummockdale, H.R.
- Valvata cristata* Müll. Lake marl, Crummockdale, H.R.
- Planorbis nitidus* (Müll.). Lake marl, Crummockdale, one specimen, J.R.B.T.
- Limnæa peregra* (Müll.). Lake marl, Crummockdale, H.R.
- Limnæa palustris* (Müll.). Lake marl, Crummockdale, H.R.

DESCRIPTION OF A NEW  
SPECIES OF VOLUTA FROM WEST AUSTRALIA.

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

Zoological Department, British Museum.

*Voluta güntheri*.

*Testa parva, breviter fusiformis, solida, alba, lineis numerosis longitudinalibus valde flexuosis flavo-fuscis ornata: anfractus 6, primi tres læves, convexiusculi; cæteri supra concavi, deinde angulati, ad angulum serie tuberculorum acutorum instructi: spira brevis, concava, longitudinis totius circa  $\frac{1}{5}$  æquans, ad apicem obtusa; columella alba, plicis validis quatuor munita; apertura elongata, angusta, alba.*

*Longit.* 43 mill., *diam. max.* 22 mill.; *apertura* 35 mill. *longa*,  $8\frac{1}{2}$  mill. *lata*.

This species is smaller than the majority of *Volutes*, and well distinguished by its peculiar colour-markings and the rather acutely noded angle at the upper part or shoulder of the penultimate and body-whorls. The shell is strong, white, and ornamented with numerous fine yellowish-brown lines, which radiate from the suture to the angle and then become wavy and more or less regularly zigzag, so that in the single specimen under examination four *indistinct* transverse bands of zigzag lines fall at sub-equal distances upon the body-whorl. The surface is smooth, with the exception of the fine lines of growth and indications of feeble spiral striæ. There are six whorls, of which the three first form a smooth obtuse mammillated apex. The last and penultimate whorls are rather concave above and then angulated and prettily sub-acutely coronated at the angle. The body-whorl is only slightly convex at the sides, and at the aperture ascends somewhat obliquely. The spire is very short, has concave outlines, and occupies only about one-fifth of the total length of the shell. The aperture is somewhat narrow and elongate and entirely white. The folds on the columella are strong, four in number, sub-equi-distant, and only a little different in thickness, the uppermost or hindmost being the strongest, and the foremost the most slender.

In style of markings this species recalls to mind *V. turneri*, but the lines are more undulating and it does not exhibit any trace of the two faint transverse bands of blotches which occur in that species. It belongs to that section of the genus which includes *V. aulica*, *V. deshayesii*, &c., and it will be figured by Mr. Sowerby in his forthcoming Supplement to the Monograph of *Voluta* in the 'Thesaurus Conchyliorum.'



THE Projectors of the New "Monograph of the Land and Freshwater Mollusca of the British Fauna" desire to express their thanks for the following assistance lately rendered:—

——Shells from Nîmes, and loan of Bourguignat's Algeria and Lehmann's Mollusca.

**G. W. Shrubsole.**—Shells from North Wales and Torquay.

**T. D. A. Cockerell.**—Transcripts from the works of M. Locard.

**T. Scott.**—Scottish Land and Freshwater Shells, mainly from Renfrew and Cantire.

**A. H. Delap.**—Shells from South Tipperary and Waterford.

**R. W. J. Smart.**—Land and Freshwater Shells from Hereford and North and South Wilts.

**C. Fortey.**—Freshwater Shells of Salop.

**B. Tomlin.**—Shells from Cambridge, and Transcripts from several works, relating to Testacellæ.

**J. R. Bourguignat.**—M. Massot's Paper upon French Testacellæ.

**J. Saunders.**—Shells from Luton Hoo.

**W. Jeffery.**—Shells from West Sussex.

**Dr. Scharff.**—Shells and Slugs from Naples.

**Sang & Sons.**—Living *T. Scutulum* from Kirkcaldy.

**J. H. James.**—Slugs from Truro.

**Miss Fairbrass.**—*Unio tumidus* from Worcestershire.

**R. C. Chaytor.**—Shells from Wensleydale.

**E. J. Lowe.**—*Limax lævis* from Chepstow.

**S. C. Cockerell.**—Pupa *marginata* and *Achatina acicula* from Surrey.

**O. Morland.**—Collection of Shells from York and North Somerset.

ASSISTANCE REQUIRED IMMEDIATELY—Specimens of Testacellæ from any locality. Extracts from, or loan of any work to which we have not access, having reference to Testacellæ.

Co-operation is invited from all Conchologists interested in the above subject. Any information or specimens illustrating the LIFE HISTORY—Structure, Development, Variation, Distribution, etc.—will be welcomed and carefully acknowledged.

ADDRESS: Mr. J. W. TAYLOR, Office of the *Journal of Conchology*, Hunslet New Road, Leeds.

## THE MARINE SHELLS OF SCILLY.

BY

THE REV. R. W. J. SMART, M.A.,

AND

THE REV. A. H. COOKE, M.A., F.Z.S.

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See "Journal of Conchology," vol. iv., 1885, pp. 285—303.

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## ADDITIONS AND CORRECTIONS.

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**Mytilus adriaticus** var. **ovalis** Sowb.—Thrown up in Pentle Bay. Rare.

**Rissoa vitrea** Mont.—This is an error. The specimens are *proxima* Alder.

**R. semistriata** Mont.—From the Menavawr dredgings. This occurs in Mr. Jenkinson's list (p. 302) and is thus, as well as *Ianthina exigua*, mentioned below, confirmed.

**Aclis supranitida** S. Wood.—One specimen in good condition from the Menavawr dredging.

**Odostomia scalaris** Phil.—The type occurs besides the var. *rufescens* in the Menavawr shell sand.

**Natica montacuti** Forbes.—Three or four living specimens; Menavawr.

**Ianthina exigua** Lam.—Once thrown up on the Western beaches about seventeen years ago. They occurred in large numbers with *Ianthina rotundata* Leach, the latter of unusual size; the beaches are described as being blue with them.

**Fusus gracilis** DaCosta.—Mr. H. K. Jordan regards these specimens (two worn shells) as undoubtedly *F. Jeffreysianus* Fischer. He also confirms our view of the variety mentioned as being certainly *convoluta*.

**Pleurotoma attenuata** Mont.—One specimen with *Pl. nebula* from Crow Sound.

**Pl. lævigata** Phil.—With *Pl. nebula*. One large specimen, which is certainly not the var. *nana*, being fully ½ inch long. It is the typical form, which thus appears to have been found for the first time on British coasts. Jeffreys only giving (Brit. Conch., vol. iv., p. 387) Belgrave Bay, Guernsey, on the authority of M. Gallienne.

**Melampus myosotis** var. *ringens*.—Found by Mr. H. K. Jordan living on the North Coast of Tresco under large stones. The shells are remarkably fine, being about ⅜ inch long, with very strong teeth on the outer lip, the fluting of which is continued inside the whorl, and gives the shell when viewed from the outside a striped appearance.

**Galeomma turtoni**.—A single valve in Menavawr dredged sand.



NOTE.—Since the above was written the following have come to hand :—

**Akera bullata** Müll.—Given by Jeffreys on authority of Lord Vernon; now confirmed by discovery of a small specimen in Menavawr dredged sand.

**Cerithiopsis pulchella** Jeff.—Given in the Abbey list; now obtained in Menavawr dredged sand.

**C. barleei** Jeff.—A single specimen, wanting the top whorls, but unmistakable; in Menavawr dredged sand.



### Discovery of *Helix cantiana* in Nottinghamshire.

—On June 3rd I found *Helix cantiana*—which has not previously been recorded for the county—plentifully on herbage by the roadside at Staunton, South-East Notts., on Lias-clay soil. All the specimens were immature and mostly belonged to var. *albida*, but a few were rufous about the newly-made and thin part of shell.—C. T. MUSSON, June 6th, 1886.

ON THE  
EROSION OF CERTAIN FRESHWATER SHELLS.

By GEO. W. SHRUBSOLE, M.C.S.

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[Read before the Conchological Society, June 3rd, 1886.]

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IN October, 1884, I gathered from the Trent Canal at Stone, Staffordshire, twenty specimens of *Planorbis corneus*. They were all young, the larger ones hatched probably the previous year, and the smaller the preceding spring. My reason for selecting them from this locality was that, so far as I know, they do not occur in Cheshire, and this was the nearest habitat. My object was experimental—to watch their growth under certain conditions of food, etc. For this purpose I selected a glass jar capable of holding one gallon of water, and so placed as to be continually under my observation. Various water plants were added, to supply food and aërate the water. Either the altered conditions of their existence were unfavourable, or the food unsuited; certain it is that they led a very inactive life at first. Winter was soon at hand, and they became more inactive than before. The introduction of water-cress as a food, coupled with the return of spring, brought new life and activity. From this period, the spring of last year, the supply of food in the shape of water-cress—and when that failed, lettuce—was very liberal, as may be inferred from the fact that during the months of June and July the amount of food consumed weekly was over four ounces in weight. A record was kept of the food supplied and the growth made during the time. After they had been under my observation three or four months, a result presented itself which I had not originally contemplated, and which I now wish to bring before the members of the Conchological Society.

The shells of the Planorbis, when I gathered them, were intact and well developed. After some time I noticed that,



from some cause or other, they, without exception, developed on their outer surface a series of circular pits or holes, which continued to enlarge till several coalesced, usually along the lines of growth, and often extending across the shell, forming a deep groove, which penetrated to the lowest shell layer, and continued to widen and spread as time went on.

I found further that the new shell growth, which was then in vigorous formation, might resist for two or three months, the erosive action, or whatever it was, but that after that time its powers of resistance gave way, and it was no longer safe from the influences at work. Still I found the action continued to spread, deepening, and widening the trenches, notwithstanding the obvious efforts of the animal to counteract the influence at work by sundry repairs, until in some cases the shell, I fear was pierced, causing the death of its inhabitant. Here was presented an unexpected problem. What was the cause of this erosion? It certainly did not originate in any want of food necessary to promote shell growth, for apart from the quantity of food eaten, the condition of the new shell negated any such view; besides it was the old growth of shell which was first attacked. In my perplexity I sought council of those versed in the life history of the mollusca, but with no definite result. The phenomenon had often been observed, but no explanation was forthcoming. Jeffreys wrote: "Various theories have been put forward to account for this erosion. In the case of freshwater shells many naturalists have supposed that it is caused by gaseous action (sulphuretted hydrogen); some have attributed it to the attacks of Myriapodous insects, others to other mollusca eating away the calcareous matter for the purpose of constructing their own shells."\* Altogether, Jeffreys had so little faith in these suggestions that he consulted Mr. Justice Grove on the subject, who wrote an elaborate letter † in reply, suggesting that "it might be owing to the want of homogeneity in the substance of the

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\* 'British Conchology,' vol. i. Introduction, p. li.

† See letter in extenso, 'British Conchology,' vol. i. Intro., pp. lii, liii, liv.

shell, and that the slightest, almost imperceptible, inequality in the surface would result in an electrolytic action of the water, which would gradually dissolve portions of the shells." With all due respect to the physicist, we fail to see that he helps us in any way to solve the problem. The want of homogeneity in the shell will hardly apply, since no erosive action is set up until the shell is removed into the water from another river, and then it will be seen that it is not every water that will produce the erosion, but only waters from certain districts.

From the outset of my inquiry I was led to think that it might arise from some peculiarity in the water, for I found that the shells of other mollusks in company with the Planorbes were similarly acted upon. There was further the fact, that during the time the Planorbes were living in the Trent Canal the shell was entire, while three months' existence in water taken from the River Dee produced the appearance I have described. In other words the mollusk could mature and maintain a shell in the Trent Canal, but not in the water from the Dee. This suggested that the presence or absence either in one or other of the waters, of some element might set up the action I have described. The solution of the question, it seemed to me, must be sought for in the water. Obviously the next point was to analyse the waters, and ascertain their leading constituents. A little reflection suggested that this inquiry might be narrowed down to one or two items usually present in water, viz., calcic carbonate and carbonic acid. My reason for limiting it thus, was that as it is well known the shelly structure of the mollusca is mainly built up of calcic carbonate, a substance which is largely soluble in water in which carbonic acid gas is dissolved. The latter as a matter of fact is largely present in all running streams, and is undoubtedly the active agent in dissolving out of various mineral substances in nature the calcic carbonate which is present, and forming with such a soluble compound. This is so extensively done, that is, that water so charged with carbonic acid gas is constantly coming

into contact with lime salts, that there is scarcely a water that is wholly free from this soluble salt of lime. The amount present in water may vary from two to ten grains in the gallon, while a spring like that at Holywell contains 24 grains to the gallon. Moreover the quantity of lime present in water is in this way constantly increasing. A spring of water in a limestone country may at its source contain only two grains, and in its subsequent progress over limestone rocks may increase the amount to twenty grains in the gallon. The explanation is that in passing along it has dissolved out a portion of the limestone. The idea here present to my mind was that under certain circumstances (such as the presence of carbonic acid), water might in a similar way act upon the shelly matter of the mollusca, in the absence of other material, and so give rise to the erosion seen upon the shells.

Before leaving this, the theoretical side of the question, I want it to be clearly understood that the substance of which shelly matter is composed is one that would be acted upon by all waters, since carbonic acid is invariably present. The next point is that the power of so acting upon the shell is in inverse ratio to the quantity of calcic carbonate already present in the water. Thus water containing only two grains of it in the gallon would have a more powerful action upon shelly matter than if it contained ten grains, and still greater action than if it held twenty grains in the same amount of water. There is a limit to the dissolving power of water, and in time a saturated point is reached, the water will take up no more, and all action upon the shell will cease.

We now take our leave of theories and come to the facts brought out by the revelations of the several analyses. The first thing is the amount of the lime salt present in the water; in this we see the work done by the carbonic acid in presenting the lime in a soluble form. In the Trent Canal there were present 8·33 grains of lime in solution, as against an average of 3 grains only in the Dee water,—a marked difference. It would

hence appear that the Dee water would possess a solvent power over shelly matter not possessed by the water from the Trent Canal. The erosive action, however, I before remarked was delayed for two or three months, whereas it might be expected that this chemical action would be set up at once. The retardation is doubtless due to the epidermis doing its work, and it is not until the water has pierced this horny armour that it can pursue its work of erosion.

This view of the case is somewhat strengthened by two other instances in which erosion is seen in shells from certain waters hereabouts. Near Wrexham there is a pool, in which *Limnæa stagnalis* is similarly eroded. The amount of lime present varies somewhat with the supply of water—the average will not exceed four grains in the gallon. The other instance is that of *Unio margaritifera* from the upper waters of the Dee at Llanderfel, the umbonal regions of which when living are deeply corroded, while dead shells may be found in every stage of dissolution, eaten away by the solvent action of the water. The water, on examination, proved to contain only a trace of lime, a very unusual circumstance, but explained by the fact that the catchment basin of the river at this point is over volcanic rocks which contain no soluble salts of lime. Another tributary of the Dee, at a point lower down, contains ten or twelve grains of lime in the gallon, and it is the mingling of these two supplies that gives to our Chester supply an average of three grains in the quantity mentioned.

The following is a summary of the facts so far as at present investigated:—

	Lime present per gall.	Result.
Water from R. Dee near Chester ...	3'00 grs. ...	Acted strongly on shells.
„ Wrexham ...	4'00 „ ...	ditto.
„ R. Dee near Llanderfel ...	0'53 „ ...	ditto.
„ Trent Canal ...	8'33 „ ...	No action on shells.

In putting forward this theory as to the cause of the erosion seen in certain shells being due to the low per-centage of lime present in the water, and the water in consequence exerting a

powerful action upon the substance of the shell after it has pierced the epidermis, I by no means wish to convey the impression that I consider the case as a matter of cause and effect fully proved. I would venture to suggest the lines on which the correctness or otherwise of the theory may be tested. It is that when shells are found eroded, that the water from which they have been taken should be analysed as to the amount of lime present. A series of observations of this kind would furnish us with valuable data as to the per-centage of lime which is necessary for molluscan life, to successfully construct and maintain its habitation.

I am also endeavouring to confirm the view I have advanced by placing a number of Planorbes from the same Canal in water which I know contains at least ten grains of lime to the gallon. In this case I do not expect to find the erosive action will occur. These experiments will extend over some months, and will form the subject of a future communication.

It may be thought that if the theory now advanced be correct, the erosion seen in *Unio margaritifera* ought to be more general, instead of being confined to the umbonal region, and seeing that there is so little lime in the water, the erosion ought to be in excess of any of the other examples. The answer is to be found in the remarkable thickness of the epidermis, a seemingly needful protection for this species, living in water highly charged with carbonic acid. The epidermis may be best described as a thick horny coating which effectually excludes all outside chemical action.

The Planorbes have now been eighteen months under my observation. Just lately I have observed an unusual modification of the shell mouth. The lip ordinarily in *Planorbis corneus* is reflected in the least degree only, but several of my specimens have the aperture widely trumpet-shaped. This modification, I conceive, has arisen on the part of the animal from a desire to cover over as much as possible of the ravages caused by erosion. In this instance we are able to *assign* the varietal character to a physical cause.

SOME PRELIMINARY NOTES  
ON THE LAND AND FRESHWATER MOLLUSCA  
ABOUT TARBERT, LOCH FYNE.

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BEFORE proceeding to give a list of species and varieties known to occur in this district, it may be as well to say a few words about the district itself, which will help to explain why some genera are either not at all or but poorly represented, while of others there are a fair number, both of species and varieties.

The scenery about Tarbert presents, when seen for the first time, a very uninviting aspect. Grey, lichen-covered, weather-beaten rocks rise up everywhere—in some places sheer from the water's edge—in rugged rounded masses, becoming more elevated as they recede inland, but never reaching a height that can be termed alpine. Approaching Tarbert from the south, the barren ruggedness of the hills, affording in many places, on their hoary sides and summits, scarcely a foothold for even that cosmopolite of the Highlands, the heather, gives one an idea of wild desolation, which those accustomed only to the rich pastoral scenery of England could scarcely realise, and tends to beget in the mind of the conchologist serious misgivings as to his being successful in getting many land or freshwater species in the locality.

The fact, too, that the rocks of which these hills are composed are hard metamorphic rocks, rather increases than allays these misgivings: they belong to the 'Lower Quartzose and Quartz Rocks of the Highlands,' and are probably of Lower

Silurian age; they are folded and twisted in every conceivable way, and present the geologist with questions of exceeding interest for solution.

A considerable part of the village of East Tarbert stands on a comparatively level piece of ground at the south-west corner of East Loch Tarbert, but a great number of detached cottages are built along the greater part of the south and west sides of the loch, many of them occupying terraces on the irregularly-rising rocky ground, so that altogether the place has a rather picturesque appearance—the old castle ruins, which will be referred to again, occupying a commanding position, adds very much to the fine effect. Northward, up Loch Fyne side, and westward along both sides of West Loch Tarbert, the general prospect is better, for the rising ground along these shores is fairly well wooded, which modifies greatly the desolate aspect of the interior, where grey rocks and brown or purple heather form a chequered but barren-looking landscape.

Owing to the physical condition of the country there are no rivers, no large burns (streams) even, for though one or two—such as Avenaghillen Burn,\* down the north side of West Loch Tarbert—become during heavy rains roaring mountain torrents; in dry weather they dwindle to little better than rivulets, and have to assume many a form ere they reach the sea; but rarely presenting anything like a habitat for the larger lamellibranchs, or, in fact, for any of the aquatic molluscs. Of

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\* Avenaghillen burn (Gaelic—Abhuin-nan-ghillean, the youths' river). The following legend is said to be the origin of the name :—“ On a certain occasion five brothers were journeying on foot along the shore of the West Loch. On their way they were met by an old woman who was noted for the power of her evil wishes. Having probably displeased her in some way, she rather ungraciously informed them that they would never reach the end of their journey, and accordingly as they were crossing this stream” (which was very likely flooded by recent heavy rains) || “ they one after another slipped from the stepping-stones and were drowned.”—TARBERT PAST AND PRESENT; by Dugald Mitchell, M.B.C.M., p. 134.

|| Without some such explanation as here given it is difficult to imagine how such a catastrophe could happen.—T.S.

freshwater lochs, there are two within a reasonable distance of Tarbert, both are well up among the hills to the northward, the nearest—Loch-na-Kenna—it is a large pond rather than a loch—is the most promising of the two, being comparatively shallow, and nearly half of it overgrown during summer and autumn with yellow water lilies and other aquatic plants, but all the species of molluscs I have as yet noticed in it are one or perhaps two *Pisidia* and the same number of *Limnæa*; the other loch I found to be even more unproductive. The many ditches and pools in the district appear also to contain but a very limited number of species, the most common and generally diffused being *Pisidium pusillum*, *Limnæa truncatula*, and *L. peregra*, this last usually small in size; but if the physical conditions of the district appear to be against the aquatic species being largely represented, it is rather otherwise with the land molluscs, which, as the subjoined list shows, may compare favourably, as regards species and varieties, with other and more promising localities. Only a few species, however, seem to be generally distributed and equally common throughout the neighbourhood, three of these, viz.:—*Helix rotundata*, *Pupa umbilicata*, and *Clausilia rugosa*, may be got so near the sea as to be scarcely beyond high water mark, and where they must be drenched with spray during every storm, and are also found well inland; one or two other species such as *Helix aspersa*, *H. nemoralis*, and *H. arbustorum*, though frequent within a restricted area, appear to be otherwise scarce, while *Pupa ringens* has only been noticed at one place as yet.

The ruins of the 'Old Castle' of Tarbert stand on what is, by some, called 'the Castle Rock,' an outstanding rocky knoll, perhaps about one hundred feet in height, and near to the old quay. A good deal that is interesting might be said about the history and traditions of the olden times of which these ruins are now the only tangible tokens—when stalwart men and stately dames walked about these now solitary and crumbling walls, but this is not the place to do so; but is the



irony of time not revealed in very bold characters indeed when it is considered that in the place where men once held high revelry, and from whence they, doubtless, often issued armed with sword and spear and buckler to do battle against their foes, the conchologist now peacefully hunts for snails !

About these ruins there are at least four varieties of *Helix arbustorum*: a light and a dark variety, both with band, and both about equally numerous ; a small form with band, and a form about the usual size, somewhat light in colour, without a band—these two are rare. There are also two distinct forms of *H. aspersa* of frequent occurrence ; *H. nemoralis* is also frequent, as well as the variety *cornea* (only) of *H. sericea*—these I find indifferently under stones, upon grass, nettles, cow-parsnips (*Heracleum*), and beaked parsley (*Anthriscus*). These *Helices*, though frequent here, I seldom meet with anywhere else in the locality ; a few other species are also found about the ruins.

Of course, when the district becomes more thoroughly worked up, other localities will likely be found for the species mentioned in the list, and possibly other species will be added thereto. The time I have been able to give to this subject since I came to Tarbert last summer has been exceedingly limited, and therefore this paper cannot be considered as in any sense exhaustive ; as it is, it shows that even in this out-of-the-way place a few things may be met with which are, comparatively at least, not altogether without interest.

**Pisidium fontinale** (Drap.). Loch-na-Kenna.

**P. pusillum** (Gmelin). Generally distributed.

**Limnæa peregra** (Müll.). Generally distributed.

**L. peregra** var. Very scarce.

**L. truncatula** (Müll.). Generally distributed.

**Ancylus fluviatilis** Müll. Rivulet near head of West Loch Tarbert.

**Arion ater** (L.). Common.

**Arion subfuscus** Drap. var. **rufo-fuscus**. About the old castle, and one or two other places.

- Limax agrestis* L. Common.
- L. lævis* Müll. Frequent about the district.
- L. arborum* B.-Ch. Old castle, under stones, and woods about West Loch Tarbert.
- Vitrina pellucida* Müll. Frequent about the district.
- Zonites cellarius* (Müll.). Generally distributed but not very common.
- Z. cellarius* var. *albinos*. Near steamboat quay, West Loch Tarbert, and from other side of Loch Fyne, opposite Tarbert.
- Z. alliarius* (Miller). Frequent.
- Z. nitidulus* (Drap.). Moderately common.
- Z. purus* (Alder). 'White Shore,' East Loch Tarbert, and one or two other places.
- Z. purus* var. *margaritacea* Jeff. More common than the type.
- Z. radiatulus* (Alder). Moderately common.
- Z. radiatulus* var. *viridescenti-alba* Jeff. 'White Shore,' East Loch Tarbert, scarce.
- Z. excavatus* (Bean). 'White Shore,' rather scarce.
- Z. crystallinus* (Müll.). Common in damp places.
- Z. fulvus* (Müll.). Generally distributed.
- H. aspersa* Müll. Plentiful about the old castle, scarce elsewhere.
- H. aspersa* var. *depressa*. Rare. Diam. 32 mill., alt. 26½ mill.
- H. aspersa* var. *conoidea* Moq. Plentiful about the old castle. Diam. 34 mill., alt. 37 mill.
- H. nemoralis* L. Plentiful about the old castle, but seems scarce elsewhere.
- H. nemoralis* var. *roseo-labiata* Taylor. Old castle, East Loch Tarbert. The specimen in colouring and banding belongs to var. *libellula* 12345.

- H. nemoralis* var. *libellula* Risso. Old castle; 00000, 00300, 003300, 12345, (12345).
- H. nemoralis* var. *carnea*. Old castle; 12345.
- H. arbustorum* L. Moderately common about the old castle, West Loch Tarbert, north side, very scarce.
- H. arbustorum* var. *cincta* Taylor. Moderately common about the old castle.
- H. arbustorum* var. *marmorata* Roff. About the old castle, rare.
- H. arbustorum* var. *flavescens* Moq. About the old castle, rare.
- H. arbustorum* var. *alpestris* Ziegl. Scarce; near steam-boat quay, head of West Loch Tarbert.
- H. sericea* Müll. Near the steam-boat quay, West Loch Tarbert, rare.
- H. sericea* var. *cornea* Jeff. About the old castle, frequent.
- H. rotundata* Müll. Generally distributed.
- H. rotundata* var. *alba* Moq. Near the steamboat quay, West Loch Tarbert, rare.
- H. rotundata* var. *Turtoni* Flem. Near steam-boat quay, West Loch Tarbert.
- Pupa ringens* Jeff. 'White Shore,' East Loch Tarbert, rather scarce.
- P. ringens* var. *pallida* Jeff. Along with type, and equally scarce.
- P. umbilicata* Drap. Common from high water mark, East Loch Tarbert, to a considerable distance inland.
- Vertigo edentula* (Drap.). About the old castle, very scarce.
- Balea perversa* (L.). Near Avenaghillen, West Loch Tarbert, and Glen Rolloch.
- Clausilia rugosa* (Drap.). Very common.
- C. rugosa* var. *tumidula* Jeff. Near the steam-boat quay, West Loch Tarbert, rare.

**Cochlicopa lubrica** (Müll.). Generally distributed.

**C. lubrica** var. **densata** Baudon. 'White Shore,' East Loch Tarbert, rare.

**Carychium minimum** Müll. Generally distributed.

In concluding this paper, I wish to draw attention to a difference I have observed in the habits of *Helix arbustorum* and *H. aspersa* and *H. nemoralis*. When hunting for snails, if the evening is mild and dry I am sure of getting *H. arbustorum* in the localities where it occurs, marching about quite freely; *H. aspersa* will also be found fairly plentiful, but *H. nemoralis* is rarely met with; but should there be a mild rain, however, then *H. nemoralis* may be seen almost everywhere within the area where it is found, the same with *H. aspersa*, but very few specimens of *H. arbustorum* are to be seen. Within the limit of the castle ruins I get *H. nemoralis* of a uniform yellow colour, the shell rather thin; of a yellow colour with one dark band (the most common variety)—from that to specimens having five dark bands; and, lastly, specimens almost black and rather solid. Among the specimens of this species I have noticed, is one where the mollusc has evidently formed its shell of a uniform yellow colour till near maturity, when it seems to have acquired gradually the power of secreting pigment to form a dark band. About one-and-a-half-inches back from the lip where the band begins, there is the merest streak of colour, which progresses in an intermittent manner for some distance, when it gradually becomes more decided till where it terminates near the lip the dark colour is of the usual breadth and density of the band seen in the one-banded variety—*i.e.*, 00300. The question, how does the mollusc acquire the power when near, or at maturity, of depositing a pigment of a different colour in its shell, may not be easily answered, but that power, though seldom exhibited as in the case described, is evidenced in unicoloured yellow or reddish shells having black lips.

## NOTES ON SOME VARIETIES OF BRITISH SHELLS.

By T. D. A. COCKERELL.

**Limax lævis** Müll.—A variety occurs on Barnes Common, Surrey, which is parallel to the var. *sylvatica* Moq. of *L. agrestis*. It differs from the typical form in being irregularly spotted with dark-brown. I would propose to call this form var. *maculata*, as no spotted variety of *lævis* seems to be described, unless the *L. mentonicus* Nevill (P.Z.S., 1880) belongs to this species.

**Helix nemoralis** var. **compressa** Terver.—Spire depressed. Mr. J. H. James has sent me an example of this from Truro, Cornwall, measuring alt. 15 mill. max. diam.  $22\frac{1}{2}$ . He also sent an example of var. *conica* Baudon from the same locality, with alt. 19 mill., and max. diam.  $21\frac{1}{2}$ .

**Helix arbustorum** var. **marmorata** Taylor, 1882. Roffiaen described a var. *marmorata* in An. Soc. Mal. Belg., 1868, which, of course, has priority, but the two forms do not appear to differ from one another.

**Helix cantiana** var. **pyramidata** Colb., 1868.—Smaller, spire more raised, pyramidal. Maidstone, one specimen (H. Lamb).

**Helix hortensis** var. **subalbida** Locard.—Very pale, almost white. Truro (J. H. James) and other localities; not uncommon.

**Helix pisana** var. **albida** Moq.—Entirely whitish, or very pale yellow. I have seen this from Tenby, South Wales.

**Clausilia rugosa** var. **parvula** Turton.—Smaller and more slender, nearly smooth. Clonmel, South Tipperary (A. H. Delap). This variety bears a close resemblance to *C. parvula* Stud., and Turton described it as *C. parvula*, under the impression that it was really *C. parvula* Stud., it must therefore stand as *parvula* Turt. (non Stud.).

*Cyclostoma elegans* Müll.—Mr. F. Harding has recently sent me the varieties *pallida* and *fasciata* from Willingdon, near Eastbourne. In the same box he sent also *Hyalina excavata* Bean, from Heathfield, Sussex.

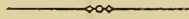
*Limnæa peregra* var. *solemia* (Zgl.) Moq.—More ventricose, whorls more convex. Near Clonmel, Ireland (A. H. Delap).

*Limnæa auricularia* (L.) Drap.—The varieties *ventricosa* Htm. and *monnardi* Htm., as well as *L. stagnalis* var. *raphidia* Bourg., are recorded for Middlesex by G. Nevill in Hand List of Moll. in Ind. Mus. Calcutta, part 1, p. 238.

*Limnæa palustris* var. *minor* Taylor, 1883.—Var. *minor* Locard (An. Soc. D'Agricul. Hist. Nat. et Arts utiles de Lyon, 1879) has priority of publication.

*Sphærium corneum* (L.).—J. E. Gray (Brit. Mus. Cat.) describes two British varieties of this which seem to have been overlooked—var. *compressa*, rather compressed, margins meeting at an acute angle, and var. *minor*, small and nearly globular.

*Pisidium amnicum* Müll. — The varieties *striolata* and *leviuscula* of Moquin-Tandon, were originally described as British (though without names) by Jenyns in his monograph.



**Paludina contecta in Nottinghamshire and Yorkshire.**—During a conchological ramble with my friend, Mr. Musson, of Nottingham, this species was found in tolerable abundance in a dyke on the Nottingham side of the River Idle, near Bawtry. On the Yorkshire side we found several shells among the rejectamenta of a small stream. On a previous excursion we collected a number of *Balea perversa* beneath the loose bark of willow trees, growing near the junction, and within each, of the parishes of Darlton, East Markham, and East Drayton.—W. A. GAIN, Tuxford, May 28th, 1886.

**Helix lactea in Yorkshire.**—At the beginning of August, 1884, Mr. W. Storey, of Pateley Bridge, sent to Leeds a living specimen of this fine Mediterranean species. It was found in a field, near the railway at Pateley Bridge, by Mr. D. Kindon some time before, and most probably it had been conveyed with the shingle which is brought to Pateley from the coast.—JNO. W. TAYLOR.

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**Extension of the range of Pupa ringens Jeff.**—Mr. C. T. Musson, whose energy and success in working up the mollusca of Notts. is so remarkable, has discovered this species at Kirkby-in-Ashfield. The specimens were all taken from twigs in a damp place in a wood about 450 feet above the sea, and situate on the magnesian limestone formation. He has also been fortunate in finding the same species at Whitney-on-the-Wye, Herefordshire, in a dingle cut through beds of red clay of varying hardness. The shells were all found on loose wood and dead leaves in a damp place.—J. W. TAYLOR, June 11th, 1886.

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**Helix obvoluta in Surrey.**—It may be interesting to many of your readers to learn that *Helix obvoluta* would appear to be extending its habitat from Ditcham Woods, Hampshire (the only place in England where it has hitherto been found), to the adjoining county of Surrey; for, during the past two years and again in the month of May last, I have found some half-a-dozen of the shells in the woods of Norbury Park, Surrey. It is true that all of them were dead specimens lying on the surface of the leaves from beech trees which had fallen in the previous autumn, and although I searched diligently for living representatives I have hitherto failed in finding any, still as those discovered were in different parts of the wood, I feel convinced the animal must have established itself in the neighbourhood.—S. J. DACOSTA, June 21st, 1886.

CONTRIBUTIONS TOWARDS  
A LIST OF NORTH WILTSHIRE MOLLUSCA.

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BY T. D. A. COCKERELL.  
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THE recorders of the Conchological Society, in their annual report, observe that only one county in England, North Wilts., is without any records whatever. Having recently spent a few days at Swindon, I therefore endeavoured to collect as many species as possible, and am able to offer the following list as a nucleus to which we may hope, in the course of time, to add greatly, but which may serve as a first indication of the nature of the molluscan fauna.

**Sphærium corneum.**

**S. lacustre.** Type.

**S. lacustre** var. **ryckholtii.** All these in the same pond, but the two species were in different parts of it. The type of *S. lacustre* was very common at one place, but only one of var. *ryckholtii* was found (measuring  $6 \times 6$  mill.).

**Pisidium fontinale.** In a pond, with *S. corneum*.

**P. pusillum.** In a small pond.

**Unio tumidus.** A single valve in the canal at Swindon.

**Bythinia tentaculata.**

**Planorbis fontanus** (= *nitidus* Jeff.). With *B. tentaculata* in a pond, and elsewhere; apparently a common species in the district.

**P. albus** var. **major.** One found in a pond: the variety is new to Britain. Locard, in 1879, gives the diameter as 4—6 mill., and Pascal, in 1883, gives the diameter as 7 mill., alt.  $1\frac{1}{2}$  mill. My specimen from Swindon has diam.  $7\frac{1}{3}$  mill., alt. 2 mill.

**P. vortex.**

**P. contortus.** Living in a pond, with *P. vortex*.



*Planorbis spirorbis*. In the canal, with the two following.

*P. umbilicatus* (= *complanatus* Jeff.).

*P. carinatus*.

*Limnæa peregra*. In the canal and in a pond.

*L. auricularia*. In the canal and elsewhere ; apparently as common as *L. peregra* in the district. One specimen approached var. *ampla*.

*L. stagnalis*. One in a pond, with *L. auricularia*.

*L. palustris*. In a pond, with *L. peregra*.

*Ancylus lacustris*. Type ; in a pond.

*A. lacustris* var. *moquiniana*. In another pond. The measurements are : type, long.  $5\frac{3}{4}$  mill., diam. 3 mill., alt.  $1\frac{1}{2}$  mill. ; variety, long.  $6\frac{1}{2}$  mill., diam.  $2\frac{1}{2}$  mill., alt. 2 mill.

*Arion ater* var. *nigrescens*. One under a stone.

*Limax agrestis*. Type ; common, but I did not see one of the mottled variety.

*Succinea pfeifferi*. By the canal.

*Hyalina cellaria*. One specimen.

*H. pura*. Type ; one on an old tree-stump.

*H. crystallina*. Locally abundant.

*Conulus fulvus*. One by a pond.

*Helix aspersa*. Very abundant. They are largely eaten by the people round Swindon, under the name of ' wall-snails.' I was assured by one who had eaten them that they are very excellent.

*H. hortensis*. Common amongst nettles by the road-side ; the varieties found were *lutea* 12345, *arenicola* 1(23)45, and the almost white bandless variety *subalbida* Locard. I did not see any traces of *H. nemoralis*.

*H. rufescens*. Very common.

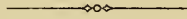
*H. rufescens* var. *rubens*. One specimen.

*H. rufescens* var. *alba*. One at Blunsdon, June 29th.

*H. concinna*. One at the base of an elm tree.

*H. hispida*. One by a pond.

- H. virgata.** One, immature, on a fence; it is pale yellowish, with indistinct bands.
- H. rotundata.** Very common.
- H. pulchella** var. *costata*.
- Balea perversa.** One at the base of an elm tree, with *H. pulchella* var. *costata*.
- Clausilia rugosa.** Very abundant.
- C. rugosa** var. *tumidula*. One specimen.
- Cochlicopa lubrica.** Not very common.
- Carychium minimum.** Very abundant amongst damp rushes.



**Note on *Helix obvoluta*.**—Mr. Jeffery, of Ratham, having supplied me with two living *H. obvoluta* last autumn, I have been much pleased by finding a host of young shells in ‘my snailery’ this summer. They vary in size from a pin’s head to the size of a half-grown *obvoluta*, thus, I suppose, representing two or three broods. I am feeding the little fellows with dock leaves, plantain (*Plantago major*), dandelion (*Leontodon taraxacum*), and cabbage leaves. The dock leaves present the appearance (after a day’s feeding) of perforated cardboard, so I conclude this is their favourite food. They remain on the leaves on the surface of the earth and seem to hide from the light, never crawling to the muslin top as our ordinary *H. aspersa*, *nemoralis*, *pomatia*, &c., do. In respect to keeping below they resemble the Zonites.—Miss F. M. HELE.



***Succinea oblonga* in North Somersetshire.**—Amongst some drift collected from the banks of the River Brue, near Glastonbury, kindly sent me by Mr. O. Morland, I have been fortunate in finding a single specimen of this species in perfect condition. It is, I believe, new to Somersetshire.—JNO. W. TAYLOR, June 5th, 1886.

## PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY.

## Meeting

HELD APRIL 1ST, 1886.

The President, Mr. W. Denison Roebuck, F.L.S., in the Chair. The minutes of last meeting were confirmed.

## NEW MEMBERS.

The following gentlemen were elected members of the society:—Rev. R. B. Watson, Rev. S. Spencer Pearce, and Messrs. Fred. R. Coles, Wm. Duncan, Wm. Baillie, and James Steel.

The under-named were nominated for membership:—Mr. Chas. L. Smout, Hastings; Mr. J. Bickerton Morgan, Welshpool; Mr. Alfred E. Craven, F.G.S., F.L.S., F.Z.S., Warwick Square, London; Mr. B. Sturges Dodd, Nottingham; Mr. Geo. T. Rope, Wickham Market, Suffolk; and Miss S. Hockin, Hayle.

## HONORARY MEMBER.

Prof. E. von Martens, Berlin, was nominated as an honorary member.

## DONATIONS.

The following donations to the Society's collection were announced:—*Limnæa stagnalis* (var. *elegantula*) m. *scalariforme* from Chislehurst, Kent, collected and presented by Mr. D. B. Cockerell; *Cyclostoma elegans* var. *albescens* Moq., Folkestone, collected by Mr. G. F. Payn; *Hydrobia corolla*, found amongst frozen fish from New Zealand in New Bond Street, London; *Littorina obtusata* var. *ornata*, near Weymouth, collected by Mr. L. M. Cockerell; *Scalaria communis*, *Columbella rustica*, *Conus mediterraneus*, and *Cochlicella acuta* var. *strigata* from Gibraltar, collected by Rev. J. W. Horsley, presented by Mr. T. D. A. Cockerell.

The thanks of the meeting was accorded to Messrs. D. B. and T. D. A. Cockerell for their valuable donations.

## SPECIMENS EXHIBITED.

Mr. J. R. Redding, M.C.S., sent a collection of slugs from County Dublin, including very characteristic specimens of the variety *bicolor* of *Arion ater*, and numerous other species; also a specimen of *Helix aspersa* showing a deformity in one tentacle.

A collection from Mr. Thos. Scott, M.C.S., included examples of *Limax lævis* from Tarbert, Cantire; also *Pupa ringens*, *Zonites radiatulus*, *Pisidium pusillum*, *Balea perversa*, &c.

Specimens of *Sphærium corneum* and *Physa fontinalis* from Stafford were shown on behalf of Mr. L. E. Adams, B.A., M.C.S.

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## Meeting

HELD MAY 6TH, 1886.

The President, Mr. W. Denison Roebuck, F.L.S., presiding. The minutes of the April meeting were confirmed.

## NEW MEMBERS.

The following were duly elected members of the society:—  
Chas. L. Smout; J. Bickerton Morgan; Alfred E. Craven, F.G.S., F.L.S., F.Z.S., &c.; B. Sturges Dodd; Miss S. Hockin; and Geo. Thos. Rope.

The following gentlemen were nominated for membership:—  
Wm. E. Hoyle, B.A., F.R.S.E., Edinburgh; Thos. Wm. Pocock, J.P., Staines; John Ponsonby, Grosvenor Place, London.

## HONORARY MEMBERS.

M. J. R. Bourguignat and Prof. E. von Martens were elected Honorary Members.

## DONATIONS.

The following donations were announced:—  
“Proceedings of the Royal Physical Society of Edinburgh,”  
by the Society.

*Testacella haliotideia* from Whetstone, Middlesex (see ‘Field,’ 1885, p. 607); *Zonites glaber* var. *bicolor*—new variety (not yet described), from Bromley, West Kent; thorn from stomach of

Parmacella, from Gibraltar; *Physa hypnorum* monst. *angulatum*, Bickley, West Kent (see 'Nat. World,' 1885, p. 200); *Physa hypnorum* var. *cuprella* E. H. Rowe, near Leominster, Sussex (See 'Nat. World,' 1885, and 'Garner'), from Mr. T. D. A. Cockerell.

The thanks of the society was voted to the donors for their valuable contributions.

It was also resolved to enter into an exchange of publications with the Royal Physical Society of Edinburgh.

#### SPECIMENS EXHIBITED.

Mr. J. W. Taylor showed numerous specimens, including a collection sent by Mr. Wotton from Glamorganshire; examples of *Helix nemoralis* from Truro, sent by Mr. J. H. James; a series of shells from Bedfordshire, which included a specimen of *Clausilia rugosa* with two distinct and separate apertures, sent by Mr. J. Saunders; an example of *Unio tumidus* from Worcestershire, on behalf of Miss Fairbrass; examples of *Helix virgata* collected by Mr. Heathcote between Lytham and Fleetwood; and a specimen of *Testacella haliotidea* living, sent by M. Morelet from the Pyrenees.

The president, Mr. W. D. Roebuck, exhibited examples of *Limax cinereo-niger* and other slugs from Powerscourt, Co. Wicklow, sent by Mr. W. F. de V. Kane, M.A., M.R.I.A.; also *Amalia gagates*, *A. marginata*, and other slugs, from Cushendun, Co. Antrim, sent by Rev. S. A. Brenan.

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## Meeting

HELD JUNE 3RD, 1886.

The President, Mr. W. Denison Roebuck, F.L.S., in the chair. The minutes of the May meeting were confirmed.

Correspondence from the Royal Physical Society of Edinburgh, M. Bourguignat, Prof. E. von. Martens, and Mr. C. L. Smout, was brought before the meeting.

## NEW MEMBERS.

Messrs. W. E. Hoyle, B.A., F.R.S.E., Edinburgh ; T. W. Pocock, J.P., Staines ; and John Ponsonby, London, were duly elected members of the society.

The following gentlemen were nominated for membership :—Messrs. A. J. R. Sclater, Teignmouth ; J. T. Lightwood, Lytham ; and W. E. Collinge, Leeds.

## DONATIONS.

The following donations to the Society's library and collection were announced :—

1. "Etude sur les Fossiles Tertiaires et quaternaire de la Vallee de la Cettina en Dalmatie."
2. "Monographies des genres Pechaudia et Hagenmulleria."
3. "Description de diverses espèces de Cælestele et de Paladilhia."
4. "Bythiospeum ou description d'un nouveau genre de Mollusques Aveugles."
5. "Monographie d'un nouveau genre d'acephale du lac Tanganika."
6. "Paulia ou description d'un nouveau groupe gènérique de Mollusques Habitant la nappe d'eau des puits de la ville d'Avignon."
7. "Description du nouveau genre Gallandia."
8. "Hélixarionidées des regions orientales de L' Afrique."—  
Presented by M. J. R. Bourguignat.
9. "Abstract of the Proceedings of the Linnean Society,"  
New South Wales, for January, February, and March,  
1886.—By the Society.

*Helix rufescens* var. *rubens*, *H. aspersa* var. *semifusca*, *H. hortensis* var. *lutea* 00045, *Physa fontinalis* var. *albina*, *Limnæa stagnalis* var. *expansa*, *Planorbis vortex* var. ? *Clausilia biplicata* monst. *tridentatum*, *Pisidium nitidum*, *Limnæa palustris* var. *angulata*, *Helix hortensis* var. *lutea-minor*, *Limnæa palustris* monst. *decollatum*, *L. stagnalis* monst. *decollatum*, *H. hortensis* var. *crassa*, *H. nemoralis* var. *libellula* 00305, *H. nemoralis* var.

*albescens*, *Clausilia rugosa* var. *gracilior*, *H. hortensis* monst., *Hyalina alliaria* var. *viridula*, *Physa acuta*, *Cardium edule* var. *rustica*.—Presented by Mr. T. D. A. Cockerell.

The thanks of the Society was accorded the donors for their valuable donations.

## PAPERS READ.

1. "Some Preliminary Notes on the Land and Freshwater Mollusca about Tarbert, Loch Fyne," by Mr. Thomas Scott, M.C.S.
2. "On the Erosion of certain Freshwater Shells," by Mr G. W. Shrubsole, M.C.S.

## SPECIMENS EXHIBITED.

A number of shells were shown for Mr. Scott in illustration of his paper; and also on behalf of Mr. Shrubsole illustrating his remarks on the erosion of shells.

Mr. C. L. Smout sent for exhibition fine specimens of *Buccinum undatum* monst. *acuminatum* and *Bulimus labio* from Central Andes.

Mr. Collinge showed *Helix hortensis* from Spurn.

Mr. J. W. Taylor showed slugs from Chepstow, sent by Mr. E. J. Lowe; and a collection of shells from Cambridge, sent by Mr. Tomlin.

The President exhibited fine examples of *Arion ater* var. *alba*, from Co. Down, sent by the Rev. S. A. Brennan; also on behalf of Mr. J. R. Redding, various slugs from Co. Dublin; and on behalf of Mr. L. E. Adams, examples of *Limnæa peregra* from the River Bann, Coleraine, and *Limax maximus* from Stafford.

Mr. J. W. Taylor also showed on behalf of Mr. G. T. Rope, a small collection from Shere, Surrey; and Blaxhall and Leiston, Suffolk. Among the Suffolk specimens is a remarkably diminutive specimen of *Helix nemoralis* found on the banks of River Alde, near Blaxhall.



ON THE  
LAND AND FRESHWATER MOLLUSCA OF NORWAY.

BY (MISS) BIRGITHE ESMARK.

MALACOLOGICAL excursions may be made with the greatest ease in Norway, particularly in its southern or midland parts. You may proceed from Christiania in an easterly direction to the frontiers of Sweden, or in a northerly direction straight up to Throindhjem\* ; all the way either by rail or by steamer along our coasts. In the latter case you may disembark and, if you choose, take the smaller steamers and go up whichever you please of our long and frequent fjords, and everywhere you will be sure to find forests and fields, rivers, creeks, and lakes. If you wish to proceed to the inland parts of the country you will often find the most excellent footpaths that in many instances will take you through lovely places with more or less grand scenery. The south-western part of Norway round about 'Jædderen'† has, on the contrary, quite a different appearance. It looks naked and uninteresting to the eye, but it is however not at all unlikely that you might there find a rich malacological fauna. We are led to think so from what has been found in these tracts by people who have made occasional visits there. All that is required is someone willing to sacrifice a few summer months to explore these regions.

If you go in a northerly direction you may, as stated above, proceed by rail, and you will find plenty of places very rich in malacological respects ; for instance, 'Æsterdalen,' through which the river Glommen winds. Three successive summers I have visited some small part of this valley, and though I have not been able to spend more than two or three weeks each summer, I have found no less than thirty-seven species, mostly freshwater mollusca. The part between Tónset ‡ and Throindhjem is yet quite a *terra incognita* in malacological respects.

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\* Throindhjem = Drontheim.

† The letter "æ" is pronounced like the English "a."

‡ The "ó" is pronounced like the diphthong "œ."



From the little I have seen in 'Gudbrandsdalen,' (the valley that goes more north-westerly up to Romsdalen), I can safely say, that a careful explorer would be sure to find many interesting species ; whilst the valley of Valdres is entirely unknown.

If you desire to proceed higher up towards the North, to the arctic regions of our country, you will require both time and patience, for the distance is much greater, it is no longer a question of hours but of days, when you take any excursion. From Christiania to Thronhjelm by rail the distance is 560 kilometers (about 377 English miles). From the latter place you may proceed the whole way by steamer up to Vadsø, 2,134 kil. (about 1,406 miles). When going up there in 1882 I did not go further than to the parish of Lebesby in 'Laxefjord,' which is situated 2,463 kil. (1,674 miles) from Christiania, and took eight days to get there, and that seems a long time to spend merely to get to the place of your destination. These regions are however extremely attractive, not only to the tourist, but to everyone who is able to sacrifice some part of his time to study nature in one direction or another. In the latter case a visitor has also the great advantage that he can enjoy the beautiful scenery and employ his time in studying. He may do one thing, and at the same time not neglect the other ; he is even in a better position than a tourist generally is, because he gets to places where tourists seldom go.

The nature of the scenery here offered to the traveller is grand indeed, High mountains, in many places descending perpendicularly into the sea, often appearing as if they had been torn asunder. Sharp alpic peaks covered with snow, and the blue glaciers may be seen, but nowhere else illuminated by the midnight sun, which at the same time sends a play of colours on the sea and the fjords. The bottom of the valley is overgrown with trees and bushes that decrease in size the further you proceed towards the north. Our common lowland plants have frequently much greater flowers and fresher colours than in the more southern regions, and our alpic flora is grow-

ing quite down to the sea. All this must necessarily create the most vivid admiration and enthusiasm of every one who comes to see these tracts.

When you are ashore anywhere you must, however, remember that it is not an easy matter to go from one fjord to another. Even with a steamer it may take you from twelve to eighteen hours. And in places where you cannot take the steamer, but must have a boat, you will find it exceedingly wearisome in spite of the soft and pleasant couch of blankets and reindeer skins, that your boatmen have prepared for you, as the passage may last from sixteen to twenty, nay, even up to thirty hours.

In the easterly parts of Finmarken—except in the South Varanger—you must necessarily limit your excursions to the sides of the valley, on the tops of the mountains you would find nothing but naked rocks. In other places where the mountains are more cut and less cohesive, you will find greater and lesser inlands, there you may ascend higher and find *Pisidium* in the mountain lakes—in some places even *Linnæa*. But you will certainly find the road up very difficult, for to tell the truth, there is no road at all; you must proceed over rocks, through swampy moors, wade through snow and rivers to reach the lakes.

And then we must remember that the species found do not correspond with the exertions. They can, at any rate, not be compared with what we find in the more southern parts of Norway. But on the other hand, they are often of much greater interest, and sometimes you will feel rewarded for all your trouble in finding a great number of specimens.

The districts that are more or less examined, are altogether very few and of very little extent. The valley of Christiania (Christianiadalen), that is to say, the town itself and the surrounding parishes, must be said to have been examined the best, and yet, even there, a great deal is left undone. Excursions have also been made towards Drammen, to Modum, Ringerige, and the east side of Tyrifjorden. The Skiensfjord,

where the small places Langesund, Brevik, Statelle, Porsgrund, and Skien are situated, would certainly continue to reward a zealous investigator. The whole south-western country to Christiansand has only had a few day's examination, which were of great interest. In Bergen and its neighbourhood, H. Friele has now and then found something, but I do not believe that these places have been more particularly examined. In the diocese of Thronhjelm nothing has as yet been done; and what has hitherto been collected on the whole long coast line of Nordland and Finmarken, is so little, and in so few places, that we may safely say, as a whole, only a good beginning has been made.

The peculiar form of Norway from  $58^{\circ}$  to  $71^{\circ} 25''$  north lat. gives a very long coast line, which besides in many places is cut through with a very great number of small and large fjords, in most cases excelling more through their length than breadth. They are in many parts surrounded by high mountains, particularly in the dioceses of Bergen, Nordland, and Tromsø Amt.

It must consequently seem to be a matter of course, that the temperature must differ very much in Norway, and that the higher you go towards the north the colder the climate must be, as we thus more and more approach the coasts of the arctic seas, and even reach them. How is it then possible to fancy anything but ice and snow in these parts? It is, however, not at all the case. On the contrary, the temperature differs very much from this supposition. As it might therefore be of interest to many of the readers who have no opportunity to study the meteorological relations of our country through annals or experience, I have copied down a table from those edited by the Metereologiske Institut in Christiania. The places have been chosen (1) according to their different degrees of latitude, (2) as lying inland or more near the coast, (3) according to the altitude of the places.

THE MEAN TEMPERATURE OF 23 DIFFERENT PLACES OF NORWAY IN DEGREES OF CELSIUS.

Month.	Karasjok	South Varanger.	Vardø.	Kistrand.	Gjæsver.	Alten.	Tromsø.	Andenes.	Bodø.	Ranen.	Brønnø.	Christiansund.	Alesund.	Florø.	Sogndal.	Bergen.	Skudenes.	Mandal.	Christiania.	Eidsvold.	Tønset.	Dombas.	Røraas.
North Lat.	69°30	69°40	70°22	70°25	71°06	69°38	69°39	69°20	66°39	66°15	65°29	68°8	62°30	61°35	61°25	60°20	59°1	58°	59°49	60°25	62°20	62°13	62°35
January ...	*16 6	*11 1	*5 7	*6 6	*4 1	*8 3	*3 5	*1 5	*2 2	*2 4	*0 8	0 9	1 6	1 2	*2 5	0 6	1 4	*0 7	*4 8	*7 2	*13 3	*9 6	*11 9
February...	*16 0	*12 6	*6 5	*7 8	*5 3	*9 5	*4 3	*2 9	*3 2	*5 2	*1 7	0 3	1 2	0 6	*2 3	0 2	0 9	*0 9	*4 9	*7 7	*11 3	*9 0	*11 1
March ...	*10 6	*8 7	*5 0	*5 5	*4 2	*6 7	*3 5	*2 3	*1 9	*2 8	*0 3	1 1	1 8	1 3	*0 5	1 5	6 6	0 6	*1 6	*4 1	*7 5	*6 3	*8 2
April ...	*3 9	*3 3	*1 8	*2 0	*1 7	*1 8	*0 7	0 2	1 1	1 2	2 3	3 7	4 1	4 2	4 4	5 0	4 7	4 3	3 8	1 7	*0 6	*1 1	*2 7
May ...	2 9	2 2	1 5	2 6	2 5	3 2	3 7	4 1	5 3	5 9	6 2	7 1	7 2	7 9	9 7	9 0	8 3	9 2	9 8	7 8	5 2	4 5	3 3
June ...	9 8	8 0	5 9	7 9	6 3	8 7	8 5	8 3	9 8	10 7	10 3	10 9	10 7	11 6	14 2	12 7	11 9	13 4	14 7	12 7	10 8	9 8	9 1
July ...	13 7	12 1	8 7	11 4	10 1	12 7	11 2	10 5	12 4	13 2	12 8	12 6	13 4	15 7	14 3	13 7	15 4	16 6	14 4	12 8	11 8	11 2	11 2
August ...	12 3	11 7	9 4	10 6	10 0	11 8	10 8	11 1	12 2	12 8	12 8	12 8	13 3	14 8	14 8	14 1	14 1	14 9	15 4	13 0	10 9	10 6	10 2
September	5 4	6 5	6 4	6 8	6 7	6 9	7 5	8 1	9 0	8 9	10 1	10 1	10 8	11 3	11 1	11 5	12 1	11 8	11 2	9 1	6 6	6 4	6 0
October ...	1 9	*0 3	1 6	1 2	2 3	0 6	2 3	3 6	4 1	3 3	5 5	5 5	7 3	7 2	5 7	7 2	8 3	7 4	5 3	3 4	*0 3	0 4	*0 3
November	*10 9	*6 8	*2 4	*3 2	1 5	*5 3	*1 0	5 0	0 *1	8 1	3 1	3 3	3 4	3 3	0 9	3 0	4 2	2 8	0 2	*2 0	*8 1	*5 6	*7 0
December	*16 1	*10 5	*4 4	*5 2	*9 *8	*1 *3	*1 *1	1 2	1 9	*3 9	*0 7	0 7	2 2	1 6	2 2	1 0	2 3	0 2	*3 9	*6 1	*12 6	*9 1	*10 8
1 days with degrees of cold.	207	201	187	189	179	190	168	142	110	154	110	0	0	0	118	0	0	77	132	155	186	186	197

Those figures with an asterisk (\*) are degrees below zero.

'The coldest tracts of Norway, where the mean temperature of the year is below  $0^{\circ}$  is found in the highest parts of the mountains and the interior of Finmarken. Close to the sea it is only in the Varangerfjord that the mean temperature of the year is below  $0^{\circ}$ . The outer coast-line from Lister to Sognefjord has the highest mean temperature of the year. The inland part of the south of Norway and Finmarken has the longest winter and the lowest mean temperature of winter, as the coldest day and night is below  $+10^{\circ}$ . From the interior part of the country towards the coast it always becomes gradually milder in winter. From the Thronhjemsfjord there is a long strip of the coast going southwards towards Lister, where the mean temperature day and night is above  $0^{\circ}$ .

Summer is warmest in the south-eastern parts and in the inner parts of Sognefjorden. It is colder on the coast and higher up in the heart of the country. It is coldest on the coast of Finmarken and on the mountain tops. The inner part of Finmarken has a warmer summer than the whole above-stated strip of the coast north of Skudesnæs.

As inland there is a warm summer and cold winter, and on the coast a coldish summer and a mild winter, the greatest change of temperature in the course of the year is to be found in the interior of the country (above  $30^{\circ}$  in Karasjok and above  $25^{\circ}$  in the south of Norway), whilst the least change is to be found on the coast of Romsdalen (only  $11^{\circ}$ ). In  $\text{\O}$ esterdalen and in the inner part of Finmarken the mercury freezes  $+40^{\circ}$  (in Karasjok  $+50\cdot6$ ). On the outer strip of the coast from Romsdalen to the island of Utsire the cold is never stronger than  $+9^{\circ}$  to  $+11^{\circ}$ . In the south-eastern parts of the country, in Sogndal and the interior of Finmarken there may be  $+30^{\circ}$ , but on the outermost islands of the western coasts never above  $25^{\circ}$ .

Norway is chiefly a mountainous country, consisting of primitive rocks, slates and schists, eruptives, and the Silurian formation. The Gneiss and hornblende-schist extend along the

coast. Jædderen is, however, covered with glacial gravel, together with erratic blocks of all sizes, and is very infertile. Violent tempests from the sea rage there horribly in the winter time—it is also mostly snowless—and the coldish summer makes it difficult for trees and bushes to grow. It is, therefore, the more interesting to observe that mollusks can thrive there.

Higher up than the lake Mjösen are great quantities of sparagmit, sandstone, mica-schist, and quartzite, forming Cæsterdalen, Gudbrandsdalen, and Dovre; the eruptives in other places forms great masses of finest granite in the southern interior parts, and gabbro in the grand mountain district of great renown, called 'Jotunheim.' In the diocese of Thronhjøm, we have 'Thronhjøm-schists,' that to a great extent consists of mica-schist, whilst also Silurian limestone strata are found, but they have, however, no significance as a substratum for the mollusks living on them.

In Nordland and Finmarken we have schists, sandstone, limestone, and quartzite of the primitive rocks; the limestone, as well in greater quantities as in lesser strata intermixed in mica-schist, as in the islands of Grótó and Gaasó in Nordland.

The Silurian formation is chiefly to be found in the valley of Christiania and neighbouring parishes going towards Drammen, particularly as limestone and argillaceous slates. It extends to Modum and Ringerige, and along the eastern side of Tyrifjorden as upper silurian limestone. We have also upper silurian strata on the eastern side of Skiensfjorden. The Lake Mjösen is also surrounded by silurian rocks.

How far the substratum has any influence on the appearance of mollusks is yet impossible to state, as the investigations have been too few. It is, however, a fact that the greatest number of species are found and collected on silurian rocks (in the valley of Christiania and Skiensfjord), but at the same time it must be stated that most of the species also appear in places very poorly provided with limestone, and then even in great

quantities, for instance, *Tachea hortensis*, *Arionta arbustorum*, *Clausilia laminata*, and *Cl. bidentata* in the park of Jarlsberg, where it is porphyre, and where in the course of a few hours the Countess Wedel-Jarlsberg collected thousands, particularly on *Angelica sylvatica* and *Stachys sylvestris*.

Not a few species have a different distribution from our neighbouring countries Sweden and Finland. With us they are found much higher towards the north, owing no doubt to the milder coast climate.

Of naked snails we have *Limax maximus* up to  $66^{\circ} 49''$ , whilst in Sweden and in Finland it is not found higher than  $62^{\circ} 6''$ . I have been informed that a great black snail appears on one of the islands of Lofoten  $68^{\circ} 6''$ , but whether it is this species or the next it is impossible as yet to decide, as my informer is no zoologist, and, therefore, does not know the two different genera. *Arion empiricorum* var. *ater* is found together with the preceding at  $66^{\circ} 49'$ . It is not found in Siberia. *Lehmannia marginata* Müll. has been found by my friend Student Hoyer, in Porsangerfjord, in Finmarken, in Sweden to  $62^{\circ}$ — $63^{\circ}$ , but neither in Finland nor in Siberia. *A. hortensis* is not found in Finland, nor in Sweden up to about  $63^{\circ}$ , but will most likely be found further north, as it exists in Siberia, and in Norway to  $69^{\circ}$ , in Trondenæs on the Island of Hindó. *Arionta arbustorum*, both in its chief form and as var. *flavescens*, is found up to  $70^{\circ} 25'$ . *Balea perversa* in Sweden and in Finland ranges to  $60^{\circ}$ — $61^{\circ}$ , but with us to  $67^{\circ} 50''$

Freshwater mollusks also differ somewhat in distribution. *Planorbis glaber* Jeff. seems to thrive excellently on the little island of Gaasó in Vestfjorden ( $68^{\circ}$ ). Of the Pisidies we find *Pisidium globulare*, *P. pulchellum*, *P. fossarinum*, *P. obtusale*, *P. pallidum*, *P. nitidum*, and *P. Scholtzii* up to  $69^{\circ}$ — $70^{\circ}$ . With *Sphærium corneum*, the inverted rule seems to exist, for in Sweden it is found to Luleå Lapmark ( $67^{\circ}$ ), but in Norway only in the southern parts. On the other hand *Sph. mamillanum* is much more common in Norway, and goes farther towards the north.

The most common of our new species is *Pisidium lilljeborgi*. I found it first at Tónset, which seems to be its southern limit, towards the north it goes right up to the most northerly frontier of our country. *Pisidium hoyeri* is limited to Tromsó Amt. *Anodonta* is as yet very little known. It is certainly not rarely found, but has hitherto been very little, investigated perhaps the least of all our mollusks.

*Margaritana margaritifera* is common from Lindesnæs to Nordkap. Dr. Erik Pontoppidan in his 'Det første Forsøg paa Norges naturlige Historie,' 1752, speaks of *Marg. margaritifera* because they were known and fished on account of the pearls contained in them. As long as Norway was united with Denmark, the Queen had the exclusive privilege to fish and collect the pearls in many rivers in the diocese of Christiansand. Some of them must have been handsome, and a great number have also been collected, as in the possession of the Danish Royal family, are found ornaments exclusively set with Norwegian pearls. From the year 1814 when Norway was separated from Denmark, this privilege also ceased, and the pearl fishing may now be carried on by anyone. The right belongs, consequently, now solely to the proprietor of the ground where the pearl mussel is found. Very few, however, make use of this right, and still fewer understand the fishing or the value of the pearls; which, besides, are not everywhere of the same beauty. The pearls are now fished chiefly by gipsies and stragglers, who, however, proceed in such a way as completely to ruin the pearl-mussel. The colour of pearls in the diocese of Christiansand I have not seen. In the county of Jarlsberg they are found in almost all the rivers; I have had occasion to see about three hundred and thirty pearls belonging to the Count Wedel-Jarlsberg. The colour and lustre are in most of them whitish or bluish white, some have a reddish lustre, others are dark olive-green, liver-coloured, and grayish-brown. Their forms are varying, most are spherical, but also oblong, and monstrosities. The greatest white pearl is oblong, the diam. is 8·6 mill. and



8 mill. In Thelemarken the pearls have a beautiful reddish lustre. From Lofoten our museum has received mussels, but they contained only small monstrosities of pearls.

As the investigations of our land and freshwater mollusks altogether are but very few, it is a matter of course that our literature contains but very little information as to them, even if we take into consideration all the books containing some information on the subject.

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**Fabricius, J. Chr.**—Reise nach Norwegen, 1779. 'Speaks of a few naked snails.'

**Friele, Joachim.**—Norske Land og Ferskvands Mollusker i Omegnen af Christiania og Bergen, 1853.

**Martens, E. von.**—Ueber die Binnen-mollusken des mittleren und südlichen Norwegens Malak. Blätter, 1857.

—Gesellschaft naturf. Freunde zu Berlin, 1881.

**Jensen, Olaf.**—Indberetning om en i Sommeren 1870 foretagen Reise i Christiania og Christiansand Stifter. Nyt Magazin f. Naturvidensk, 1872.

**Westerlund, Dr. C. A.**—Fauna Sueciæ, Novegiæ et Daniæ, 1873.

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**Bougemont, M. de.**—Bulletin d. l. Société des Sciences nat. d. Neuchatel, xi. 1878.

**Esmark, Birgithe.**—Bidrag til Kundskaben om Udbredelsen af Norges Land og Ferskvands Mollusker. Nyt Mag. f. Naturvidensk, xxv. vol., 1880.

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—Die Pisidien des Südlichen Norwegens. Malak. Blätt. N. F. v. vol.

—Land and Freshwater Mollusks in the Arctic Regions of Norway. Tromsø Museums Aarshefte, 1883.

**Esmark, Birgithe, and Hoyer, F. A.**—Land and Süßwasser Mollusken des Norwegens. Mal. Bl. N. F., 1886.

As but few districts have yet been examined I have, on purpose to make it easier to see the different places where the mollusks have been found, thought I had better use the ecclesiastical division in 'Stifter' (Dioceses) for the southern part, whilst the northern Tromsó Stift must be divided into several sub-divisions—the Amt of Nordland, the Amt of Tromsó, and the Amt of Finmarken. On the map you will find a reddish colour laid on the chief localities.

It is a great pleasure for me to have the opportunity of giving my best and most hearty thanks to all who have assisted me in many ways, also in lending me both specimens and collections. Among these I shall mention the Professors Messrs. R. Collett, Lilljeborg, and G. Sars; J. S. Schneider, Manager of the Museum at Tromsó; H. Friele, in Bergen; and the late Dr. C. M. Poulsen, in Copenhagen.

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CLASS MOLLUSCA GASTEROPODA.

*Ord. GASTEROPODA INOPERCOLATA.*

I. GEOPHILA Fér.

Family LIMACIDÆ.

Genus LIMAX L.

Subgenus HEYNEMANNIA West.

- Limax maximus** L. Rather rare. About Christiania; Lillesand in Christiansand Stift; and Bergen.
- L. maximus** var. **niger**. Very common in Christiania, Christiansand, and Hamar Stifts; Aafjorden, Vigten, Lekó, and Ródó in Thronhjelm Stift; and Grónó in the Amt of Nordland.
- L. maximus** var. **albus**. Bamble in Christiansand Stift.
- L. maximus** var. **fasciatus**. Laurvik, Modum, Christiania; and Skien in Christiansand Stift.
- L. maximus** var. **cinereo-nebulosus**. Malmóns, Laurvik, Skien.

- L. maximus** var. **leucogaster**. Laurvik, with more or less variety in colours; and from other places in Christiania Stift.
- L. cinereus** Lister. Rare in the beech wood by Laurvik; the Island of Tromsó, and Arendal in Christiansand Stift; also at Bergen.
- L. cinereus** var. **unicolor** Heynem.
1. The whole animal dark blackish-brown: Bergen and Arendal.
  2. Bluish-grey: Bergen.
  3. With small black and white spots.
- L. cinereus** var. **punctatus** Mh. *The whole animal yellowish-white, with a broad black band on the neck, the middle part of the shield with small spots, the back not much but irregularly speckled.*

The animal was not quite full grown and a little contracted; length 48 mill. Tromsó by Arendal.

Subgenus MALACOLIMAX Malm.

**Limax tenellus** Nilss. Is probably not so uncommon as previously believed. In the park and oakwood at Jarlsberg, Christiania, Modum, by the lake 'Spirilen,' and other places in Christiania Stift. Some few localities in Christiansand Stift.

Subgenus AGRIOLIMAX Mörch.

**Limax agrestis** L. Very common throughout the country to 70° N. latitude. Renó, Tromsón, and Trondenæs, About Christiania I have found it in November, when there has been snow lying for several days, and the temperature was below 0° (Celsius).

**L. agrestis** var. **succineus** Müll. Christiania.

**L. agrestis** var. **norvegicus** West. Ringerige and Eker in Christiania Stift.

**L. agrestis** var. **albidus**. Brevik.

**L. agrestis** var. **varians**. Brevik.

Subgenus HYDROLIMAX Malm.

**Limax lævis** Müll. Only in the southern part of Norway. Bygdó, near Christiania, Laurvik; Brevik, Næs Jernværk, Lillesand, and Christiansand in Christiansand Stift.

Subgenus LEHMANNIA Heynm.

**Lehmannia marginata** Müll. Very common in Christiania Stift; Lillesand, Christiansand, Bergen; 860 m. high up in Østerdalen in Hamar Stift; and about Kistrand, and Porsangerfjord, in Finmarken.

**L. marginata** var. **obscurus** Mh. *The animal hard and solid, not transparent, the keel yellowish, the back dark yellowish-brown or greyish-brown, the lower parts of the sides not so dark; some specimens speckled with lighter colour; the shield blackish-brown, often with a handsome yellow margin.*

One animal from Dovre, in Hamar Stift has a light band on each side of the shield. Ringerige, Laurvik, Krageró, and Lillesand in Christiansand Stift.

Genus ARION Fér.

Subgenus LOCHEA Moq-Tand.

**Arion empiricorum** Fér. var. **ater**. Very common in the Christiania and Christiansand Stifts; Bergen; Thronhjelm Stift; and Grónó in the Amt of Nordland.

**A. empiricorum** var. **marginatus** Moq. Bergen.

**A. empiricorum** var. **medius** Jens. Bergen.

**A. empiricorum** var. **albus** L. Not so common as var. *ater*. Modum, Tónsberg, Laurvik, Asker, Skien, and Bergen.

Subgenus PROLEPSIS Moq-Tand.

**Arion subfuscus** Drap. Generally dark-coloured; common all over the country to 70° N. lat.

**A. subfuscus** var. **albus** B. Esm. *White, with a greyish tinge on the back.*

Tónset in Hamar Stift; Maalselven in the Amt of Tromsó; Tromsóen and Porsangerfjord in the Amt of Finmarken.

**Arion hortensis** Fér. Common in the Christiania, Christiansand, and Hamar Stifts; the most northern locality is Trondenæs on Hindó in the Amt of Tromsó.

**A. citrinus** West. Ringerige and Herfjeldet in Christiania Stift.

Family HELICIDÆ.

Subfamily VITRININÆ.

Genus VITRINA Drap.

Subgenus PHENACOLIMAX Stabile.

**Vitrina pellucida** Müll. Very common in the south; extends to the north of Amt of Nordland.

**V. angelica** Beck. From the north of Bergen Stift, and very common in Tromsó Amt; from Tromsóen, Maalselven, Renó, Karlsó; and from Vardó, Porsangerfjord, Lebesby, and Varangerfjord in the Amt of Finmarken.

Subfamily ZONITINÆ.

Genus HYALINIA Agass.

Subgenus HYALINIA Gray.

**Hyalinia cellaria** Müll. Not very common. In the vicinity of Christiania, Skien, Porsgrund, Brevik, Arendal, and Lillesand in Christiansand Stift; Manger in Bergen Stift.

**H. cellaria** var. **compacta** Jeff. Modum.

**H. cellaria** var. **plana** B. Esm. The shell on the upper side flat. Manger in Bergen Stift.

**H. alliaria** Müll. Uncommon. Modum, Ringerige, Laurvik, Lillesand, Tromsó, near Arendal; Bergen.

**H. nitidula** Drap. Christiania, Bygdó, Langesund, Bergen.

**H. pura** Ald. Rare. Modum, Eker, and Langesund.

**H. pura** var. **viridula** Menke. Modum, Langesund, Skien; Manger in Bergen Stift; and Romsdalen in Thronhjelm Stift.

**H. hammonis** Stróm. Very common all over the country.

**H. hammonis** var. **virescens**. Fagerheim near Tónsberg, Christiania Stift.

**H. petronella** Charp. As common as *H. hammonis*, and very often in company with it.

## Subgenus VITREA Fitz.

*Hyalinia crystallina* Müll. In the neighbourhood of Christiania, Modum in Christiania Stift; Romerige in Hamar Stift; Vestfjorddalen in Telemarken, and Stordóen in Bergen Stift.

*H. contracta* West. Rare. Forneboskoven, Bygdó, Ringerige, Modum, and Asker in Christiania Stift; Brevik and Lillesand, in Christiansand Stift.

## Subgenus CONULUS Fitz.

*Hyalinia fulva* Müll. Very common everywhere to Nordcap.

## Subgenus ZONITOIDES Lehm.

*Hyalinia nitida* Müll. Common in the southern parts.

*H. nitida* var. *albida*. Ringerige.

*H. norvegica* B. Esm. Very rare. Langesund in Christiansand Stift.

## Subfamily HELICIDÆ.

## Genus HELIX L.

## Subgenus PATULA Held.

*Patula pygmæa* Drap. Probably very common, but researches are wanting. Christiania, Kródsherred, Drammen, Modum, Asker, Hvalóerne, in Christiania Stift; Tónset in Hamar Stift; Maalselven in the Amt of Tromsó; Porsangerfjord, Vardó, and Varangerfjord in the Amt of Finmarken.

*P. rotundata* Müll. Not very common. In the neighbourhood of Christiania, Eker, Laurvik, Hof, in the county of Jarlsberg, Sandefjord, in Christiania Stift; Brevik, Langesund, Skien, "Gaustafjeld" (about 2460 metres high) in Telemarken, Arendal, Lillesand, Bergen.

*P. rotundata* var. *albina*. Malmóen, near Christiania.

*P. ruderata* Stud. One of our most common species; goes as well to the far north as on our highest mountains, wherever it is possible for any mollusks to live.

*P. ruderata* var. *albina*. Tin in Telemarken, Røevenæs in Porsangerfjord, and Elvenæs in South-Varanger.

## Subgenus ACANTHINULA Beck.

**Acanthinula aculeata** var. *sublævis* West. Brevik in Christiansand Stift.

**A. harpa** Say. This species is widely distributed, but in most localities few specimens are found. Asker and Eker in Christiania Stift; Tónset and Valdres in Hamar Stift; South-Varanger and several places in Porsangerfjord in the Amt of Finmarken.

## Subgenus VALLONIA Risso.

**Vallonia costata** Müll.—Common in the southern parts. In the vicinity of Christiania, Jarlsberg, Drammen, Sandefjord, Telemarken, Brevik, Skien; Gudbrandsdalen in Hamar Stift; Trondenæs and Tromsó on Tromsóen in the Amt of Tromsó.

**V. pulchella** Müll. Not so common as *V. costata*, but always found together with it. Christiania, Ramnæs in the county of Jarlsberg, Hvalóerne, Skien, Lillesand, Tromsóen in the Amt of Tromsó.

## Subgenus TRICHIA Hartm.

**Trichia hispida** L. Very common in some places in Christiania, Christiansand, and Bergen Stifts; in Hamar Stift it is rather rare; I have not found it in Østerdalen; and as it neither in Sweden nor in Finland goes higher than  $61^{\circ}$ , I doubt whether it is circumpolar as Clessin says in his 'Excursions Fauna.'

**T. hispida** var. *depilata* Pfr. In the vicinity of Christiania and Sandefjord, Brevik and Skien.

**T. hispida** var. *conica* Jeff. Bygdó near Christiania, Eker, Sandefjord; Manger in Bergen Stift.

**T. hispida** var. *septentrionalis* Cles. Eker in Christiania Stift; Langesund.

**T. hispida** var. *concinna* Jeff. Bygdó and several other localities round Christiania; Skien.

**T. hispida** var. *nana* Jeff. Langó, near Christiania, Ramnæs in the county of Jarlsberg.

**T. hispida** var. **albina**. Krokkleven in Ringerige.

Subgenus XEROPHILA Held.

**Xerophila candicans** Ziegl. A few specimens found near Fredriksværn, Christiania Stift, 1871, by the late Dr. Poulsen, Copenhagen.

**X. ericetorum** Müll. In the Zoological Museum there is a specimen of this species without bands, found many years ago at Bygdó, near Christiania. It has, since then, never been found, although the locality has often been searched. On that account it seems very difficult to explain the presence of one shell. Perhaps it might have been among sand brought with vessels from England or France. I think this the most probable explanation, as, a few years ago, I found a well conserved shell of *Helix aspersa* in some imported sand near Langesund.

Subgenus EULOTA Hartm.

**Eulota strigella** Drap. In the neighbourhood of Christiania, Lier, Modum, and Ringerige in Christiania Stift; Langesund, Brevik, Skien, Vestfjorddalen, in Telemarken; also in Christiansand Stift.

**E. strigella** var. **subglobosa** West. Rare; (Westerlund.)

**E. fruticum** Müll. Not very common, but plentiful where it occurs. Bygdó, Ringerige, Jarlsberg Park, and Lier, in Christiania Stift.

**E. fruticum** 1. **rufa** (*a*) **unicolor**. Lofoten, in the Amt of Nordland.

(*b*) **unifasciata**. Christiania, Lier, Ringerige.

2. **pallida-cornea** (*a*) **unicolor**. Langesund.  
(*b*) **unifasciata**. Lillesand.

3. **alba** (*a*) **unicolor**. Jarlsberg, Lier, Laurvik, Skien.

(*b*) **unifasciata**. Christiania, Jarlsberg, Lillesand.



## Subgenus CHILOTREMA Leach.

**Chilotrema lapicida** L. Probably very common both in Christiania and Christiansand Stifts, but nowhere abundant. In the vicinity of Christiania, Asker, Lier, Modum, Ringelinge, and Sandefjord in Christiania Stift; Langesund, Skien, Telemarken, and Lillesand in Christiansand Stift; Sognefjorden in Bergen Stift.

**C. lapicida** var. *minor*. Bamble near Langesund, diam. 13·5 mill., alt. 6 mill. Asker near Christiania, diam. 13·5 mill., alt. 4·5 mill.

## Subgenus ARIONTA Leach.

**Arionta arbustorum** L. Very common; is found in all parts of the country, as well on the highest mountains as up in the far north. The shells are very thin everywhere in the north, as also in the south, where the soil is very poor in lime; in the park at Jarlsberg, where they live in great quantities, they are very thin and mostly semi-transparent. Grótó in the Amt of Nordland; Maalselven, Tromsón, Renó, and Fugleó in the Amt of Tromsó; Porsangerfjord in the Amt of Finmarken.

**A. arbustorum** var. *rudis* Mühlf. Found at Fredriksværn and Dovre (1000 metres). Clessin, in a letter to me, said that he very much doubted that this variety was to be found here, as it has previously only been found in the south of Tyrol. Dr. Poulsen, of Copenhagen, was kind enough to lend me the two specimens he found at Fredriksværn, and they are quite identical with some examples I have from Prof. E. von Martens, at Berlin, which he found in Tyrol. Therefore there can be no doubt that the specimens found at Dovre are the var. *rudis*.

**A. arbustorum** var. *alpestris*. With both high spire and depressed. 'Skeikampen' in Gansdal, Gudbrandsdalen, and Lofoten in the Amt of Nordland.

- A. arbustorum** var. *flavescens* Cles. Ringebu, Gudbrandsdalen, in Hamar Stift; the vicinity of Christiania, Jarlsberg, and Lier, in Christiania Stift; Gaasó, Grótó, Tranó, in the Amt of Nordland; Fugleó in the Amt of Tromsó.
- A. arbustorum** var. *trochoidalis* Rof. Grótó, in the Amt of Nordland.
- A. arbustorum** var. *picea* Ziegl. Christiania.
- A. arbustorum** var. *septentrionalis*. Skien.

Subgenus TACHEA Leach.

- Tachea nemoralis** Müll. Only found on the west coast; at Sandvigen, and in the cemetery of the cathedral at Bergen, Ullensvang in Hardangerfjorden, Bergen Stift; Stavanger, Christianiasand Stift.
- T. nemoralis** var. *lutea*. 12345, (12)345, (123)45, (123)(45), 00345, 00300, 00000. Bergen.
- T. nemoralis** var. *carnea*. 00345, 003(45), 00(345), 00300. Bergen, and Stavanger.
- T. hortensis** Müll. Widely distributed in Christiania Stift, but not often numerous. The only locality where it is found in great quantities, is in the garden and park at Jarlsberg. The Countess of Wedel-Jarlsberg has collected many thousands for me. They live on the fruit trees, the stems of oak, beech, asp, on *Stachys sylvatica* and *Angelica sylvestris*. The shells are thin and small, and never reach the size gained in other countries.

1. *lutea*. 12345. Christiania, Lier, Modum, Fredrikshald, Jarlsberg, Christiania Stift; Lillesand, Bergen, Thronhjelm; (12)345, Christiania, Jarlsberg, Langesund; (123)45, Christiania, Róken, Jarlsberg; 123(45), Jarlsberg; (123)45, Christiania, Jarlsberg, Laurvik; 1(234)5, Jarlsberg; (12345), Jarlsberg; (12)3(45) Jarlsberg, Arendal; (12)(345), Jarlsberg; 10345, Jarlsberg, Langesund, Bergen; 12045, Jarlsberg; 10305, Bergen; 00000, Jarlsberg, Christiania, Modum, Lillesand, Arendal, Jædderen.

2. *lutea* (semi-transparent). Jarlsberg, Lillesand.

3. *grisea*. 12345. Jarlsberg.
4. *grisea-brunnea*. 00000. Jarlsberg, Christiania, Fredriksværn.  
     *grisea-brunnea* (semi-transparent). Laurvik.
5. *hepatica*. 12345, Lillesand, Hof in the county of Jarlsberg; (12)345, Jarlsberg; 12045, Jarlsberg; 00000, Lysaker, near Christiania.
6. *rosea-hepatica*. 00000. Jarlsberg.
7. *isabellina*. 00000. Jarlsberg.
8. *pallida-castanea*. 00000. Christiania.
9. *lilacina*. 00000. Christiania, Jarlsberg.
10. *albida* (transparent-fasciæ). 12345. Christiania, Ringerige, Jarlsberg, Laurvik, Brevik, Lillesand; (12)345, Christiania; (123)45, Hof in the county of Jarlsberg; 00345, Laurvik; 00000, Christiania, Ringerige, Jarlsberg; with *brown bands*, 12345, Jarlsberg.

**T. hortensis** var. *hybrida* Poir.

(a.) *rosea-labiata*.

1. *carnea*. 00000, Jarlsberg; on the apple trees.
2. *pallida-castanea*. 12345, Jarlsberg, Langesund.
3. *hepatica*. 00000, Jarlsberg.  
     *pallida-hepatica*. (12)345, Jarlsberg, Langesund;  
 123(45), (12)3(45), (123)45, and 12045, Jarlsberg
4. *lutea*. 12345 and 00000, Jarlsberg.
5. *grisea-lutea*. 12345, Jarlsberg.
6. *grisea-brunnea*. 12345, Jarlsberg, Langesund.
7. *rosea-hepatica*. 00000, Jarlsberg.

(b.) *fusco-labiata*.

1. *hepatica*. 12345, 12(345), (12)345, (12)3(45), and (123)45, Lillesand; (12345), Bergen; 00000, Fredriksværn.

**T. hortensis** var. *minor* Jeff.

1. *lutea*. 12345 and 00000, Jarlsberg.
2. *hepatica*. 12345, Lillesand.

## Subgenus HELICOGENA Risso.

**Helicogena pomatia** L. This species must be excluded from the list of our mollusca. Mr. J. Friele has named the botanic garden in Christiania as its locality. I have spoken to the head-gardener, who has been there for thirty years or more, but he assured me that he has never seen anything like this shell in the garden. About twelve years ago, Prof. R. Collett brought some from Denmark, but they have all vanished, so also some I took with me from Sweden; they have probably been eaten by foxes or *Erinaceus*, which live everywhere in the neighbourhood of Christiania. Last year I again got some from Sweden, and had them put in the park at Jarlsberg. But I cannot at all consider it to belong to our fauna.

## Subfamily PUPINÆ.

## Genus BULIMINUS Ehrenb.

## Subgenus NAPÆUS Alb.

**Napæus obscurus** Drap. Rare. Asker near Christiania, Modum, Langesund, and Brevik.

## Genus COCHLICOPA Risso.

**Cochlicopa lubrica** Müll. Very common all over the country.

**C. lubrica** var. *minima* Siem. Not very common. Christiania, Modum, Jarlsberg, Brevik, Porsgrund, Grótó.

**C. lubrica** var. *albina* B. E. Milk-white, glossy. Ringerige.

## Genus PUPA Drap.

## Subgenus CHARADROBIA Alb.

**Charadrobia cylindracea** Da Costa. Rare. On the walls of 'Sverreborg' at Bergen and Lillesand.

## Subgenus PUPILLA Leach.

**Pupilla muscorum** L. Common everywhere; in the southern parts both with tooth and without it; in the north, *unidentata* is rare inland.

**P. muscorum** var. *elongata* Cles. Trondenæs on Hindó, in the Amt of Tromsó.

**P. muscorum** var. *minor*. Christiania.

**P. muscorum** var. **lundstromi** West. Lofoten.

Subgenus ISTHMIA Gray.

**Isthmia minutissima** Hartm. Christiania, Malmóen near Christiania.

**I. minutissima** var. **odontostoma** West. Akershus, Fæstning, and Christiania.

Subgenus COLUMELLA West.

**Columella edentula** Drap. Eker in Christiania Stift, and Bergen.

**C. edentula** var. **Gredleri** Cles. Tónset in Hamar Stift ; Tromsón, Vardó, Porsangerfjord, and South Varanger.

Subgenus VERTIGO Müll.

**Vertigo gravida** West. Bórsesó near Skien.

**V. pygmæa** Drap. Not very common. In the vicinity of Christiania, Hof in Jarlsberg, Eker, Modum, and Ringerige ; Bergen.

**V. substriata** Jeffr. Eker, Langesund, Brevik ; Molde in Throndhjem Stift.

**V. antivertigo** Drap. Not common. Christiania, Hvalóerne, and Skien.

**V. lilljeborgi** West. Rare. Skien.

**V. alpestris** Ald. Common. Round Christiania, Modum, Ringerige, Jarlsberg, and Hvalóerne in Christiania Stift ; Tónset, Lilleelvedalen, in Hamar Stift ; Porsangerfjord in the Amt of Finmarken.

**V. arctica** Wallenb. (P. Hoppei). 'Gaustafjeld' in Telemarken ; Vardó, The Nordkap, Porsangerfjord ; several localities in South Varanger ; 660 m. high on Svendborgtind in Maalselvedalen.

**V. pusilla** Müll. More common than any of the preceding species. In the neighbourhood of Christiania, Eker, Modum, Ringerige, and Vestfjorddalen in Telemarken.

**V. angustior** Jeffr. Lindóen, Malmóen, and Asker in Christiania Stift.

## Genus BALEA Prid.

- Balea perversa** L. Not very common. Christiania, Skien, Langesund, Brevik, Lillesand, Bergen, Dovre 600 m. high, Thronhjelm, Tranó, and Grótó in the Amt of Nordland.
- B. perversa** var. **lucifuga** Leach. Fredriseshald in Christiania Stift.

## Genus CLAUSILIA Drap.

## Subgenus CLAUSILIASTRA Möll.

- Clausilia laminata** Mont. Very common in Christiania and Christiansand Stifts.

**C. laminata** var. **virescens** Ad. Schm. Jarlsberg.

**C. laminata** var. **nana**. Laurvik and Christiania.

## Subgenus ALINDA Böttg.

**C. biplicata** Mtg. Manger, near Bergen.

## Subgenus PYROSTOMA Vest.

**C. ventricosa** Drap. Very rare. Brevik.

**C. rolphi** Leach. Very rare. Christiania and Asker.

**C. plicatula** Drap. Common round Christiania, Modum, Jarlsberg, Langesund, and Skien.

**C. plicatula** var. **leucostoma** West. Modum and Drammen.

**C. plicatula** var. **curta** Ad. Schm. Asker near Christiania.

## Subgenus IPHIGENIA Gray.

**C. sejuncta** West. Rare. Ekeberg near Christiania, and Langesund.

**C. dubia** Drap. var. **obsoleta** A. Schm. Rare. Asker, Bergen, and between Skien and Porsgrund.

**C. cruciata** Stud. Gausdal in Hamar Stift.

**C. bidentata** Stróm. The most common of all our Clausiliæ.

Found everywhere in the southern parts; much less frequent in the north, where it is found as high as Renó in the Amt of Troinsó. It has seldom folds on the interlamellare.

**C. bidentata** var. **septentrionalis** A. Schm. Often with the type.

**C. bidentata** var. **exigua** West. Modum.

**C. bidentata** var. **erronea** West. Brevik.

- C. bidentata** var. *subrugosa* West. Modum.  
**C. bidentata** var. *minor*. Alt. 7·5—8 mill. Christiania and Fredrikshald.

- C. bidentata** var. *elongata* Cles. Brevik and Modum.  
 Family SUCCINIDÆ.  
 Genus SUCCINEA Drap.  
 Subgenus NERITOSTOMA Klein.

**Succinea putris** L. Very common in Christiania and Christiansand Stifts, Bergen (H. Friele); but it is not yet found higher up than 61°. Slender forms are most common, measuring alt. 20 mill., diam. 11·5 mill., mouth alt. 14·5 mill., diam. 7·7 mill. The colour is variable—grey and greyish-yellow at Christiania, smoke-colour at Modum and Fredrikshald, yellow to brown from Jarlsberg, whitish-yellow to reddish-brown from Eker.

- S. putris** var. *olivula* Baudon. Jarlsberg, Hole, and Mjón-dalen in Christiania Stift.  
**S. putris** var. *trianfacta* Da Costa. Laurvik and Skien.  
**S. putris** var. *limnoidea* Pic. Fragnerdammen near Christiania; one shell collected 1834.

Subgenus AMPHIBINA Mörch.

- S. stagnalis** Gassies. Colour: greyish-yellow. Some specimens found in 1870, near Arendal, by O. Jensen.  
**S. pfeifferi** Rossm. Much more common than *S. putris*. In the vicinity of Christiania, Skiensfjord, Lillesand, Arendal, Bergen, Nordland, Tromsøen, Maalselven, in the Amt of Tromsø; Alten, Pasvikelven, in South-Varanger. The colour is in the south pale greyish-yellow or smoke-coloured, but in the north amber-coloured.  
**S. pfeifferi** var. *contorta* West. Tromsøen.  
**S. pfeifferi** var. *propinqua* Baudon. Arendal. From Tónset I have one shell which very much resembles this variety; it is smaller, very glossy, brownish-smoke colour, with red spire.  
**S. pfeifferi** var. *ventricosa* Pic. Gaasó, in the Amt of Nordland.

**S. pfeifferi** var. **contortula** Baudon. Renó, in the Amt of Tromsó.

Subgenus LUCENA Aken.

**Succinea oblonga** Drap. Malmóen, Lindóen, and Brandskjær, near Christiania, Krokkleven at Ringerige.

**S. oblonga** var. **agonostoma** Kustr. Sundvolden at Ringerige, Malmóen.

**S. oblonga** var. **arenaria** Bouch. Langesund.

II. HYDROPHILA Fér.

Family AURICULIDÆ.

Genus CARYCHIUM Müll.

**Carychium minimum** Müll. Common in Christiania and Christiansand Stifts,

Family LIMNÆIDÆ.

Subfamily LIMNÆINA.

Genus LIMNÆA L.

Subgenus LYMNUS Mont.

**Limnæa stagnalis** L. Is not very common. It is very variable, not only from different localities but also from the same lake. The head-type as in Rossmassler's Iconographie, vol. v., pl. 128, fig. 1230, is rare; much more frequently we meet with slender forms, more or less resembling *vulgaris* and *appressa* Say. Lakes by Christiania; Formo in Gudbrandsdalen, with the columella bent very much backwards; the Pasvikelv in South Varanger; and Hennæssjøen in the Amt of Nordland. The largest specimen belongs to Prof. Sars, it is from Æstensó, near Christiania, alt. 55·5 mill., diam. 27 mill., mouth alt. 29 mill., diam. 16 mill.

**L. stagnalis** var. **vulgaris** Leach. Not uncommon; colour brown to greyish-brown, and very variable. Specimens from Padderudvand in Asker were of the following dimensions:—

alt. 38 mill., diam. 18·5 mill., mouth alt. 20·5 mill., diam. 13 mill.

„ 36 „ „ 15 „ „ 17 „ „ 9·5 „

From Lóvtjern at Eker:—



alt. 37·5 mill.,	diam. 16 mill.,	mouth alt. 20 mill.,	diam. 10·5 mill.
„ 37·5 „ „	15 „ „	17·5 „ „	7·5 „
„ 32 „ „	15 „ „	17·3 „ „	9·5 „
„ 32 „ „	13 „ „	16 „ „	9 „
„ 30·5 „ „	12·5 „ „	15·3 „ „	9 „

The two last have very slender spires, and the outer-lip of the mouth reflected; the whorls are convex, except one shell, which is a little concave, as Clessin mentions in his 'Excursions Fauna' for var. *subulata* West. In 'Aborretjern' in Gudbrandsdalen, a great quantity of them are living. The lake is very small, and they seem to live under very homogenous conditions, but in spite of this they are developed into more than ten different forms, from one very near var. *colpodia*, but with slender spire, and other shells gradually more slender, some with very long and slender spires, the last whorl more convex, and the outer-lip of the mouth reflected; they remind me of var. *ampliata* and No. 1234 in Rossmassler's Iconographie, which Kobelt considers to be the real var. *fragilis*; some have the last whorl less convex and somewhat angled at the upper part. Var. *minor*, with narrow whorls, is also represented. The dimensions are given for the greatest and smallest shell.

alt. 46 mill.,	diam. 21 mill.,	mouth alt. 25 mill.,	diam. 14·5 mill.
„ 34 „ „	14·5 „ „	17·5 „ „	9·5 „
„ 31 „ „	13·5 „ „	16 „ „	8·5 „

From Norderhoug, in the Ringerige I have some handsome and very slender shells, alt. 37·3 mill., diam. 14·5 mill., mouth alt. 17·5 mill., diam. 8·5 mill.

L. *stagnalis* var. *turgida* Menke. Tónset in Hamar Stift.

L. *stagnalis* var. *minor* Kob. Tónset, Abborretjern, Gudbrandsdalen.

Subgenus GULNARIA Leach.

*Gulnaria auricularia* L. Rare. Tyrifjorden and Asker in Østensó near Christiania. Prof. Sars found them in great quantities; lately they have quite disappeared. Lier, Skien.

- G. lagotis** Schr. More common than the preceding species. Asker, with the whorls very convex, and open *umbilicus*; Ringerige, Skien, Christiania, Dovre (1000 m. high); Fiskumvand at Eker; Lillehammer, very thin and brittle; Manger, near Bergen; and Tónset.
- G. lagotis** var. *baltica* Nilss. Arendal.
- G. ovata** Drap. Probably all over the country, as it is very common in Christiania, Christiansand, Hamar, and Tromsó Stifts. From most localities, very thin and so changeable in form, that I hardly have the same form from two localities. All these variations and transitions make it very difficult and doubtful how to deal with varieties, which very often seem to be '*Bedingte varietäten.*' On that account I have found it better to wait, in hopes that when we have got many more collections from different parts of the country, and from the same locality more than one year, we shall be able to give a fuller account of this species. In a rivulet in Asker, where there is a rapid current, I collected many shells, both full-grown and young ones, the latter with the spire very slender, whorls very convex, mouth broad (egg-formed), reminding me of *lagotis*. The full-grown specimens had the spire shorter, mouth larger, and resembling var. *patula* D. C. In Tónset *Gulnaria* lives in every lake and pond, but nowhere in its typical form. In a swamp overgrown with rushes, there lived a very interesting form, which reminds one equally of *lagotis* and *peregra* as *ovata*. I had the opportunity to collect them in two succeeding summers, they are not only different the two years but also each collection. *All* have the first whorls very convex as *lagotis*, but the spire is more plump and the suture not so deep, more like *ovata*. The last whorl is depressed under the suture, which makes it angled, not rounded, in bending down. The first year's collection was for the greater part full-grown specimens. Some had the last whorl compressed under the suture, this makes it less

bulged, and the mouth egg-shaped above at an acute angle; others have it oval or angled-oval, reminding us of forms of *L. peregra* var. *curta*.

The second year I found mostly biennial animals, and I am inclined to think they have had much more food, as the last whorl suddenly was more expanded with the suture ascending as in *lagotis*, the striæ coarser, mouth egg-shaped, spire variable in height. At present I must put it down as *ovata*, without deciding it as any variety before I have got more collections from the same place, hoping later to find a constant form. At Lomtjem in Kvikne, 40 kilometers farther north and 700 metres altitude, I found a *Limnæa*, which also must be ranged under *ovata*. In some the spire is higher than in the typical form, and gradually gets shorter, and at last it resembles var. *patula*; whorls very convex, the most of them horizontal under the suture, in which it is like the preceding, but is separated from this by the last whorl, being much more bulging, mouth much larger, and the outer lip reflected.

- G. ovata** var. *colletti* Hoyer. Laxelv in Porsangerfjord in the Amt of Finmarken.
- G. ovata** var. *patula* Da Costa. Toten near Mjósén, Vaale in Jarlsberg, and Oxfjord, in the Amt of Finmarken.
- L. mucronata** Held. Vardó, in the Amt of Finmarken.

Subgenus LIMNOPHYSA Fitz.

- L. palustris** Müll. Not common. Bórsesó near Skien, Maalselven, in the Amt of Tromsó; Pasvikelven, in the Amt of Finmarken.
- L. palustris** var. *septentrionalis* Cles. Æstensó, near Christiania.
- L. palustris** var. *fusca*. Bergen.
- L. peregra** Müll. Very common in Christiania, Christiansand, and Hamar Stifts, and is found up to Varangerfjord, in the Amt of Finmarken, and belongs to the circumpolar species. At the Zoological Museum they have some shells

found on the 'Frognerdam,' in Christiania, 1834. I have compared them with those I have collected fifty years later, they are just as thick and strong, but the form is not quite the same; the last whorl has been less convex, somewhat truncate, with very distinct sculpture, as in *L. stagnalis*, even in very young specimens. Alt. 16 to 17 mill. Shells from Asker and Jarlsberg have the same form. From Gaasó, in Nordland, I have a very interesting form with the whorls very convex and suture very deep. Malakozool Blätter, N. F., Band viii., with two plates.

- L. peregra* var. *margaritana*. Asker.
- L. peregra* var. *ambigua* West. Is an intermediate link between *peregra* and *lagotis*. Prof. Sars has found some in 'Lusvand,' at Jædderen, which must be like this. It is exceedingly pretty, glossy, very finely striated, yellowish-brown, with dark reddish-brown spire. Alt. 17 mill., diam. 9 mill., mouth alt. 11.5 mill., diam. 6.5 mill.
- L. peregra* var. *minor* Mh. Alt. 9.11 mill., diam. 6.5 mill., mouth alt. 7 mill., diam. 4.2 mill. Modum, in Christiania Stift.
- L. peregra* var. *elongata* Cles. Baadntjern, near Christiania.
- L. peregra* var. *peregra-ovata* Kob. Salangen, in the Amt of Tromsó; Kistrand in Porsangerfjord, in the Amt of Finmarken.
- L. glabra* Müll. Not very common. In the vicinity of Christiania, Romerike, Laurvik, Jarlsberg, and Sandefjord, in Christiania Stift; Skudesnæs and Lillesand, in Christiansand Stift.
- L. glabra* var. *elongata* Jeff. Bamble, near Langesund.
- L. glabra* var. *subulata* Kob. In a pond at Arendal.
- L. truncatula* Müll. Very common, both in the northern and the southern parts. Porsangerfjord and South-Varanger, in the Amt of Finmarken.

- L. truncatula* var. *microstoma* Drouet. Helgó in Mjósen, Ullensaker, Gudbrandsdalen, Gaasó, Tromsó, and South-Varanger.
- L. truncatula* var. *oblonga* Puton. Asker and Bryn, near Christiania ; Tromsó.
- L. truncatula* var. *maximella*. Asker, Justó, near Lillesand.
- L. truncatula* var. *compressa* B. Esm. Bergen, Statelle, Brevik, and Tromsó.
- L. truncatula* var. *schneideri* B. Esm. In several ponds on 'Flóifjeld,' near Tromsón, in the Amt of Finmarken.
- L. truncatula* var. *minor*. Asker.

Subfamily PHYSINA.

Genus PHYSA Drap.

Subgenus PHYSA Drap.

- Physa fontinalis* L. Rare. Vaale, Ramnæs, and Jarlsberg, in the county of Jarlsberg.

Subgenus APLEXA Flem.

- Aplexa hypnorum* L. In the neighbourhood of Christiania ; the Justuó, near Lillesand, 14·5 mill. alt.

Subfamily PLANORBINA.

Genus PLANORBIS Guett.

Subgenus TROPODISCUS Stein.

- Planorbis marginatus* Drap. Rare. Bergen, Jædderen ; many years ago found on Bygdó, near Christiania.

Subgenus GYRORBIS Ag.

- P. vortex* L. Very rare. Christiania and Bergen.

- P. rotundatus* Poir. Rare. Several places near Christiania and Hvalóerne.

- P. spirorbis* L. Rare. Asker.

Subgenus BATHYOMPHALUS Ag.

- P. contortus* L. Very common in Christiania, Christiansand and Hamar Stifts, Nordland, and Finmarken.

Subgenus GYRAULUS Ag.

- P. borealis* Lovén. Very common in Christiania, Christiansand, and Hamar Stifts, Nordland, and Finmarken.

- P. borealis* var. *angigyryus* West. Tónset, Kvikne, and Ringerige.
- P. borealis* var. *flexus* West. Christiania.
- P. borealis* var. *gredleri* Cles. Christiania, Siljordvand in Telemarken, Drammen, Gudbrandsdalen.
- P. borealis* var. *arcticus* Beck. Finmarken.
- P. polaris* B. Esm. and Hóyer. Maalselven, in the Amt of Tromsó.
- P. limophilus* West. Rare. Jædderen and Valdars.
- P. concinnus* West. Rare. Œier in Gudbrandsdalen.
- P. glaber* Jeff. Not common. Jædderen, Valdars, Christiania, Bergen, Gaasó in Nordland.
- P. stromi* West. Rare. Christiania and Eker.
- P. albus* Müll. Common in Christiania, and Christiansand Stifts, Bergen, and Œsterdalen in Hamar Stift.
- P. albus* var. *hispidus* Drap. Dróbak, Sandvigen in Asker ; Bergen.
- P. albus* var. *cinctutus* West. Very common. Christiania, Christiansand, and Hamar Stifts, Nordland and Finmarken.
- P. albus* var. *depressus* West. Ringebu in Gudbrandsdalen.
- P. albus* var. *lemniscatus* Hartm. Gausdal and Ringebu in Gudbrandsdalen, Christiania, Arendal, Jædderen, and Bergen.
- P. albus* var. *draparnaldi* Jeff. Jædderen, Stavanger, and Fredriksstad.

Subgenus ARMIGER Hartm.

- P. crista* L.
- P. crista* var. *nautilus* L. Helgó in Mjósen, and Snaróén near Christiania.
- P. crista* var. *cristatus* Drap. Christiania, Fredriksstad, and Stavanger.
- P. crista* var. *spinulosus* Cles. Fredriksstad.

Subgenus HIPPEUTIS Ag.

- P. complanatus* L. Rare. Moss, Akersvand in Jarlsberg, Skien, and Arendal.

Subgenus SEGMENTINA Flem.

**P. nitidus** Müll. Rare. Bergen.

Subfam ANCYLINA.

Genus ANCYLUS Geoff.

Subgenus ANCYLUS Geoff.

**Ancylus fluviatilis** Müll. Not common. In the vicinity of Christiania, Sandefjord, and Jædderen.

**A. fluviatilis** var. **gibbosum** Bourgt. More common than the preceding species. Christiania, Asker, Sognselven, Fiskum, and Skien.

Subgenus ACROLOXUS. Beck.

**A. lacustris** L. Christiania, Brevik, Skien, Arendal, and Jædderen.

Genus PISIDIUM C. Pfr.

Subgenus RIVULINA Cless.

**Pisidium globulare** Cless. Rather common. Many places near Christiania, Ringsaker at Hedemarken, Romerige, Ringeby, Tónset, in Hamar Stift; Langevand, near Bergen; also in Christiansand Stift; Maalselven, in the Amt of Tromsø; Porsangerfjord and South-Varanger in Amt of Finmarken.

Subgenus FOSSARINA Cless.

**P. henslowianum** Sheppard. Bergen.

**P. fossarinum** Cless. Very common. Many places round Christiania, Dróbók, Laurvik, Porsgrund, Romerige, Hvaløerne, 'Siljordvand' in Telemarken, Tónset in almost all lakes, and as far north as Maalselven, Tromsøen, Porsangerfjord, and South-Varanger.

**P. fossarinum** var. **flavescens** Cless. Kródsherred, Christiania Stift; Trondenæs, in the Amt of Tromsø; Alten, in the Amt of Finmarken.

**Abnormity.**—'Colour white, glossy; lower margin is not straight, but impressed from the side; from the underside it looks like fig. 1, from the side it is long and narrow, as in fig. 2. Something like this form has also been seen in Unio. It is sure to be caused by external circumstances.' (Clessin in letter.)

- P. pallidum** Pfr. Rare. Asker by Christiaia, Tónset, Fjeldfróskelv in Maalselven.
- P. obtusale** Pfr. Very common in Christiania, and Christiansand Stifts, and in the Amt of Tromsó. Often in great quantity. Many localities round Christiania, Eker, Ringerige, Romerige, Kródsherred, and Jarlsberg, in Christiania Stift; Brevik, Arendal, Skien, Lillesand, 'Langvand,' in Bergen; several lakes in Tónset, where I also found a small form, very ventricose, colour bluish-grey, and epidérmis rough; Trondenæs, 'Skotstinderne,' near Grótó; Tromsóen.
- P. obtusale** var. **personatum** Malm. Romerige.
- P. obtusale** var. **esmarkiana** Cles. Sandtjern at Eastern Modum.
- P. obtusale** var. **colletti** Cles. *Shell small, ventricose, tolerably solid, distinctly striate, beaks broad, ventricose and very prominent; anterior margin short and rounded, posterior margin narrow and rounded.* Ringebu in Gudbrandsdalen.
- P. lilljeborgi**\* Cles. Very common in the north. It is new for the fauna. In Tónset, in many lakes; Gausdal, in Gudbrandsdalen; Gaasó and Grótó, in the Amt of Nordland; Trondenæs, 'Præstvand,' in Tromsóen, in great quantities; Oxfjord and Kvænvik, in Alten, in the Amt of Finmarken.
- P. lilljeborgi** var. **transversale** Cles. Trondenæs.
- P. lilljeborgi** var. **minor**. 'Vetlevand,' near Gausdal Sanatorium.
- P. pusillum** Gmel. Rare. Asker, Eker, and Christiansand.
- P. pulchellum** Jen. Not so rare as the preceding species. Statelle, some small lakes at Tónset, Gausdal, and Trondenæs.
- P. hoyeri** Cles. Tromsóen and Renó, in the Amt of Tromsó.
- P. nitidum** Jen. Rather common. Tyrifjorden, Eker, Ringerige, Laurvik, Skien, several lakes round Arendal,

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\* The description of this and following new species and varieties is in the last part of 'Malacozoologische Blätter,' N. Folge Band viii.



Christiansand, many lakes in Tónset ; Andóen, in the Amt of Tromsó ; Oxfjord and Hammerfest, in the Amt of Finmarken.

- P. subtruncatum** Malm. Rare. Christiania, Eker, Arendal, and Christiansand.
- P. milium** Held. Common in Christiania, Christiansand Stift, the Amt of Nordland, the Amt of Tromsó, and the Amt of Finmarken. Akersvand, in Jarlsberg ; Kródsherred, lakes round Gausdal Sanatorium and in Tónset, Maalsvedalen, Trondenæs and Tromsóen.
- P. scholtzii** Cles. Not common. Gausdal and Ringebu, in Gudbrandsdalen, Tónset, Trondenæs, Maalsvedalen, and South-Varanger.

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*2nd Ord. GASTEROPODA OPERCULATA.*

I. PULMONATA TERRESTRIA.

Family VALVATIDÆ.

Genus VALVATA Müll.

Subgenus CINCINNA Hübner.

- Valvata piscinalis** L. Common. In the vicinity of Christiania, Gudbrandsdalen, Tónset, Jædderen, Porsangerfjord, South-Varanger ; belongs to the circumpolar species.
- V. piscinalis** var. **costulata** West. Ringebu in Gudbrandsdalen. Alt. 4·7 mill., diam 4·8 mill.
- Subgenus TROPIDINA Adams.
- V. depressa** C. Pfr. Stavanger, 'Vetlevand,' near Gausdal Sanatorium. Alt. 5 mill., diam. 6 mill.
- Subgenus GYRORBIS Fitz.
- V. cristata** Müll. Rare. Christiania.
- V. sibirica** Middl. Bottnelv, in South-Varanger ; and Salonijavre in Pasvikelven, in the Amt of Finmarken.

Family RISSOIDÆ.

Genus BYTHINIA Gray.

- Bythinia tentaculata** L. Frognerdammen near Christiania.
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## CLASS II.—MOLLUSCA CONCHIFERA.

Family CYCLADIDÆ.

Genus SPHÆRIUM Scop.

Subgenus CORNEOLA Clessin.

**Sphærium corneum** L. Many places around Christiania ; but is not common elsewhere. Moss, Formo in Gudbrandsdalen ; Jarlsberg, and Tyrifjorden.

**S. draparnaldi** Cless. Bergen, several localities ? (Westerlund).

**S. mamillanum** West. Much more common than the preceding species, and goes much farther north 'Sognsvand' near Christiania, Skien, Norderhoug at Ringerige, 'Vetlevand' near Gausdal Sanatorium, several lakes at Tónset and Malangen, in the Amt of Tromsø.

**S. mamillanum** var. **clessini** mihi. *Shell small, in transverse section, heart-shaped, with prominent lines of growth, greyish-horn colour, either with three narrow greyish-yellow bands, or the two lowest confluent ; lower margin more rounded than the type, and the curve to the anterior and posterior side less prominent. Cardinal teeth in the left shell as in the type, cardinal tooth in the right one less curved, and not thickened in the posterior part.* L. 6·5 mill., br. 5·8 mill., th. 4·6 mill. From 'Vetlevand,' near Gausdal Sanatorium in Gudbrandsdalen.

Genus CALYCULINA Cles.

**Calyculina lacustris** Müll.

**C. lacustris** var. **steini** A Schm. Rather common, but only in Christiania and Christiansand Stifts. Several localities near Christiania, Asker, Snarøen, Jarlsberg, Sem, Skien, Dróbak, and Eidsvold.

**C. parulum** Cles.**C. parulum** var. **martensi** Cles. Bergen.

Family UNIONIDÆ.

Genus MARGARITANA Schm.

**Margaritana margaritifera** L. Very common all over the country.

Genus ANODONTA Cuv.

**Anodonta cygnea** L. Probably common, but very little known.

*A. cygnea* var. *cellensis* Gmel. Asker, Trógstad, Vandsó,  
near Moss; and Hvalóerne, in Christiania Stift.

*A. cygnea* var. *ponderosa* Pfr. Bórsesó, near Skien.

*A. cygnea* var. *anatina* L. Trógstad.

TABLE OF DISTRIBUTION\*.

Number.	NAME.	South Norway.	North Norway.	Sweden.	Finland.	Siberia.
I.—Family LIMACIDÆ.						
1. Genus LIMAX.						
1	<i>Heynemannia maximus</i> ... ..	I	I	I	I	O
	var. <i>niger</i> ... ..	I	I	I	O	O
	var. <i>albus</i> ... ..	I	O	I	O	O
	var. <i>fasciatus</i> ... ..	I	O	I	O	O
	var. <i>cinereus-nebulosus</i> ... ..	I	O	I	O	O
	var. <i>leucogaster</i> ... ..	I	O	I	O	O
2	<i>H. cinereus</i> ... ..	I	O	O	O	O
	var. <i>unicolor</i> ... ..	I	O	O	O	O
	var. <i>punctatus</i> ... ..	I	O	O	O	O
3	<i>Malacolimax tenellus</i> ... ..	I	O	I	O	O
4	<i>Agriolimax agrestis</i> ... ..	I	I	I	I	I
	var. <i>succineus</i> ... ..	I	O	I	O	O
	var. <i>norvegicus</i> .. ..	I	O	O	O	O
	var. <i>albidus</i> ... ..	I	O	I	O	O
	var. <i>varians</i> ... ..	I	O	I	O	O
5	<i>Hydroliximax lævis</i> ... ..	I	O	I	O	O
6	<i>Lehmannia marginata</i> ... ..	I	I	I	O	O
	var. <i>obscurus</i> ... ..	I	O	O	O	O
2. Genus ARION.						
7	<i>Lochea empiricorum</i> .. ..	I	I	I	I	O
	var. <i>ater</i> ... ..	I	I	I	O	O
	var. <i>marginatus</i> ... ..	I	O	O	O	O
	var. <i>medius</i> ... ..	I	O	O	O	O
	var. <i>albus</i> ... ..	I	O	I	O	O
8	<i>Prolepsis subfuscus</i> ... ..	I	I	I	I	O
	var. <i>albus</i> .. ..	I	I	O	O	O
9	<i>P. hortensis</i> ... ..	I	I	I	O	I
10	<i>P. citrinus</i> ... ..	I	O	I	O	O
II.—Family HELICIDÆ.						
1. Subfamily VITRININÆ.						
3. Genus VITRINA.						
11	<i>Phenocolimax pellucida</i> ... ..	I	I	I	I	I
12	<i>P. angelicæ</i> ... ..	I	I	O	O	O

\* I have divided Norway in two parts—south and north of the polar-circle.

Number.	NAME.	South Norway.	North Norway.	Sweden.	Finland.	Siberia.
	2. Subfamily HYALININÆ.					
	4. Genus HYALINIA.					
13	<i>Euhyalina cellaria</i> ... ..	I	O	I	I	O
	var. <i>compacta</i> ... ..	I	O	O	O	O
	var. <i>plana</i> ... ..	I	O	O	O	O
14	<i>E. alliaria</i> ... ..	I	O	I	O	O
15	<i>E. nitidula</i> ... ..	I	O	I	O	O
16	<i>E. pura</i> ... ..	I	O	I	O	O
17	<i>E. hammonis</i> ... ..	I	I	I	I	I
18	<i>E. petronella</i> ... ..	I	I	I	I	I
19	<i>Vitrea crystallina</i> ... ..	I	O	I	O	O
20	<i>V. contracta</i> ... ..	I	O	I	O	O
21	<i>Conulus fulvus</i> ... ..	I	I	I	I	I
22	<i>Zonitoides nitida</i> ... ..	I	O	I	I	I
23	<i>Z. norvegica</i> ... ..	I	O	O	O	O
	3. Subfamily HELICIDÆ.					
	5. Genus HELIX.					
24	<i>Patula pygmæa</i> ... ..	I	I	I	O	I
25	<i>P. rotundata</i> ... ..	I	O	I	O	O
26	<i>P. ruderata</i> ... ..	I	I	I	I	I
27	<i>Acanthinula aculeata</i> ... ..	I	O	I	O	O
	var. <i>sublævis</i> ... ..	I	O	I	O	O
28	<i>A. harpa</i> ... ..	I	I	I	O	O
29	<i>Vallonia costata</i> ... ..	I	I	I	I	I
30	<i>V. pulchella</i> ... ..	I	I	I	I	I
31	<i>Trichia hispida</i> ... ..	I	O	I	I	I
	var. <i>depilata</i> ... ..	I	O	I	O	O
	var. <i>conica</i> ... ..	I	O	I	O	O
	var. <i>septentrionalis</i> ... ..	I	O	O	O	O
	var. <i>concinna</i> ... ..	I	O	I	O	O
	var. <i>nana</i> ... ..	I	O	O	O	O
	var. <i>albina</i> ... ..	I	O	O	O	O
32	<i>Xerophila candicans</i> ... ..	I	O	O	O	I
33	<i>Eulota strigella</i> ... ..	I	O	I	O	O
34	<i>E. fruticum</i> ... ..	I	I	I	I	I
35	<i>Chilotrema lapicida</i> ... ..	I	O	I	I	O
36	<i>Arionta arbustorum</i> ... ..	I	I	I	I	O
	var. <i>rudis</i> ... ..	I	O	O	O	O
	var. <i>alpestris</i> ... ..	I	O	I	O	O
	var. <i>flavescens</i> ... ..	I	I	I	O	O
	var. <i>trochoidalis</i> ... ..	O	I	O	O	O
	var. <i>picea</i> ... ..	I	O	O	O	O
	var. <i>septentrionalis</i> ... ..	I	O	O	O	O
37	<i>Tachea nemoralis</i> ... ..	I	O	I	O	O
38	<i>T. hortensis</i> ... ..	I	O	I	O	O
	4. Subfamily PUPINA.					
	6. Genus BULIMINUS.					
39	<i>Napaeus obscurus</i> ... ..	I	O	I	O	O

Number.	NAME.	South Norway.	North Norway.	Sweden.	Finland.	Siberia.
	7. Genus COCHLICOPA.					
40	<i>Cochlicopa lubrica</i> ... ..	I	I	I	I	I
	var. <i>minima</i> ... ..	I	I	I	O	O
	var. <i>albina</i> ... ..	I	O	O	O	O
	8. Genus PUPA.					
41	<i>Charadrobia cylindracea</i> ... ..	I	O	I	O	O
42	<i>Pupilla muscorum</i> ... ..	I	I	I	I	O
	var. <i>lundstrómi</i> ... ..	O	I	O	O	I
	var. <i>elongata</i> ... ..	O	I	O	O	O
	var. <i>minor</i> ... ..	I	O	I	O	O
43	<i>Isthmia minutissima</i> ... ..	I	O	I	O	O
	var. <i>odontostoma</i> ... ..	I	O	O	O	O
44	<i>Columella edentula</i> ... ..	I	O	I	I	I
	var. <i>gredleri</i> ... ..	I	I	I	O	O
45	<i>Vertigo gravida</i> ... ..	I	O	O	O	O
46	<i>V. pygmæa</i> ... ..	I	O	I	I	O
47	<i>V. substriata</i> ... ..	I	I	I	I	O
48	<i>V. antivertigo</i> ... ..	I	O	I	O	O
49	<i>V. lilljeborgi</i> ... ..	I	O	I	I	O
50	<i>V. alpestris</i> ... ..	I	I	I	I	O
51	<i>V. arctica</i> ... ..	I	I	I	O	I
52	<i>V. pusilla</i> ... ..	I	I	I	O	I
53	<i>V. angustior</i> ... ..	I	O	I	O	O
	9. Genus BALEA.					
54	<i>Balea perversa</i> ... ..	I	I	I	I	O
	var. <i>lucifuga</i> ... ..	I	O	I	O	O
	10. Genus CLAUSILIA.					
55	<i>Clausiliastra laminata</i> ... ..	I	O	I	I	O
	var. <i>virescens</i> ... ..	I	O	O	O	O
	var. <i>nana</i> ... ..	I	O	O	O	O
56	<i>Alinda biplicata</i> ... ..	I	O	I	O	O
57	<i>Pyrostoma ventricosa</i> ... ..	I	O	I	O	O
58	<i>P. rolphi</i> ... ..	I	O	O	O	O
59	<i>P. plicatula</i> ... ..	I	O	I	I	O
	var. <i>leucostoma</i> ... ..	I	O	I	O	O
	var. <i>curta</i> ... ..	I	O	I	O	O
60	<i>Iphigenia sejuncta</i> ... ..	I	O	I	O	O
61	<i>I. dubia</i> ... ..	I	O	I	O	O
	var. <i>obsoleta</i> ... ..	I	O	I	O	O
62	<i>I. cruciata</i> ... ..	I	O	O	I	O
63	<i>I. bidentata</i> ... ..	I	I	I	I	O
	var. <i>septentrionalis</i> ... ..	I	I	I	O	O
	var. <i>exigua</i> ... ..	I	O	I	O	O
	var. <i>erronea</i> ... ..	I	O	I	O	O
	var. <i>subrugosa</i> ... ..	I	O	I	O	O
	var. <i>minor</i> ... ..	I	O	O	O	O
	var. <i>elongata</i> ... ..	I	O	O	O	O

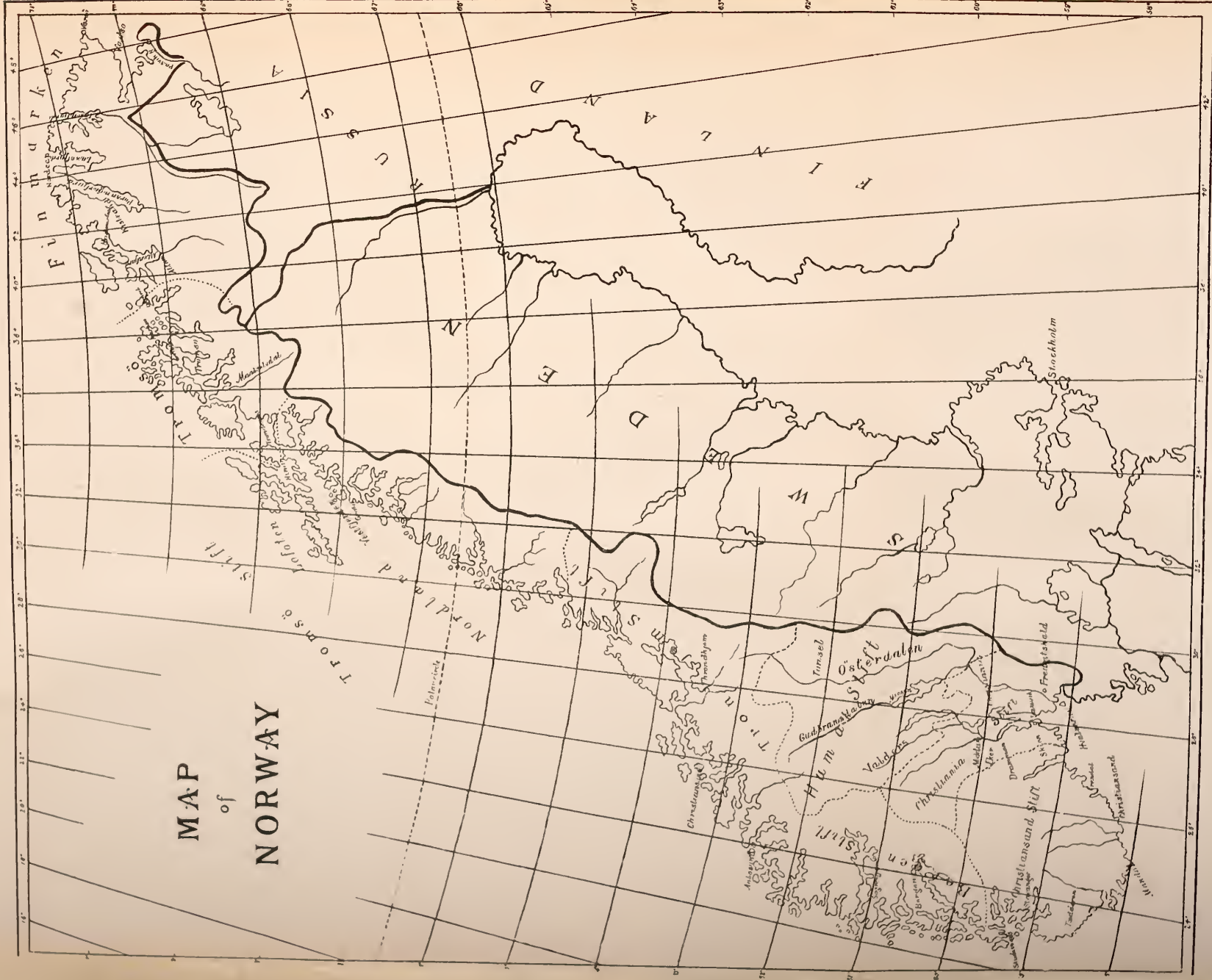
Number.	NAME.	South Norway.	North Norway.	Sweden.	Finland.	Siberia.
	5. Subfamily SUCCINIDÆ.					
	11. Genus SUCCINEA.					
64	Neritostoma putris ... ..	I	O	I	I	I
	var. olivula ... ..	I	O	O	O	O
	var. trianfacta ... ..	I	O	I	O	O
	var. limnoidea ... ..	I	O	O	O	O
65	Amphibina stagnalis . . . . .	I	O	O	O	O
66	A. pfeifferi ... ..	I	I	I	I	I
	var. contorta ... ..	O	I	I	O	O
	var. propinqua ... ..	I	O	O	O	O
	var. ventricosa ... ..	O	I	O	O	O
	var. contortula ... ..	O	I	O	O	O
	var. sarsi ... ..	O	I	O	O	O
67	Lucena oblonga ... ..	I	O	I	O	I
	var. agonostoma ... ..	I	O	I	O	I
	var. arenaria ... ..	I	O	I	O	O
	III.—Family AURICULIDÆ.					
	12. Genus CARYCHIUM.					
68	Carychium minimum ... ..	I	O	I	I	O
	IV.—Family LIMNÆIDÆ.					
	6. Subfamily LIMNÆIDÆ.					
	13. Genus LIMNÆA.					
69	Lymnus stagnalis ... ..	I	I	I	I	I
	var. vulgaris ... ..	I	O	I	O	O
	var. turgida ... ..	I	O	I	O	I
	var. minor ... ..	I	O	O	O	O
70	Gulnaria auricularia ... ..	I	O	I	I	I
71	G. lagotis ... ..	I	O	I	I	I
	var. baltica... ..	I	O	I	I	O
72	G. ovata ... ..	I	I	I	O	I
	var. colletti... ..	O	I	O	O	O
	var. patula ... ..	I	I	I	O	I
73	G. mucronata ... ..	O	I	O	O	O
74	Limnophysa palustris... ..	I	I	I	I	I
	var. septentrionalis	I	O	O	O	O
	var. fusca ... ..	I	O	I	O	I
75	L. peregra ... ..	I	I	I	I	I
	var. margaritana ... ..	I	O	I	O	O
	var. ambigua ... ..	I	O	I	O	O
	var. minor ... ..	I	O	O	O	O
	var. elongata ... ..	I	O	O	O	O
	var. peregra-ovata... ..	O	I	O	O	O
76	L. glabra ... ..	I	O	I	O	O
	var. elongata ... ..	I	O	I	O	O
	var. subulata ... ..	I	O	I	O	O
77	L. truncatula ... ..	I	I	I	I	I
	var. microstoma ... ..	I	I	O	O	I
	var. oblonga ... ..	I	I	O	O	O







# MAP of NORWAY





Number.	NAME.	South Norway.	North Norway.	Sweden.	Finland.	Siberia.
	var. maximella ... ..	I	O	O	O	O
	var. compressa ... ..	I	I	O	O	O
	var. schneideri ... ..	O	I	O	O	O
	var. minor ... ..	I	O	I	O	O
	7. Subfamily PHYSINÆ.					
	14. Genus PHYSA.					
78	Physa fontinalis ... ..	I	O	I	I	I
	15. Genus APLEXA.					
79	Aplexa hypnorum ... ..	I	O	I	I	I
	8. Subfamily PLANORBINÆ.					
	16. Genus PLANORBIS.					
80	Tropidiscus marginatus ... ..	I	O	I	I	I
81	Gyrorbis vortex ... ..	I	O	I	I	I
82	G. rotundatus ... ..	I	O	I	I	I
83	G. spirorbis ... ..	I	O	I	I	O
84	Bathyomphalus contortus ... ..	I	I	I	I	I
85	Gyraulus borealis ... ..	I	I	I	I	I
	var. angigyryus ... ..	I	O	O	O	O
	var. flexus ... ..	I	O	O	O	O
	var. gredleri ... ..	I	O	I	O	O
	var. arcticus ... ..	O	I	I	O	O
86	G. polaris ... ..	O	I	O	O	O
87	G. limophilus ... ..	I	O	I	O	O
88	G. concinnus ... ..	I	O	I	O	O
89	G. glaber ... ..	I	I	I	O	O
90	G. strómi ... ..	I	O	O	O	O
91	G. albus ... ..	I	O	I	I	I
	var. hispidus ... ..	I	O	I	I	O
	var. cinctutus ... ..	I	I	I	O	I
	var. depressus ... ..	I	O	O	O	O
	var. lemniscatus ... ..	I	O	I	O	O
	var. draparnaldi ... ..	I	O	I	O	O
92	Armiger crista... ..	I	O	I	I	O
	var. nautileus ... ..	I	O	I	I	O
	var. cristatus ... ..	I	O	I	I	O
	var. spinulosus ... ..	I	O	I	O	O
93	Hippeutis complanatus ... ..	I	O	I	O	I
94	Segmentina nitidus ... ..	I	O	I	I	I
	9. Subfamily ANCYLINÆ.					
	17. Genus ANCYLUS.					
95	Ancylus fluviatilis ... ..	I	O	I	I	O
	var. gibbosum ... ..	I	O	O	O	O
	18. Genus ACROLOXUS.					
96	Acroloxus lacustris ... ..	I	O	I	O	O
	V.—Family VALVATIDÆ.					
	19. Genus VALVATA.					
97	Cincinna piscinalis ... ..	I	I	I	I	I
	var. costulata ... ..	I	O	I	O	O

Number.	NAME.	South Norway.	North Norway.	Sweden.	Finland.	Siberia.
98	<i>Tropidina depressa</i> ... ..	I	0	0	0	0
99	<i>Gyrorbis cristata</i> ... ..	I	0	I	?	0
100	<i>G. sibirica</i> ... ..	0	I	0	0	I
	VI.—Family RISSOIDÆ.					
	20. Genus BYTHINIA					
101	<i>Bythinia tentaculata</i> ... ..	I	0	I	I	I
	VII.—Family CYCLADIDÆ.					
	21. Genus SPHÆRIUM.					
102	<i>Corneola corneum</i> ... ..	I	0	I	I	0
103	<i>C. draparnaldi</i> ... ..	I	0	I	I	0
104	<i>C. mamillanum</i> ... ..	I	I	I	0	0
	var. <i>clessini</i> ... ..	I	0	0	0	0
	22. Genus CALYCULINA.					
105	<i>Calyculina lacustris</i> ... ..					
	var. <i>steini</i> .. ..	I	0	I	I	I
	23. Genus PISIDIUM.					
106	<i>Rivulina globulare</i> ... ..	I	I	I	0	0
107	<i>Fossarina henslowianum</i> ... ..	I	0	I	0	0
108	<i>F. fossarinum</i> ... ..	I	I	I	0	0
	var. <i>flavescens</i> ... ..	I	I	0	0	0
109	<i>F. pallidum</i> ... ..	I	I	I	0	0
110	<i>F. obtusale</i> ... ..	I	I	I	I	0
	var. <i>personatum</i> ... ..	I	0	I	0	0
	var. <i>esmarkiana</i> ... ..	I	0	0	0	0
	var. <i>colletti</i> ... ..	I	0	0	0	0
111	<i>F. lilljeborgi</i> ... ..	I	I	0	0	0
	var. <i>transversale</i> ... ..	0	I	0	0	0
	var. <i>minor</i> ... ..	I	0	0	0	0
112	<i>F. pusillum</i> ... ..	I	0	I	0	I
113	<i>F. pulchellum</i> ... ..	I	I	I	0	0
114	<i>F. hóyeri</i> ... ..	0	I	0	0	0
115	<i>F. nitidum</i> ... ..	I	I	I	0	0
116	<i>F. subtruncatum</i> ... ..	I	0	I	0	0
117	<i>F. milium</i> ... ..	I	I	I	0	I
118	<i>F. scholtzii</i> ... ..	I	I	I	0	I
119	<i>F. parvulum</i> ... ..					
	var. <i>martensi</i> ... ..	I	0	0	0	0
	VIII.—Family UNIONIDÆ.					
	24. Genus MARGARITANA.					
120	<i>Margaritana margaritifera</i> ... ..	I	I	I	I	0
	25. Genus ANODONTA.					
121	<i>Anodonta cygnea</i> ... ..	I	0	I	I	0
	var. <i>cellensis</i> ... ..	I	0	I	I	0
	var. <i>ponderosa</i> ... ..	I	0	I	0	0
	var. <i>anatina</i> ... ..	I	0	I	0	0

		Total Number of Species.	South of Norway.	North of Norway.	Sweden.	Finland.	Siberia.
GASTEROPODA. PULMONATA.							
Geophila	... ..	67	67	27	59	32	21
	Varieties	...	61	55	14	...	...
Hygrophila	... ..	29	27	11	25	18	17
	Varieties	...	34	30	9	...	...
		96—95	94—85	38—23	84—	50—	38—
GASTEROPODA. PECTINIBRANCHIATA							
Cyclostomidæ	... ..	5	4	2	3	2	3
	Varieties	...	1	1	...	...	..
		5—1	4—1	2—	3—	2—	3—
CONCHIFERA.							
Cycladidæ	... ..	18	17	11	15	4	4
	Varieties	...	8	7	2	...	...
Najacæ	... ..	2	2	1	2	2	0
	Varieties	...	3	3	...	...	...
		20—11	19—10	12—2	17—	6—	4—

NORWAY, ... species 121 ... varieties 108

SWEDEN, ... .. 104

FINLAND, ... .. species 58

SIBERIA ... .. 46

Species found in SWEDEN, not in Norway ... 44



## PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY.

## Meeting

HELD JULY 1ST, 1886.

The President, Mr. W. Denison Roebuck, F.L.S., presiding.

## NEW MEMBERS.

The following gentlemen were duly elected members of the Society:—Messrs. A. J. R. Sclater, Teignmouth; J. T. Lightwood, Lytham; and W. E. Collinge, Leeds.

The following gentleman was nominated for membership: Mr. W. Whitwell. Wandsworth Common, London.

## DONATIONS.

The following donations were laid on the table:—

1. "Record of the Opening of the Linnean Hall," New South Wales.—From the Linnean Society.
2. "Proceedings of the Linnean Society," New South Wales, vol x., part 4.—The Society.
3. "Proceedings of the East of Scotland Union of Naturalists' Societies," Kirkcaldy, Sept., 1885.—The Union.
4. Three specimens of *Limnæa burnetti*, from Loch Skene, Dumfriesshire.—Mr. W. Nelson.
5. The under-named series, by A. J. R. Sclater:—*Aporrhais pes-pellicani*, *Tapes pullastra*, *T. perforans*, *T. deussata*, *Cardium echinatum*, *C. rusticum*, *C. norvegicum*, *Trochus magus*, *T. lineatus*, *T. zizyphinus*, *T. cinereus*, *Ostrea edulis*, *Nassa reticulata*, *Purpura lapillus*, *Mya truncata*, *Pileopsis hungaricus*, group of *Saxicava rugosa*, *Buccinum undatum*, *Littorina rudis*, *Murex erinaceus*, *Nucula radiatus*, white *Mytilus edulis*, *Turritella communis*, *T. cornea*, *Lucinopsis undata*, *Patella pellucida*, *Lepas anatifera*, Cuttle bones, beak of Octopus, four Starfishes; and *Helix nemoralis* and *H. hortensis* from Teignmouth.

A vote of thanks was heartily accorded the donors for their gifts.

SPECIMENS EXHIBITED.

The President showed various shells from Altadiawol, Ireland. sent by Mr. W. F. de V. Kane ; also several freshwater shells from Kings Lynn.

Mr. W. Nelson exhibited several fine specimens of *Linnæa burnetti*, recently taken at Loch Skene, N.B.

Examples of *Linnæa palustris* from Clapham Common, and *Clausilia dubia* from Ingleborough. were shown by Mr. W. E. Collinge ; also a specimen of *Patella vulgata*, which he had found in a pond of fresh water at Black Hills, near Leeds, and which continued to live a week in fresh water after removal from the pond.

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## Meeting

HELD AUGUST 5TH, 1886.

Mr. J. W. Taylor occupied the chair.

NEW MEMBERS.

Mr. W. Whitwell, of Wandsworth Common, London, was elected a member of the Society.

Messrs. S. J. da Costa, of London ; and Alfred J. Jenkins, of Deptford, were nominated for membership.

DONATIONS.

The following donations were laid on the table :—

1. "Abstracts of the Proc. Lin. Society," New South Wales, for January, February, March, and April, 1886.—The Society.
2. "Report of the Smithsonian Institute" for 1884.—The Trustees.
3. "Notes on the Subgenus Cylinder (Montfort) of Conus," by J. C. Melvill, M.A., F.L.S.—The Author.

The thanks of the Society was accorded the donors for their donations.

## SPECIMENS EXHIBITED.

The number of specimens sent for exhibition was very large and included the following :—

The Chairman showed, on behalf of Mr. W. Jeffery, examples of *Limax cinereo-niger* and var. *ornata*, *Arion subfuscus*, *A. hortensis*, and *A. bourguignati* from Up Park, West Sussex ; living specimens of *Planorbis dilatatus* from Gorton Canal, Manchester, collected by Mr. T. Rogers ; *Limnæa stagnalis* var. *albida* from a pond at Milford, near Stafford, and *L. peregra* from River Bann, Coleraine, collected by Mr. L. E. Adams ; *Unio pictorum* var. *compressa* from River Wensum, Norwich, sent by Mr. J. B. Bridgman ; *Helix nemoralis* var. *albolabiata*, with straw-coloured bands, found at Bridlington by Mr. W. Denison Roebuck, F.L.S. ; *H. pisana* from Porto Santo, sent by Mr. Gain ; a collection of Land and Freshwater Shells from Swindon, North Wilts., including *Sphærium ryckholtii*, *Limnæa auricularia*, *Planorbis nitidus*. &c., collected by Mr. T. D. A. Cockerell ; and a collection of Land and Freshwater Shells from Clonmel, Ireland, collected by the Rev. A. H. Delap.

Mr. W. E. Collinge exhibited a number of peculiar *Limnæa stagnalis* with a notch at the base of the outer lip, which had appeared since their confinement in his aquarium ; also a specimen of *Arion ater* var. *brunnea* found between Ripon and Kirby Malzeard.

Mr. T. W. Bell showed specimens of *Helix rotundata* var. *alba*, *Pupa umbilicata* and *Helix rupestris* from Crina Bottom, Ingleton ; and *Clausilia dubia*, *Pupa secale* and *Cochlicopa lubrica* from White Scar, Ingleborough, collected by Mr. H. Shaw ; also *Helix hortensis* var. *fuscobabiaia*, *H. hispida* and *Zonites nitidulus* from Dogthorpe, near Peterborough ; and *Limnæa stagnalis*, *L. peregra*, *L. palustris*, *Planorbis corneus*, *P. marginatus*, *P. albus*, *P. vortex*, *Paludina contecta*, and *Bythinia tentaculata* from Crowland Wash.



## Meeting

HELD SEPTEMBER 2ND, 1886.

The President, Mr. W. Denison Roebuck. F.L.S., in the chair.

## NEW MEMBERS.

The following gentlemen were duly elected members of the Society:—Messrs. S. J. Da Costa, London; and A. J. Jenkins, Deptford.

The following gentlemen were nominated for membership: Mr. J. W. Wood, Bedford; and Mr. W. Turner, Edinburgh.

## DONATIONS.

The following donations were announced:—

1. "Proceedings of the Linnean Society," New South Wales, new series, vol. 1, part 1.—The Society.
2. "What I believe," by Leon Tolstoi, translated from the Russian by Constantine Popoff.—The Publishers.
3. The following Reprints of Papers by Mr. W. E. Hoyle M.A., M.R.C.S., F.R.S.E.:—"Notes on the Cephalopoda," "Diagnosis of new species of Cephalopoda," collected during the cruise of H.M.S. Challenger—part 1, "The Octopoda"; part 2, "The Decapoda"; "On Loligopsis and some other species"; "Note on *Loligo Forbesii*."—The Author.
4. The following Magazines and Reprints of Papers, from Miss F. M. Hele:—"The American Naturalist" January, 1876; "The American Journal of Microscopy," February, 1876; "On *Plocamia Plena*—a new species of sponge," by W. J. Sollas, M.A., F.G.S.; "Notes on some of the Land Shells of Curacao," by J. S. Gibbon, M.B.; "Description of the new genus *Delphinolopsis* and of the new species *D. lesourdi*," by M. B. Wright, F.R.G.S.; "Conchiglie Coralligene del mare de Seracea"; "I Molluschi del Velebit"; "Note di Conchigliologia Apuana," del Dott. R. del Prete.

5. Specimens of *Limnæa glabra* from Castleford and Sparkbrook; *Bulimus montanus* from Cooper's Hill, Gloucester, and *Planorbis marginatus* from Black Hills, Leeds.—Mr. W. Nelson.
6. Several specimens of *Anodonta cygnea* (of various sizes) and two *Anodonta anatina* var. *piscinalis*.—Mr. T. W. Pocock, J.P.
7. *Pisidium fontinale*, Linthorpe; *Limnæa peregra* var. *ovata*, River Leven, near Hutton Rudby; *Helix nemoralis* var. *carnea*, (123)45, Foyers, Loch Ness; *Planorbis spirorbis*, *Pisidium pusillum*, and *Limnæa palustris*, from a pond near Levisham; *Ancylus fluviatilis* and *Helix rotundata*, Levisham; *Helix aspersa*, Sunderland; *Helix concinna*, *H. rotundata*, *H. hispida*, *Zonites cellarius*, *Cochlicopa lubrica*, *Clausilia rugosa*, and *Cl. laminata*, from Farwith Bridge, Newtondale, North-East Yorkshire.—Mr. B. Hudson.
8. Twelve very finely-polished specimens of Fossil sponges and coral.—Mr. A. J. R. Sclater.

## PAPER READ.

“*Achatina acicula* in Northamptonshire,” by Mr. Walter D. Crick.

## SPECIMENS EXHIBITED.

The President exhibited numerous species collected during a few days in the Lowland counties of Scotland. Among the most interesting specimens were *Amalia gagates*, from Leven Hall, Edinburghshire; *Helix fusca* and *H. sericea* from Skelmorlie, Ayrshire; and *Zua lubrica* var. *viridula*, from Dunoon, Argyleshire.

Mr. J. W. Taylor showed four living examples of *Helix obvoluta* from Up Park, West Sussex, sent by Mr. W. Jeffery; *Limax arborum* and *Arion bourguignati* from Rev. A. H. Delap, Clonmel; a number of shells collected by Mr. G. T. Porritt, at Redcar and Saltburn; and a small collection of land shells from Ullapool, West Ross, on behalf of Mr. A. Somerville.

Mr. Baker Hudson sent examples of *Helix virgata* var. *subalbida* from Coatham; *Limnæa peregra* var. *ovata* from Marton; *Planorbis spirorbis* monst. *scalaris* from Levisham; and several species from the Falls of Clyde, Lanarkshire.

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## Meeting

HELD OCTOBER 7TH, 1886.

Mr. W. Denison Roebuck, F.L.S., presided.

### NEW MEMBERS.

Mr. Jas. W. Wood, and Mr. Wm. Turner were elected members of the society.

### DONATIONS.

The following donation was announced, and thanks voted to the donor:—

Specimens of *Pupa dolium* from Brugg, Canton Aargau, by Dr. Rudolf Hænsler.

### PAPERS READ.

“Notes on Slugs from Merionethshire.”—Mr. F. G. Fenn.

“Notes on the Epidermis or Periostrakon of certain species of Mollusks.”—Mr. Geo. S. Tye.

“*Helix obvoluta*.”—Mr. W. Jeffery.

Discussion ensued on Mr. Fenn’s paper, when the president and Mr. Taylor expressed their opinion that the specimen which Mr. Fenn considered as a variety of *Limax cinereo-niger* was only an example of *Limax maximus*.

### SPECIMENS EXHIBITED.

In illustration of his paper Mr. F. G. Fenn sent a number of specimens collected in Merionethshire, including some examples of *Limax cinereo-niger*.

The general exhibits were very numerous, including shells from North Italy collected and sent by Mr. Tomlin of Chester. Specimens from King’s Lynn and other places were shown on behalf of Dr. Plowright. Mr. Jeffrey, of Tenby, sent a very small specimen of *Helix pisana*, 11 mm. diameter.

Mr. Taylor showed *Vertigo minutissima* from Palermo, collected by Signor Platania; shells from north Essex, sent by Mr. Whitwell, of Wandsworth; examples of *Helix virgata* and *H. ericetorum* from Leamington, sent by Mr. Quilter; and a small collection of shells from Herts. and Essex, from Mr. C. Oldham, of Sale, Cheshire.

Mr. Nelson showed *Planorbis parvus* in a subfossil state from the mud-cliffs, Hornsea.

The president exhibited shells from several Scotch localities sent by Mr. Mellor; *Limax flavus* from Worcester, sent by Rev. H. Milnes; and *Limax cinereo-niger* from Shipley Glen, collected by Mr. J. A. Hargreaves.

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## Meeting

HELD NOVEMBER 4TH, 1886.

The President, Mr. W. D. Roebuck. F.L.S., presiding.

### NEW MEMBERS.

The following gentlemen were nominated for membership: Rev. H. Glanville Barnacle, M.A., F.R.A.S., Holmes Chapel, Cheshire; Mr. Wm. Bendall, Nottingham Place, W.; Mr. Geo. Dixon, Sen., Great Ayton; Mr. H. M. Gwatkin, Cambridge; Rev. Wm. L. W. Eyre, Alresford; Rev. Carleton Greene, St. Neots; Mr. John Hagger, Burton-on-Trent; Mr. W. J. O. Holmes, F.L.S., Norwich; Prof. Adolph Leipner, Bristol; Mr. E. J. Lowe, D.L., J.P., F.R.S., &c., Chepstow; Mr. D. Pidgeon, Assoc.Inst.C.E., F.G.S., London; Mr. John Ramage, Dundee; Mr. Edward Saunders, F.L.S., Bromley; Mr. Robert Standen, Swinton.

### DONATIONS.

The following donations were laid on the table:—*Helix personata* L., *H. carpatica* Friv., *H. faustina*, *H. bidens* Chem., *H. holosericea* Stud., *H. rossmassleri* Pfr., *Bulimus montanus* Drap., *Pupa dolium*, *Clausilia gulo* Rossm., *C. orthostoma*, *C. dubia* Drap., *C. tumida* Rossm., *C. turgida* Rossm., *C. cru-*

*ciata* var. *minima* from Kotlina Thal, Carpathians, *C. laminata* var. *Parreyssii* Rossm., *C. biplicata* var. *carpatica* Tatra, Carpathians, and *C. fallax* Rossm., Sinnya, Roumania.—Presented by Mrs. Fitzgerald.

*Planorbis lineatus* Cambridge, *Limnæa peregra* from Island of Herm, *Helix arbustorum* Gemmi Pass, Switzerland, and *Helix strigella* from Menaggio, Lake Como. — Presented by Mr. Tomlin.

The thanks of the society was accorded the donors for their gifts.

## PAPER READ.

“New Habitat for *Odostomia pallida*.”—by the Rev. R. W. J. Smart.

The President then gave the Annual Presidential Address, in which, taking the forthcoming Monograph of British Land and Freshwater Mollusca, by Mr. Taylor and himself, he reviewed the present state of our knowledge of that department of the British fauna, calling special attention to the deficiencies which exist, and the urgent need of further investigation into the anatomical and physiological structure, the embryology and development, the life-history and habits of the various species. The deficiencies in our knowledge of distribution and variation were then dealt with, and the concluding portion of the address dealt with the function and scope of the Conchological Society, the catholicity of its aims, and the necessity which exists for a more adequate and varied supply of communications to be read at the meetings.

## SPECIMENS EXHIBITED.

Mr. W. Nelson showed examples of *Zonites nitidus* and *Helix rotundata* from Headingley.

Mr. J. W. Taylor exhibited on behalf of Rev. J. E. Somerville, B.D., a collection of land and freshwater shells made by him in the Islands of Tiree, S. Uist, Lewis, Benbecula, and Barra; and also a number of species recently found on the

north coast of Sutherlandshire. Also on behalf of Mr. A. Somerville, B.Sc., *Planorbis nautilus* from Lanarkshire, and several species from Nairnshire. On behalf of Rev. A. H. Delap a living specimen of *Limax arborum* var. *maculata* from Clonmel, Tipperary. On behalf of Mr. Whitwell several species from Salford Priors near Evesham. Mr. Taylor further exhibited a number of shells from Chester, Cambridge and Lombardy, sent by Mr. B. Tomlin; also a distorted specimen of *Planorbis spirorbis* found by Mr. W. H. Heathcote at Tarleton, S. Lancashire. Also examples of *Helix aculeata*, *Vertigo edentula*, *Zonites radiatulus*, and other species, from Montgomeryshire, sent by Mr. J. B. Morgan. Some remarkable specimens of *Valvata piscinalis* with the last whorl dislocated, and a number of freshwater shells from Saddington Reservoir and other places in Leicestershire, sent by Mr. H. E. Quilter. Also on behalf of Dr. Viner a number of land shells from Monaco, Riviera, Rimini, Ravenna, and several places in Spain.

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## Annual Meeting.

HELD DECEMBER 9TH, 1886.

The President, Mr. W. Denison Roebuck, F.L.S. presided.

### NEW MEMBERS :

The following were duly elected Members of the Society:—  
 Rev. H. Glanville Barnacle, M.A., F.R.A.S. ; Mr. W. Bendall ;  
 Rev. W. L. W. Eyre ; Mr. Geo. Dixon, Senr. ; Rev. Carleton  
 Greene ; Mr. H. M. Gwatkin ; Mr. Jno. Hagger ; Mr. W. J. O.  
 Holmes, F.L.S. ; Prof. Adolph Leipner ; Mr. Daniel Pidgeon,  
 F.G.S. ; Mr. E. J. Lowe, D.L., J.P., F.R.S., F.L.S., F.G.S. ;  
 Mr. John Ramage ; Mr. E. Saunders, F.L.S. ; Mr. Robert  
 Standen.

The name of Mr. Hy. Coates, of Perth, was inadvertently omitted from the list of Members elected at the February Meeting.

The following were nominated for Membership:—Mr. H. Wallis Kew, Louth; Mr. R. Renton; Mr. A. Shaw; Mr. W. H. Heathcote; Mr. Conrad Gerland, B.A., Ph.D.; Mr. J. Beulah; and Rev. A. H. Cooke, M.A., F.Z.S.

## DONATIONS.

The following donations were announced:—

“Transactions of the Yorkshire Naturalists’ Union,” part 9, for 1884.—The Union.

“Proceedings of the Linnean Society, N. S. W.” vol. i, part 2, New Series.—The Society.

*Helix aspersa*, *H. nemoralis*, *H. hortensis*, *H. ericetorum*, *H. virgata*, *H. sericea*, *H. caperata*, *Bulimus acutus*, and *Planorbis spirorbis* from Newquay, W. Cornwall.—Presented by Mr. J. H. James.

*Cyclostoma elegans* Isle of Portland, *Clausilia rugosa* var. *albinos*, *Helix rotundata* var. *alba*, *H. aspersa* Hampshire, *H. virgata* Weston-super-Mare, *Limnæa palustris* Cheddar, *L. stagnalis* from Selly Oak, Packington Park, Lifford, and Bordesley Green, near Birmingham; *L. peregra* from Hall Green, near Birmingham; and *Planorbis corneus* var. *albinos*.—Presented by Mr. J. Madison.

The thanks of the society was accorded the donors for their donations.

## PAPER READ.

“On the Shells of Newquay, Cornwall.”—Mr. J. H. James.

## SPECIMENS EXHIBITED.

Mr. J. W. Taylor showed on behalf of Mr. Ponsonby, a fine collection of *Helix nemoralis* and *H. hortensis* from various localities in Switzerland and Germany. On behalf of Mr. B. Sturges Dodd, a Brachiopod new to science, which he has recently found at Sutton-on-the-Sea, Lincolnshire.

The Annual Report was read by the secretary, and after some discussion was unanimously adopted.

The recorder had not completed his analysis of the records made during the year, but gave a general summary of the work done, which was eminently satisfactory.

The treasurer brought forward the Cash Account for the year, which showed receipts (including balance from last year) £27 14s. 11d., expenditure £21 2s. 8½d., and cash in hand £6 12s. 2½d.

The scrutineers announced that fifty-one voting-papers had been received, and the results of the voting was:—

PRESIDENT.—Mr. J. W. Taylor, 51 votes.

VICE-PRESIDENTS (four required).—

W. Denison Roebuck, F.L.S.	49	W. H. Evans, M.D.	... 44
J. C. Melvill, M.A., F.L.S.	47	C. Ashford (not a member)	2
Rev. H. Milnes, M.A.	... 45	A. H. Cooke, M.A., (not a member)	2

TREASURER.—Thos. W. Bell, 50 votes.

SECRETARY.—Thos. W. Bell, 50 votes.

MEMBERS OF THE COUNCIL (six required).—

Baker Hudson	... .. 50	G. Sherriff Tye	... .. 49
Wm. Jeffery	... .. 49	Wm. Cash, F.G.S.	... .. 48
Lionel E. Adams, B.A.	... .. 49	A. Somerville, B.Sc.	... .. 2
Chas. T. Musson, F.L.S.	... .. 49	R. D. Darbshire, B.A.	... .. 1

RECORDER.—

W. Denison Roebuck, F.L.S.	50	W. Jeffery	... .. 1
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The suggestions of the council (referred to in the Annual Report) in reference to nomenclature and identification of shells, were brought forward by the President, and after some conversation on the subject, were adopted by the meeting as follows:—

- 1.—That Referees be appointed, to whom specimens and all questions of nomenclature shall be referred for consideration and report.
- 2.—That all specimens presented to the society shall be authenticated by the Referees, to whose particular department the species appertain.



- 3.—That specimens sent by members for record, shall be authenticated in like manner.
- 4.—That members proposing changes of nomenclature in the Conchological Society's List of 'British Land and Freshwater Mollusca,' and in such other lists as may hereafter be prepared under the Society's auspices, shall forward their recommendations to the Secretary, who will submit them to the Referees immediately concerned. The member will be expected to set forth at length the reasons which induced him to propose any change, and each proposed change must be written on a separate sheet of paper, on which the referees may write their views and decision. Such decision to be afterwards submitted to and ratified by the council of the society.

The following gentlemen were elected referees under this scheme, subject to their consent to act being obtained :—

1.—BRITISH MARINE MOLLUSCA—

Mr. W. E. Hoyle, B.A., F.R.S.E.  
 Mr. J. T. Marshall.  
 Mr. Alexr. Somerville, B. Sc., F.L.S.

2.—LAND AND FRESHWATER MOLLUSCA—

Mr. Charles Ashford.  
 Mr. William Nelson.  
 Mr. W. Denison Roebuck, F.L.S.  
 Mr. Jno. W. Taylor.

3.—EXOTIC MOLLUSCA—

Mr. James Cosmo Melvill, M.A., F.L.S.  
 Mr. Edgar A. Smith, F.Z.S.  
 Rev. Robert Boog Watson, B.A., F.R.S.E., F.L.S.

The thanks of the meeting was accorded the retiring Officers and Council for their services during the year.

## THE ANNUAL REPORT.

Your committee have to congratulate the members on the marked success which has attended the operations of the society during the year, and the continued interest which the members have evinced in its progress.

At the commencement of the year, it was felt that a number of well-known Conchologists who were not already members, only needed to have their attention called to the existence of the society, in order to at once secure their adhesion.

Steps were accordingly taken by your President, and a large number of Conchologists promptly responded to his invitation. Sixty new members have been elected during the year; and several more have been nominated for membership at this meeting. Only one member has resigned.

Two Honorary members have been elected, namely, M. J. R. Bourguignat, of St. Germain-en-Laye; and Dr. E. von Martens, of Berlin.

The Donations to the society's Library and Museum have been too numerous to allow of detailed mention here; but many valuable acquisitions have been made, and the society is greatly indebted to those who have so freely contributed. All donations have been acknowledged in the society's proceedings from time to time.

Attention has been devoted by your council to the mounting of the collections of the society. Mr. W. Nelson has been appointed to act as Curator, and on his recommendation the system of mounting in glass tubes has been adopted, as being perhaps the most economical and convenient method of storing the specimens.

The attention of your council has been called by one of the members to the advisability of making certain modifications of the nomenclature adopted in the 'Conchological Society's list of British Land and Freshwater Mollusca.'

After due consideration, it was deemed advisable that a permanent system should be devised of dealing with those and similar questions.

Recommendations on the subject will be brought forward at the present meeting.

The number of shells that have been brought forward at the Society's Meetings for Exhibition and Identification has been very large, and has helped to considerably increase the number of recorded varieties and localities.

The chief drawback to the success of the Society during the year is the comparatively small number of papers read, and your Council would urge upon the members the desirability that exists for an ample supply of original communications in the future.

Your Council would also be pleased if those members who interest themselves in exotic and marine shells; and in Conchological Paleontology, would assist in keeping these departments of the science more prominently before the meetings, and thus vindicate the claim of the Society to the representation of the science in its widest acceptance.



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



- 1.—That this Society be called the "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.
- 5.—That composition fees shall be treated as capital and not as income.
- 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, and six other members, who shall be elected annually.
- 9.—That the Presidency shall not be tenable 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, Dr. E. von, 29, Franzosiche Strasse, Berlin, N.W.

## ORDINARY MEMBERS.

- Adams, Lionel E., B.A., 5, Park-street, Stafford.  
Baillie, William, Brora, Sutherlandshire.  
Barnacle, Rev. H. Glanville, M.A., F.R.A.S., The Vicarage,  
Holmes Chapel, Crewe, R.S.O.  
Beulah, John, Raventhorpe, Brigg.  
Bell, Thos. William, 10, Reuben-place, Leeds.  
Bendall, Wilfrid, Nottingham place, London, W.  
Bostock, Edwin D., F.L.S., The Radfords, Stone, Staffordshire.  
Brazier, Jno., C.M.Z.S., Windmill-street, Sydney, N.S.W.  
Brown, Alfred, 7, Bowmont-terrace, Glasgow.  
Butterell, J. Darker, 4, Willow Grove, Westwood, Beverley.  
Cash, Wm., F.G.S., 38, Elmfield-terrace, Halifax.  
Chaytor, R. C., Scafton Lodge, Middleham, Yorkshire.  
Clarke, Wm. Eagle, F.L.S., M.B.O.U., 18, Claremont-road,  
Headingley, Leeds.  
Coates, Hy., Pitcullen House, Perth.  
Coates, William, 18, Borough-terrace, Middlesbrough,  
Cockerell, Sydney C., 5, Priory-road, Bedford Park, Chiswick.  
Cockerell, T. D. A., do. do.  
Coles, F. R., Ye Hermitage, Tongland, Kirkcudbrightshire.  
Collier, Edward, 74, Yarburgh-street, Manchester.  
Collinge, W. E., 68, Springfield-place, Leeds.  
Cooke, Rev. Alfred Hands, M.A., F.L.S., King's College,  
Cambridge.  
Costa, S. J. Da, 2, Craven Hill, London.  
Coulson, Frank, 4, Foremound-terrace, Dowanhill, Glasgow.  
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.  
Cundall, J. W., Carrville, Alexandra Park, Redland, Bristol.  
Darbishire, R. D., B.A., F.G.S., Victoria Park, Manchester.  
Davis, Jas. W., F.S.A., F.L.S., F.G.S., Chevinedge, Halifax.

- Dixon, George, Sen., Great Ayton, Northallerton.  
Dodd, B. Sturges, 33, Beech-avenue, New Basford, Nottingham.  
Duncan, Wm., 1, India-street, Montrose.  
Elliott, Edward J., High-street, Stroud.  
Evans, W. Hill, M.D., 58, Little Horton-lane, Bradford.  
Eyre, Rev. W. L. W., M.A., Swarraton Rectory, Alresford, Hants.  
Fairbrass, (Miss) E. R., Abbey-street, Faversham.  
Fenn, F. G., 20, Woodstock-road, Bedford Park, Chiswick.  
Fitzgerald, (Mrs.) J., 10, West-terrace, Folkestone.  
Fitzgerald, H. Purefoy, North Hall, Preston Candover, Hants.  
Fitzgerald, F. R., F.S.Sc., Clifford House, Harrogate.  
Gain, Wm. Albert, Tuxford, Newark.  
Gerland, Conrad, B.Sc., Ph.D., University of Marburg, Germany; and Church Hall, Church, Lancashire.  
Godlee, Theo., Whips Cross, Walthamstow, Essex.  
Gordon, Rev. George, LL.D., The Manse, Birnie, Elgin, N.B.  
Green, Rev. Carleton, M.A., Great Basford Vicarage, St. Neots., Huntingdonshire.  
Gwatkin, H. M., M.A., Scrope-terrace, Cambridge.  
Hagger, Jno., Repton School, Burton-on-Trent.  
Heathcote, Wm. Hy., Avenham-lane, Preston.  
Hepburn, Frederick, B.A., Sutton, Surrey.  
Hey, Rev. W. C., M.A., St. Olave's Vicarage, York.  
Hillman, Thos. Stanton, Eastgate-street, Lewes, Sussex.  
Hockin, (Miss) S., Phillack Rectory, Hayle, Cornwall.  
Holmes, W. J. O., F.L.S. Strumpshaw Hall, Norwich.  
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**Planorbis complanatus** monst. terebrum in East Kent.—I found a very characteristic example of this monstrosity at Minster, near Sandwich, on June 14th last. In general contour it somewhat resembles *Helix conica*.—S. C. COCKERELL, July 14th, 1886.



**Achatina acicula in Northamptonshire.**—The first record of this interesting mollusk being found in this county is given by the Rev. M. J. Berkeley, in the 'English Mechanic,' Oct. 20th, 1876; this article on Northamptonshire as a field of study for Naturalists, was reprinted in the Northamptonshire Nat. Hist. Soc. Journal, vol. ii, pp. 347 to 351, and contains the following paragraph referring to the above:—'The delicate *Achatina acicula* which is so seldom found alive, though not uncommon in fresh water deposits, has occurred to me at Sibbertoft in full vigour.' In the list of Land and Freshwater Mollusca collected at Peterborough by A. W. Nicholls; 'Journ. of Conch.', iv., p. 185, April, 1884, this species is recorded as being rare in the gravels of the River Lane. In a letter to me dated Oct., 1885, T. Beesley, F.C.S. of Banbury, writes as follows:—'This [*Achatina acicula*] I found some years ago very abundantly in roots of grass, near a stonepit close to the town; but this was in Oxfordshire. If searched for, you will be sure to find it. The pit was marlstone.' On Aug. 14, of this year, while turning over some stones of the Middle Lias which had been excavated for the new railway between Weedon and Daventry, in a gravel walk, close to the latter town, I found a single dead specimen of this species; although careful search was made, no further specimens could be found.—WALTER D. CRICK, Aug. 1886.

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**Marine Mollusca at Land's End, Cornwall.**—Among some shells sent to me from this locality by Mr. J. H. James are the following, some of which are not included in the Scilly list, though the locality is not far distant:—*Rissoa membranacea*, *R. semistriata*, *R. parva* type, var. *interrupta*, and var. *lurida* nov (of *interrupta*, form, purplish brown, almost unicolorous, also found at Margate), *Eulima bilineata*, *Rissoa striata* and var. *arctica*, *R. costata*, *R. reticulata*, *R. punctura*, *R. inconspicua*, *R. costulata*, *Barleeia rubra*, and *Lacuna divaricata*.—T. D. A. COCKERELL, Sept. 1886.

**New habitat for *Odostomia pallida*.**—The usual habitat for *Odostomia pallida* is, as is well known, on the ears of *Pecten opercularis* or *P. maximus*; but what I imagine to be an entirely new habitat has just been brought to light, viz: on the operculum of *Turritella terebra*. These latter were taken in large quantities in a small trawl in Sullom Voe, Mainland, Shetland, depth about 10 fathoms. An *Odostomia* was observed on the operculum of one which led to a careful investigation. After lying a short while undisturbed in a sieve, many of the animals protruded themselves, immediately withdrawing however on the slightest touch; by careful looking over, about a dozen specimens were secured, each having an *Odostomia*, and in one case two, attached to the operculum. These were all of one size, about half grown; a few were placed in salt water, but the partnership ceased when the water became insufficient, and the *Odostomia* dropped off. The specimens of *Turritella* that were allowed to dry, had to be broken to procure the *Odostomia*, which was withdrawn with the operculum. A number of specimens of *P. opercularis* were obtained in the same haul, some few with adult *Odostomia pallida* on the ears.—R. W. J. SMART, Oct., 1886.

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#### BIBLIOGRAPHY.

**Museum Normanianum**, or a Catalogue of the Invertebrata of Europe, and the Arctic and North Atlantic Oceans, which are contained in the collection of the Rev. Canon A. M. NORMAN, M.A., D.C.L., F.L.S.

This catalogue, of which three parts are already issued, containing the Echinodermata, Pantopoda, and Crustacea, is a list of the species inhabiting the area north of north latitude 35° in the magnificent collection formed by Dr. Norman, at Burnmoor Rectory, Fencehouses, Co. Durham. The Echinodermata, of which 194 species are listed, is mostly deficient in North-East American forms, especially the Holothuroidea, in the deep sea Atlantic species, and in Mediterranean and recently described Arctic species.

The Pantopoda contained in present list number thirty-five, additions to which are earnestly desired.

The total number of Crustacea from this region, described to present time, is 3209, of this vast number Dr. Norman possesses 1362. These valuable lists are issued mainly to make known the contents of Dr. Norman's museum to curators of museums and private naturalists, in the hope that by exchange or purchase, it may be still further enriched.

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LAND AND FRESHWATER MOLLUSCA  
ROUND CHRISTCHURCH, SOUTH HANTS.

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BY CHARLES ASHFORD.

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LITTLE description of this district is needed. A five-mile radius extends to the border of Dorset on the west, and nearly to the fringe of the New Forest on the north-east. The circle includes the southern part of the basins of two rivers—the Avon and the Stour—which unite just before entering Christchurch harbour. Probably the bed of an ancient estuary, the surface is for the most part flat and very thinly wooded, but the land rises about one hundred feet towards Bournemouth on one side and the Forest on the other. Geologically, an unbroken bed of coarse gravel and sand from three to thirty feet thick overlies the equally continuous Lower Tertiary Clays. Rock, in its popular sense, is altogether absent inland.

With a few exceptions, land-species are poor in individuals. It will be observed that the aquatic genera *Unio*, *Paludina*, and *Dreissena* are unrepresented in the list.

The names of a few localities situate beyond the five-mile limit have been placed within square brackets.

I have to thank the revising committee of the Conchological Society for a most careful scrutiny of the shells submitted to their judgment.

**Sphærium corneum.**—In all suitable places. R. Stour from Christchurch to Herne; R. Avon, from Christchurch to Sopley, and many ditches communicating; also at [Ringwood, Holmsley, Brockenhurst]. Adults with fry, 2—3 mm. in early May.

**Pisidium amnicum.**—River Stour at Tuckton, length 8 mm., breadth 10·5 mm.; Somerford Brook sparingly; [Ringwood, Brockenhurst abundant and fine, Holmsley]. Adults with eleven to fourteen fry each, 1—2 mm. broad, and distinctly striated, on 13th May.

**P. fontinale.**—River Avon at Christchurch, Winkton, and [Ringwood]; R. Stour at Christchurch. Two with umbonal projections (*henslowana*) at Tuckton (J. H. Ashford) and a few *pulchella* from both rivers at Christchurch.

**P. pusillum.**—River Stour, Christchurch, Wick, Tuckton; Somerford Brook; a smaller, rather more glossy and inequilateral form abundant in 1882 in the chalybeate streamlet, running down Boscombe Chine, since covered in; R. Avon and ditches, Christchurch and Winkton; [Ringwood, Brockenhurst].

**P. nitidum.**—Three specimens from R. Stour, Christchurch, and R. Avon, Winkton, identified by Mr. J. W. Taylor.

**Anodonta cygnea.**—River Stour at Tuckton Bridge, generally undersized, occasionally attaining 5 inches. [Beaulieu, 6 inches].

**Neritina fluviatilis.**—River Stour, Christchurch to Tuckton. Very abundant above Tuckton Bridge, Sept. 1884, in great variety of markings; about 4 per cent. being pure yellow without spots (*cerina*), 14 per cent. presenting a most instructive graduated series connecting the latter with the type, a few marked with three bands (*trifasciata*), and two with transverse bands (*undulata*); R. Avon at Winkton and [Ringwood].

**Bythinia tentaculata.**—Widely distributed. R. Stour from Christchurch to Herne Court; R. Avon up to Sopley, also

at [Ringwood]; in most ditches, sometimes abundant, often encrusted but rarely decollated. One specimen with elongate spire (*producta*) Tuckton. [Water draining from the New Forest appears to be more detrimental to the shell. In a stream near Holmsley Station, 24th Sept., the decollated condition was general, so also, 13th May, near "The Queen's Bower," N. of Brockenhurst, where, in addition to loss of spire, the body whorl and occasionally even the operculum was deeply pitted].

- B. leachii.**—Sparingly, Christchurch, Winkton, [Ringwood], Tuckton.
- Valvata piscinalis.**—River Avon at Christchurch and [Ringwood] moderately abundant; R. Stour up to Tuckton, occasional; [Brockenhurst, Holmsley].
- V. cristata.**—With the last, in both Stour and Avon, but more frequent in latter; [Ringwood].
- Planorbis nitidus.**—Four specimens on weed in Somerford brook, near Christchurch, with *P. nautilus* (J. H. A.); two dead shells among rejectamenta of R. Avon.
- P. nautilus.**—Moderately abundant in Somerford brook, small (August) but all beautifully crested (*cristata*).
- P. albus.**—Widely distributed, but nowhere very abundant or fine. River Avon from Christchurch to Sopley [and at Ringwood]; R. Stour from Christchurch to Iford Bridge; Somerford; Boscombe Chine; [Lyminster R. at Brockenhurst]. One conically-coiled shell at Tuckton (J.H.A.).
- P. spirorbis.**—River Avon at Christchurch; plentiful in 1880 in a shallow grassy roadside ditch, dry in summer, but not found there recently; Waterditch; [Holmsley, numerous]. A shell curiously twisted into a cylindrical form (J.H.A.); and a discoidal shell with whorls irregularly separated, Christchurch.
- P. vortex.**—Much less local than *P. spirorbis*. Throughout lower reaches of both Avon and Stour and in most ditches; [Ringwood, Brockenhurst].

- P. carinatus*.—River Avon at Christchurch ; Winkton and [Ringwood] ; R. Stour, Tuckton ; [Holmsley] ; in places plentiful.
- P. marginatus* (Drap.).—Frequent in most places round Christchurch, in R. Stour, R. Avon, ditches and marshes ; [Holmsley, Brockenhurst]. Of examples from the Avon Mr. Nelson remarks : “ a rather curious form with very compact whorls.”
- P. corneus*.—In ditches near the Avon, Christchurch.
- P. contortus*.—Local. Abundant in a brook, Somerford, with *P. albus* and *P. nautilus* ; [Holmsley].
- Physa hypnorum*.—Only two examples, in ditches near Christchurch.
- P. fontinalis*.—Numerous and generally distributed round Christchurch in Avon, Stour, smaller streams, ditches, and marshes ; [Brockenhurst, Ringwood]. Some variation in shape approaching *oblonga* and *inflata*.
- Limnæa peregra*.—Our most abundant aquatic species, occurring in both rivers, but preferring quiet ditches. Christchurch, Wick, Tuckton, Iford, Blackwater, Winkton, Sopley, Mudeford, [Ringwood, Holmsley, Brockenhurst]. Fry innumerable in May, no adults to be found after June. Prevailing form in ditches is intermediate between *ovata* and *acuminata*, attaining 21 mm., a few tending to each extreme ; in the rivers more nearly typical. A dwarf form, 7—10 mm. (*maritima*), in the mineral stream, Boscombe Chine. [To the last named variety may perhaps be referred a small russet-brown form, 10—12 mm., found alive in a dry cattle trough at Beaulieu].
- L. auricularia*.—Christchurch, in both rivers, seldom found adult and never fine.
- L. stagnalis*.—Christchurch, in R. Stour, ditches near R. Avon, rarely adult.
- L. palustris*.—In most waters near Christchurch, abundant in places, adults varying from 15 to 20 mm. Also at Boscombe,

[Ringwood, Holmsley, Brockenhurst]. One example of *v. lacunosa*, Christchurch (J. W. Taylor). Hundreds of this species, carried by winter overflow of R. Avon to adjacent meadows, lead an aerial life during summer and some form an epiphragm in periods of drought.

**L. truncatula.**—Boscombe (J.H.A.); R. Stour and Avon at Christchurch, Tuckton, Winkton, and [Ringwood]. Much less numerous than *L. palustris*, but often with it.

**L. glabra.**—As yet, only at [Holmsley] at roots of *Iris* in one damp hollow (J.H.A.). The young form a thickened rib within the peristome after each fresh addition to the shell.

**Ancylus fluviatilis.**—Occasionally in R. Avon, at Christchurch and Winkton, and in a branch of that river at Burton; a few in R. Stour at Tuckton, on *Nuphar*, with *A. lacustris*. In the opinion of Mr. J. W. Taylor some from the last named locality conform to Morelet's *Ancylus strictus*, "laterally compressed with side-margins somewhat straight and parallel." More plentiful and including the whitish form (*albida*) in Somerford brook on stones; in Bure brook, near Mudford, on gravel, rather small, dark and corroded at apex; [Holmsley].

**A. lacustris.**—River Stour from Christchurch up to Holdenhurst; R. Avon at Christchurch, Winkton, and [Ringwood] on *Nuphar*, *Nymphæa*, and *Sagitta*, but everywhere in its white form only (*albida*).

**Arion ater.**—The dark form occurs rather sparingly and seems chiefly confined to damp meadows, Christchurch, Winkton (dark olive), Chuton Glen, [Holmsley, Brockenhurst]. I have never seen it in the garden.

The reddish-brown form (*rufa*) in various shades of that colour occurs more frequently, chiefly in gardens on kitchen and other refuse, Christchurch; also away from houses at Roeshot Hill and Hengistbury Head.

**A. subfuscus** Drap.—Intermediate in size between *A. ater* and *A. hortensis*, orange-red to reddish-brown, with

- darker brown band on sides and mantle. Christchurch, on kitchen refuse, occasionally in the garden under dead leaves.
- A. bourguignati.**—A small slug about the length of *A. hortensis*, but fuller bodied, grey or silver-grey, with a narrow dark band on each side. Christchurch, under dead leaves and damp boards with *A. hortensis*.
- A. hortensis.**—Gardens and meadows, Christchurch, Mudeford, Chuton Glen. In this district it is pretty uniform in size and colour—black back and sides, shading off into iron-grey or greenish-grey.
- Amalia gagates.**—Christchurch, in heaps of refuse and dead leaves, occasionally in outhouses climbing the walls with *L. flavus*. The light grey form (*plumbea*), and no other, occurs here.
- A. marginata.**—Christchurch, frequent in garden on rock-work, refuse, dead leaves, etc., typical. Four individuals on a wall at Mudeford in 1879, none found there since.
- Limax lævis.**—Boggy ground and river banks, especially under old logs in several places near Christchurch. Its associates in one instance were *A. hortensis* and *Zonites nitidus*. Whether actually submerged or not appears to be a matter of perfect indifference to this little slug. If held upon a piece of stick it will let itself down by a thread of mucus. Scarcely varies at all in colour.
- L. flavus.**—Frequent in gardens and outhouses. Christchurch; Mudeford .. Much darker and tinged with green when young.
- L. agrestis.**—Strictly unspotted individuals rare; those approaching this condition not numerous; prevailing form distinctly spotted or blotched (*sylvatica*), frequently with russet, reddish-brown, or brown markings in gardens, and generally with some shade of grey in meadows. Christchurch, Hengistbury Head, Highcliff, Barton, Winkton, Burton, Sopley...[Ringwood, Holmsley].



- L. arborum.**—Christchurch, on rockwork in garden, several ; on a beech tree, Bure Homage, one ; [under felled timber in the New Forest in Wootton Inclosure, two, one of which, in Mr. Roebuck's opinion, answered to Baudon's *nemorosa*, the other to Sordelli's *bettonii*].
- L. maximus.**—Christchurch, numerous, chiefly in gardens. The young here are generally greyish-yellow with four conspicuous, broken or continuous bands. As age advances the ground colour assumes a dark wood-brown, often with a tinge of red, and when the animal is adult the bands are more or less obscured. In one instance the dorsal spots were disposed without order (*maculata*). In the Forest at [Cadnam (J.H.A.) and Beaulieu, adult and brightly striped].
- Succinea putris.**—Christchurch, Winkton, Burton, [Ringwood], very variable in numbers at the same spot from year to year.
- S. elegans.**—Christchurch, Tuckton, Winkton, [Holmsley, Ringwood].
- Vitrina pellucida.**—Hengistbury Head, at foot of sandhills, Mudeford, Highcliff, Winkton.
- Zonites cellarius.**—Christchurch, Highcliff, Hoborne Common, Chuton Glen ..[Beaulieu]. Two albino examples at Christchurch ; a colony of a larger and darker form existed up to 1880 at Mudeford, since destroyed by high tides.
- Z. alliarius.**—Nowhere abundant. Chuton Glen with *Z. excavatus*, Mudeford, Highcliff, Newtown, [Cadnam J.H.A.].
- Z. nitidulus.**—Much less numerous than *Z. cellarius*, and rarely found in gardens. Christchurch, Mudeford, Highcliff, Somerford, Winkton, Chuton Glen... [Beaulieu].
- Z. nitidus.**—Local colonies in damp meadows and swamps. Christchurch, Tuckton, Winkton, [Holmsley, rather abundant ; Ringwood].

- Z. excavatus.**—Numerous where it occurs, but very local. Chuton Glen, Hengistbury Head, Boscombe, Hoborne, and [in Wootton Enclosure, Holmsley], in all which places the type only has been found; in a small copse at Roeshot Hill, near Christchurch, it occurs with a transparent light yellow shell to the exclusion of the type.
- Z. crystallinus.**—Occasionally in damp meadows. Christchurch, Tuckton, Somerford, [Holmsley].
- Z. fulvus.**—Sparsely at Christchurch, Hengistbury, Tuckton, Chuton Glen, [Cadnam (J.H.A.), Holmsley].
- Helix aculeata.**—Two specimens at bottom of a hedge, Somerford.
- H. aspersa.**—In and around every village in the district, also at [Ringwood, Holmsley, Beaulieu]. In one garden at Christchurch, 1591 killed in four nights. A dozen or more observed stationed in the daytime on the upper branches of a *Genista* in the public gardens of Bournemouth, (cf. a similar statement by Mr. Hopkinson, in Trans. Nat. Hist. Soc., Herts.)
- VARIATIONS.—*Undulata* Christchurch, [Holmsley, Beaulieu]; *zonata* [Beaulieu], one; a dwarf form, 22 mm., on the coast at Mudeford; a reversed shell, Christchurch.
- H. nemoralis.**—A considerable colony occupies the east side of the hill terminating in Hengistbury Head, traceable thence along the inner base of the sandhills to Mudeford, where, in one hedge, it overlaps for about 20 yards the quarters of *H. hortensis*. Isolated examples in gardens, Christchurch and Bournemouth; at [Holmsley and Bolderwood]. Ground colour confined to pure yellow and light-rufous salmon, with intermediate shades, the banding, with rare exceptions, being 00000 and 00300; one shell 003(45).
- H. hortensis.**—Christchurch, widely spread over sandy banks and hedge-rows near the town; also at Mudeford, Waterditch, Burton, Bournemouth, [Fordingbridge (H. Richardson)].

VARIATIONS.--(a) Size from 15 to 20 mm. in breadth ; (b) ground-colour from the very palest straw-yellow through canary-yellow to rufous salmon, rarely liver-brown, rarely violet-grey ; (c) about three-fifths are bandless, the rest comprising most of the band combinations, a notable exception being 00300 ; (d) lip rarely rose-colour, very frequently reddish brown ; a tinted lip not confined to bandless shells ; (e) shells with 'transparent colourless bands (*arenicola*) frequent.

- H. arbustorum.**—Appears to be very local. A few may generally be found on a swampy spot at Knapp Mill near Christchurch ; rather pale, tending towards *pallida*. This spot is often under water in winter.
- H. cantiana.**—One small colony, including *rubescens* and *albida*, at Mudeford, under brambles on a bank rising from the shore. Two isolated examples at Winkton.
- H. rufescens.**—Plentiful in gardens and among nettles. Christchurch, Winkton... ; [Beaulieu]. Rufous shells (*rubens*) frequent, white ones (*alba*) occasional.
- H. concinna.**—Abundant at Knapp Mill near Christchurch, on swampy ground, with *H. sericea* ; Winkton, [Ringwood]. " I consider them typical specimens " (Dr. Jeffreys).
- H. hispida.**—Christchurch, Highcliff, Winkton, [Holmsley, Brockenhurst, Beaulieu]. Nowhere numerous ; I have not seen more than a score or so ; frequents rather dryer situations than *H. concinna*.
- H. sericea** (*granulata* Ald.).—Abundant below trodden *Phragmites* and rank vegetation close to R. Avon, Christchurch ; a few at Winkton on a roadside bank ; [Ringwood]. Some shells are a shade darker than others.
- H. fusca.**—[New Forest near Holmsley, one alive, one dead (J.H.A.)].
- H. virgata.**—A small community struggling for existence on an arable field, Newtown, varying in numbers from year

to year. The majority belong to the form *albicans*, the rest to *subalbida*. Isolated examples occasionally at Mudeford and Highcliff.

- H. caperata.**—Widely scattered over the whole coast-belt from Barton to Boscombe, on arable land as well as uncultivated ground. Their persistence on farm land is striking, seeing that the plough sends them summarily to hibernation in October, and frequently turns them in again as soon as they reappear in spring.

VARIATIONS.—Several beautiful examples of dark unicolor shells (*fulva*), with and without white lineoles, on the Priory walls, Christchurch, also one at Newtown; *alba*, Christchurch one, Newtown one; *ornata*, Christchurch a few, Newtown two.

- H. rotundata.**—Chuton Glen and Roeshot Hill, with *Zonites excavatus*; Christchurch, abundant in gardens with *Z. cellarius*; Mudeford, Highcliff, Hoborne Common; [Cadnam (J.H.A.), Holmsley, Beaulieu, Ringwood]...
- H. rupestris.**—Very local and true to its usual habitat. Priory wall, Christchurch; [on the church walls and tombstones, Brockenhurst (J.H.A.), on the Abbey ruins, Beaulieu].
- H. pygmæa.**—Roeshot Hill, a few; rejectamenta of R. Avon Christchurch, several.
- H. pulchella.**—Hengistbury, under old bricks; Christchurch and Tuckton, in meadows; Highcliff, on dry banks; [Beaulieu]. I cannot find a shell absolutely free from ribs under a lens.
- H. lapicida.**—A flourishing and pretty numerous colony, the only one known to me, finds congenial conditions on the Priory wall, Christchurch, with *H. rupestris*, *H. caperata*, *Pupa umbilicata*, *Clausilia rugosa*... This ancient, time-furrowed wall, sprinkled with vegetation (*e.g.*, *Parietaria officinalis*) is roughly built of limnæan limestone from the Isle of Wight, Purbeck oolite, and Septaria. Two

living specimens have occurred in unusual places—at Tuckton, on a neglected plot of grass, and in the New Forest at [Holmsley] under felled timber (J.H.A.).

**Bulimus obscurus.**—A solitary specimen on a wall at Highcliff.

**Pupa umbilicata.**—Numerous under old bricks, Hengistbury and base of the sandhills, very variable in length, 2·3 to 3·8 mm.; Christchurch, Highcliff, [Beaulieu, Brockenhurst]. An *albino* on decaying willow trunk, Christchurch, (J.H.A.).

**Pupa marginata.**—A few round a dismantled limekiln, Hengistbury, barely maintaining themselves.

**Vertigo antivertigo.**—Frequent in damp meadows, near R. Stour, at Tuckton, and R. Avon, at Christchurch.

**V. pygmæa.**—Highcliff and Hengistbury, a few.

**V. edentula.**—Highcliff, (J.H.A.); a few among dead leaves on Hoborne Common, where I have observed it in active motion in January.

**Balea perversa.**—On a willow, in garden, Christchurch, with *C. rugosa* (J.H.A.). Have met with it nowhere else in this neighbourhood; frequent in New Forest, [Bolderwood on beech, Cadnam, (J.H.A.), Beaulieu].

**Clausilia rugosa.**—Widely diffused, Christchurch, Mudeford, Hengistbury, Hoborne, Staple Cross, Chuton, Burton, Highcliff... [Ringwood, Beaulieu].

VARIATIONS:—A shell *rugosa* only on body whorl, Chuton Glen, (J.H.A.); two, extremely pointed, *nucleus* only 0·3 mm. broad, [Holmsley]; two exquisite *albinos*, Christchurch, occurring with the white *P. umbilicata* already mentioned; from same spot a light-buff or sandy coloured shell, apparently a link between the *albino* and type.

**Cochlicopa lubrica.**—In dry sandy places, as well as damp meadows; Christchurch, (with *lubricoides*) Highcliff, Tuckton... [Holmsley, Beaulieu, Ringwood].

**Carychium minimum.**—Christchurch, Tuckton, abundant in low meadows; [Holmsley]. Shell very variable in shape.

LAND AND FRESHWATER SHELLS COLLECTED  
ABOUT NEWQUAY, CORNWALL, SEPT., 1886.

By J. H. JAMES.

**Helix aspersa.**—In hundreds, and in every hedge. The shells are of very light ground colour, and the greater number prettily banded and ‘flammulated.’

**H. aspersa var. exalbida.**—Only one small specimen found.

**H. aspersa var. undulata.**—Very few and not good specimens. One young and very characteristic example.

**H. aspersa var. — ?** Peculiarly marked and banded.

**Helix nemoralis var. libellula.**—Very common in the hedges around the town. Majority (12)345, many 00300, and a few 00000.

**H. nemoralis var. rubella.**—Plentiful, (1234)5 and 00300, but only found one 00000.

At the back of the beaches I found very many of vars. *libellula* and *rubella* (12)345 and 123(45). The shells were quite dull, the gloss having apparently been removed by the sand and spray which must have been blown on the shells when the wind was from the sea. The animals were principally found on the umbelliferous plants.

**H. nemoralis var. albolabiata.**—One specimen only.

**Helix hortensis.**—Small and pale straw-coloured; 12345 and 12(345). Not plentiful.

**H. hortensis var. lutea.**—Not plentiful; 00000.

**Helix rufescens.**—Scarce; only three or four specimens found; one abnormal.

**Helix sericea.**—Plentiful under stones at the back of beaches.

**Helix rotundata.**—Plentiful under stones at the back of beaches.

**Helix caperata.**—Plentiful in hedges around the town.

**H. caperata var. ornata.**—Fairly common; many dead, but in good condition.

- H. caperata* var. *fulva*.—Fairly common ; many dead shells in good condition.
- Helix ericetorum*.—In great abundance on the commons near the beaches. The varieties seem endless.
- Helix virgata*.—In greatest abundance everywhere ; finest specimens in common adjoining the Fistral beach.
- H. virgata* var. *albicans*.—Almost as plentiful as the type, and generally scattered with it.
- H. virgata* var. *hypoazona*.—Plentiful ; generally found with the type.
- H. virgata* variety undescribed, brown.—Plentiful, with the type.
- H. virgata* var. *leucozona*.—Not common.
- H. virgata* var. *nigrescens*.—Rare ; only six found, at the Fistral common.
- H. virgata* var. *alba*.—Very rare ; only one found, at the Fistral common.
- Zonites draparnaldi*.—Five found ; all under stones at the back of Lustigaze beach, the only place.
- Zonites glaber*.—Common and generally distributed.
- Zonites cellarius*.—Common and generally distributed.
- Bulimus acutus*.—In greatest abundance everywhere.
- B. acutus* var. *bizona*.—Almost as plentiful as the type.
- B. acutus* var. *articulatus*.—Almost as plentiful as type.
- B. acutus* var. *strigatus*.—Almost as plentiful as type.
- Clausilia rugosa*.—Only one found.
- Pupa marginata*.—A few under stones at the back of beaches.
- Arion ater* var. *atra*.—Plentiful and generally distributed.
- Arion hortensis*.—Plentiful.
- Limax agrestis*.—Plentiful.
- Amalia marginata*.—Not common ; I got two shells from two fine specimens.

CRANTOCK.

About one and a half miles to the west of Newquay. I went once.

- Helix aspersa*.—In abundance. I did not search for any other species, and the *aspersa* were just as at Newquay.

*Limnæa peregra*.—In great quantities in a little stream from the Churchtown to the beach ; very small.

*Pisidium pusillum*.—Very abundant in the same stream as *L. peregra*.

*Planorbis vortex*.—One specimen only.

ST. COLUMB PORTH.

About a mile to the east of Newquay. I went twice.

*Helix aspersa*.—As at Newquay.

*Helix nemoralis*.—A few.

*Helix virgata*.—Plentiful.

*Helix ericetorum*.—Scarce.

*Helix caperata* and varieties.—Plentiful.

*Helix rotundata*.—Common.

*Helix sericea*.—Two or three.

*Zonites crystallinus*.—Four or five only.

*Limax maximus*.—Plentiful ; shells large and thick.

*Pupa marginata*.—A few under stones in hedge.

*Succinea pfeifferi*.—Small, but plentiful in moors.

*Planorbis vortex*.—Plentiful in stream in moors.

*Planorbis albus*.—Rare, in same stream as *P. vortex*.

*Limnæa peregra*.—Plentiful, in the same stream.

*Limnæa palustris*.—Plentiful, in stream.

*Limnæa truncatula*.—Plentiful, in stream.



*Helix hortensis* monst. *sinistrorsum* and *H. aspersa* var. *exalbida* in Pembrokeshire. — Mr. C. Jefferys informs me that he has lately found in the immediate neighbourhood of Tenby, a fine reversed shell of *H. hortensis* var. *lutea*. On 24th of July he met with *H. aspersa* var. *exalbida*. Both forms are, I believe, new to the district. Mr. Jefferys remarks that the vars. *minor* and *conoidea* of *H. aspersa* are common, and *H. aculeata* is also found in some numbers, but is very local.—JNO. W. TAYLOR, August 1st, 1886.



ON THE GENUS *CUMA*.

BY THE REV. A. H. COOKE, M.A., F.Z.S.  
CURATOR IN ZOOLOGY, CAMBRIDGE.

In H. and A. Adams' 'Genera of the Mollusca,' the following are enumerated as

Species of *Cuma* (Humphr.).

<i>Africana</i> Mart.	<i>muricina</i> Blainv.
<i>carinifera</i> Lam.	<i>quadrata</i> Jonas
<i>cuspidata</i> Ad. & Rve.	<i>rugosa</i> Quoy
<i>diadema</i> Lam.	<i>sacellum</i> Chem.
<i>Grateloupiana</i> Petit	<i>tectum</i> Chem.
<i>Gravesii</i> Brod.	<i>thiarella</i> Lam.
<i>imperialis</i> Blainv.	<i>trigona</i> Lam.
<i>kiosquiformis</i> Ducl.	

Of these, *Africana*, *diadema*, *imperialis*, *thiarella*=*carinifera*; *Grateloupiana* and *trigona* are better known as *gradata* Jonas, for which I strongly suspect *quadrata* is a misprint; *cuspidata* is possibly a variety of *Purpura hippocastanum*, *Gravesii* is a *Coralliophila*, *muricina* is a *Sistrum*, *rugosa* Quoy is an error for *rugosa* Born (*rugosa* Quoy=*scobina* Quoy), which is a synonym of *sacellum* Chem.

The list, therefore, of species of *Cuma* may be re-written as follows:—

<i>carinifera</i> Lam.	<i>sacellum</i> Chem.
<i>gradata</i> Jonas	<i>tectum</i> Chem. (Wood).
<i>kiosquiformis</i> Ducl.	

Tryon, in his 'Manual of Conchology,' vol. ii., pp. 199-202, enumerates the following as *Cuma* (Humphr.):—

<i>kiosquiformis</i> Ducl.	<i>gradata</i> Jonas
<i>purpuroides</i> d'Orb.	<i>tectum</i> Wood
<i>carinifera</i> Lam.	<i>rugosa</i> Born
<i>coronata</i> Lam.	<i>muricata</i> Hinds

It is necessary to state distinctly what Tryon's views are with regard to the first new member of this list, viz. : *purpuroides* d'Orb. In vol. ii., p. 200, he writes, 'This well-known species, inhabiting the West Coast of Central and South America, is said to have a fusoid operculum ; it will therefore be described and figured in vol. iii. Conchologically, the species is very closely allied to *C. kiosquiformis* Ducl.' Referring to vol. iii., p. 109, we find '*Melongena fusiformis* Blainv. This shell is apparently very closely related to *C. kiosquiformis*, but the operculum, according to d'Orbigny, is not purpuroid. The resemblance, conchologically, is much nearer [to] *Cuma* than either [to] *Melongena* or *Siphonalia*, and I cannot help thinking that the great French naturalist was mistaken as to the operculum.'

Now, this is all a piece of guess-work, of a most unscientific kind. d'Orbigny was perfectly correct in stating that the operculum is not purpuroid. We have a specimen in the MacAndrew collection here, whose operculum, though unfortunately imperfect, is yet quite sufficiently perfect to enable one to state distinctly that the shell which possesses it is not allied to *Cuma*, or even to *Purpura*, in the remotest degree. Perfect specimens with the operculum *in situ* may be seen at the British Museum. The unguiculate form and terminal nucleus settle at once the question of its non-purpuroid relationship ; whether the affinities of the shell be in the direction of *Melongena* or *Fusus* or *Siphonalia* is another matter, which must wait for an examination of the animal, and in particular of the dentition. Conchologically, too, the difference between the two shells is very marked. The thick 'fibrous-brown' epidermis of *purpuroides* is of itself sufficient evidence that the shell which it envelopes so tightly is not a *Purpura*. Few *Purpuras* have a distinct epidermis at all, and none any that in the least degree resembles this.

It may be added that the locality given by Tryon, on Cuming's authority (St. Elena, W. Columbia), is probably in-

correct. Cuming's localities, as Dr. Gray has sufficiently shown, are not to be relied upon as establishing, but only as confirming, a question of distribution. Its range is probably confined to the second locality which Tryon gives, viz : Peru, and to North Chili.

*Cuma coronata* is placed by Tryon amongst the *Cumas*, without a word of explanation, except by saying that it resembles *kiosquiformis* in the whorls being connected across the sutures by laminae. But since this peculiarity is never stated, or supposed, to be an index of generic distinction (see below), *coronata* had better, in the absence of other evidence for removing it, stay where it has hitherto been, with the *Purpuræ*.

*Cuma muricata* is admitted on the evidence of a single specimen, dredged by Hinds at Panama in nineteen fathoms, mud. It is only natural to remark that mud at nineteen fathoms is not the usual habitat of shells of this group, and when we further learn that this single specimen is a very young shell, that it is only the wide difference of locality which prevents it being identified as *rugosa* Born (i.e. *sacellum* Chem), and that it has also been described as a *Trophon*, we need not have much compunction in not letting it disturb us further.

Thus then Tryon's list, purged of intruders, becomes exactly identical with the reformed list of H. and A. Adams.

Now let us see what are the recognised conchological distinctions, which separate these five shells, viz : *carinifera* Lam. *gradata* Jonas, *kiosquiformis* Ducl., *rugosa* Born, *tectum* Wood, under the genus *Cuma*, from the genus *Purpura*, in other words, why are the shells, or any of them, classed as *Cuma*, and not *Purpura* ?

The descriptions of *Cuma* and *Purpura*, as given in H. and A. Adams, and copied by Tryon, are—placing them for the sake of convenience in parallel columns :—

<i>Purpura</i>	<i>Cuma</i>
SHELL oblong oval, last whorl large, SPIRE short.	SHELL pyriform, SPIRE elevated, acute, whorls angular or spinose.
APERTURE ovate, large, with an oblique channel or groove at the fore part.	APERTURE oval oblong.
COLUMELLA flattened.	COLUMELLA convex, sometimes with a strong angular tooth in the middle.
OUTER LIP simple.	OUTER LIP acute, grooved internally.
OPERCULUM oblong, nucleus elongate, forming the long outer edge.	OPERCULUM ovate, blunt, nucleus elongate, forming the outer or hinder edge.

Now, it is plain that the possession of a 'pyriform' shell is not a peculiarity of *Cuma* as opposed to *Purpura*, for *Purpura armigera*, *speciosa*, and certain varieties of *hæmastoma* are as much 'pyriform' as they are 'ovate-oblong', and they have never been classified as *Cuma*. Again an 'elevated' *spire* is just as common in *Purpura* as a 'short' one, e.g. *P. scobina*, *lapillus*, *cingulata*. And many *Purpuras* have 'angular' or even 'spinose' whorls, e.g. *P. armigera*, *consul*, *hippocastanum*, *echinata*.

The *aperture* does not present, and is not described as presenting, any point of contrast.

The *outer lip* in *Purpura* is described as being 'simple', in *Cuma* as being 'acute', which I suppose is only two ways of expressing the same thing. It is stated however of *Cuma*, and is not stated of *Purpura*, that the outer lip is 'grooved internally'. But for this to be valid as a generic distinction, it would be necessary to show that no *Purpurae* were internally grooved, and a glance at *Purp. persica*, *planospira*, *hippocastanum*, and *hæmastoma* in certain cases, will dispose of the possibility of this. And, conversely, several so called *Cumas* are not always internally grooved, e.g. *carinifera*, *gradata*, and particularly *kios-*

*quiiformis*, of which latter I have many specimens without the symptom of a groove.

The *operculum* is the same in both.

There remains the *columella*, and here alone there appears any distinction which really may be taken as constituting generic difference. The 'convexity' of the *columella* in *Cuma*, as compared with its 'flatness' in *Purpura*, may be dismissed at once, for in the so-called *Cuma carinata*, *kiosquiiformis*, *rugosa*, *sacellum*, the *columella* is just as straight as in the normal *Purpura*. There remains only the sentence—'sometimes with a strong angular tooth in the middle.' If for 'sometimes' we read 'once,' the facts will be stated correctly. For, out of the five species to which we have reduced *Cuma*, *tectum* alone possesses this 'strong angular tooth.' It follows, therefore, that the remaining four, destitute as they are of what we have proved is the sole qualification for generic difference, and unable to produce any other claim to the same, must sink back into what they doubtless ought to be, viz., *Purpuras* pure and simple. *Cuma* then, is represented, really on the showing of the genus-makers themselves, by the single species *tectum*.

It is hardly correct to describe this sole peculiarity of *Cuma* as simply 'columella with a strong angular tooth in the middle.' For, if a shell of *Cuma tectum* be broken open, it will be seen that this 'tooth' is not a development of the *columella* only, not a mere sharpened callus, so to call it, but is the termination, on the *columella*, of a strong ridge which ascends the interior of all the whorls, up to the top of the spire itself. Hence its true importance; for a mere callus, confined to the *columella*, would not take equal rank as determining a genus.

Lastly, I would point out that the evidence of geographical distribution is in favour of this restriction of the genus *Cuma*. If the other four species, *carinifera*, *gradata*, *kiosquiiformis*, and *sacellum*, which I hope I have succeeded in expelling from the genus, are placed here, there is no explanation of the fact that a

gap in the distribution occurs, unbridged by the occurrence of any species. For, broadly speaking, the Malay peninsula is the metropolis of *carinifera* and *gradata*, Western tropical America of *kiosquiformis* and *tectum*. If however the genus be restricted as here proposed, we have one more well marked example of what I may call 'modified *Purpuras*,' peculiar to the *W. coast of America*. *Cuma*, *Monoceros* and *Concholepas* will then rank together, as characteristic of this coast, and of this coast only, the columellar tooth in *Cuma* being paralleled by the labial tooth in *Monoceros*.

The exact limits of the distribution of *Cuma tectum* are not known. Its metropolis appears to be Panama; where I have collected it in large numbers at low water mark, neap tides, in clefts of rocks. It does not extend northwards as far as Mazatlan; or (apparently) southwards as far as Guayaquil, and it does not occur at the Galapagos.

A word in conclusion with regard to nomenclature. The Genus *Cuma*, as constituted by Humphrey in 1797 (Mus. Calonn., p. 35, genus 60), is an *omnium gatherum* of fourteen species, from which this at most can be learned, that it includes two species of *Fasciolaria* (*tulipa* and *trapezium*) and one of *Pyrula* (*morio*). To say that Humphrey constituted the genus is perhaps to pay him too great a compliment, as his 'genera' are merely unscientific groupings of species under popular names, for sale purposes.

Swainson, in 1840 (Malac., pp. 73, 87, 307), first took the name up, making *Cuma* a subdivision of the *Pyrulinæ*, and taking as the type, and apparently as the only species, *sulcata* Swains. (= *tectum* Wood). He regarded *Cuma* as a passage between *Pyrula* and *Fusus*, giving the following description: Shell subfusiform; spire and base equal in length; inner lip with a central fold.

Gray (P. Z. S., 1847) placed *Cuma* Swains. in his section *b* of the *Muricidæ*, between *Rapana* and *Latirus*.

It follows therefore that for *Cuma* Humphr. must be substituted *Cuma* Swains., although the latter author did not correctly estimate the position of the genus.

SOME CONCHOLOGICAL  
NOTES OF A VISIT TO FIFESHIRE, N.B.

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By THOMAS SCOTT.

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(Read before the Conchological Society).

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About the end of July last year I spent part of a short holiday in Fifeshire, and while in 'Ye Kingdom' several notable and interesting places were visited,—but there are few places in Fifeshire which are not either notable or interesting,—and among others a few hours were passed at the side of Lindores' Loch.

This Loch is easily reached from Newburgh-on-Tay where there is a station of the North British Railway, though, in the present instance, I did not take advantage of this mode of locomotion.

Lindores' Loch as a famous rendezvous of the votaries of the Roaring Game, otherwise curlers, is known far and wide, and many an exciting and busy scene has been witnessed on its surface, when 'John Frost' had hardened it into a firm and crystalline pavement; and, though, in the eyes of the curler this may be its most interesting aspect, and, though, the animated and stirring scenes witnessed under such conditions cannot but be interesting even to the uninitiated, the beauty of this beautiful loch is best seen and appreciated by the naturalist on a clear sunny day in midsummer; then its surface is ornamented with numerous Water Lilies, Polygonums, Ranunculi, and other aquatic plants, round its margin rise tall grasses and sedges, while over its limpid surface snowy swans move in deliberate and stately dignity, the whole forming, when seen under favourable conditions, a picture of exquisite loveliness; and at such

times as if to add still further to the enchantment of the scene the air is filled with the hum of the busy insect life that finds food and shelter amid the luxuriant vegetation in the vicinity of the loch.

The fauna and flora of the loch and its neighbourhood is well worth the spending of a long summer's day to examine. Unfortunately at this time my visit was limited to a few hours, and to make it more unsatisfactory the weather was unpropitious, but notwithstanding this combination of unfavourable conditions a few interesting objects were secured, and among them were a number of molluscs.

The following is a list of all the species observed in and about the loch during my visit :—

**Sphærium corneum** (L.). This species is not very plentiful, nor is it so large as in some other Scotch localities.

**Pisidium nitidum** Jenyns. Of frequent occurrence.

**P. roseum** Scholtz? This form though agreeing very well with *P. roseum* as described in Dr. Jeffrey's 'British Conchology,' and which is generally known in England by this name, is not considered by some Continental Conchologists to be the *P. roseum* of Scholtz. This, though somewhat scarce, is not exactly a rare form in Lindores' Loch.

**Valvata piscinalis** (Müll.). A common species.

**Planorbis nitidus** (Müll.). Frequent.

**P. nautilus** (L.). This seems rather scarce, but that is owing perhaps, not to its actual scarcity so much, as to its being so small and easily overlooked.

**P. albus** (Müll.). Frequent.

**P. contortus** (L.). Rather common.

**Physa fontinalis** (L.). Common.

**Limnæa peregra** var. **lacustris** (Leach). Not unfrequent ; it is noteworthy that all the specimens observed belonged to this variety.



*L. auricularia* (L.). This appeared to be one of the commonest species in the loch, but the majority of the specimens were immature.

*L. palustris* (Müll.). Not unfrequent.

*Ancylus lacustris* (L.). Rather scarce.

*Succinea putris* (L.). Frequent, but mostly immature.

These were all I noticed, but if the molluscan fauna was carefully worked up, doubtless other species would be added to the list here given.

The habitat given in Jeffrey's 'British Conchology' for var. *lacustris* of *L. peregra* is 'mountain lakes' in Zetland, Scotland, Ireland, and the North of England; but Lindores' Loch has no great elevation above sea level; in this case, however, the habitat may be exceptional.

After leaving Lindores' Loch I walked to Cupar, thence to St. Andrews, Anstruther, St. Monance, Elie, Largo, and on to Markinch—famed for big cabbages and early butterflies, as well as for other marvels both animal and vegetable—where I got on board a railway carriage, and reached home within a few hours thereafter. Between St. Monance and Largo I kept by the shore, and it is a most interesting stretch of shore, geologically, botanically and otherwise; parts of it can only be traversed when the tide is out, and, even then, in some places, as at Kinraig, between Elie and Largo, it is with considerable difficulty and even danger that progress can be made, but the prospects that open out now and again as one scrambles along far more than repays all the toil.

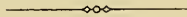
On the sandy links to the east of Elie, *Helix nemoralis* L. was exceedingly abundant, the majority of the shells being unicoloured, of all shades from almost white to yellow, brown, and nearly black, but the lighter shades were the most common, *H. ericetorum* Müll. was also of frequent occurrence as well as the variety *alba* Charp. of the same species.

*H. nemoralis* is also common in and about Cupar, Darsie, and other inland places, but the shells seem to me to be of a heavier build and there are fewer unicoloured varieties; near Cupar also, I noticed *Limax maximus* L., there were two or three specimens, and they were all banded longitudinally, the bands being alternately dark and light coloured; *Zonites cellarius* (Müll.) and *Pupa umbilicata* Drap. were also noticed in the same neighbourhood.

In the vicinity of the railway station at Burntisland I observed a few specimens of *Helix aspersa* Müll. It did not seem that their life-work was carried on under very favourable conditions, if one could safely judge by their appearance, for they were rather stunted in growth and their shells were sadly eroded and blackened from the frequent smoke-baths to which they were subjected by the incessant coming and going of railway engines, and possibly the sooty grass they had to live on was not good for their health; they had such a dilapidated appearance that one felt inclined to gather them all into the vasculum and transfer them to some dewy hedgerow where they would have pure air and clean grass.

A few specimens of *H. aspersa* which I brought with me from Burntisland measured on an average about  $1\frac{1}{6}$  inch in height and  $1\frac{1}{4}$  inch in greatest breadth.

During my visit I had very little time to spare for conchological work, which will explain why so few species are here recorded. Perhaps during another visit the molluscs will be more attended to.



**Pisidium roseum and Vertigo antivertigo in East Kent.**—Yesterday I found *Pisidium roseum* and *Vertigo antivertigo*, associated with other species already recorded, at Minster, near Sandwich. I am not aware that these two species have been found in any other Kentish locality.—SYDNEY C. COCKERELL, March 15th, 1887.

COLLECTING MOLLUSCA IN THE  
CELTIC REGION (ON THE COAST OF FRANCE),  
NEAR BREST.

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IN the 'Journal de Conchyliologie' for April, 1885, Dr. F. Daniel has a pleasant article in which he offers very useful advice from an experienced naturalist to collectors on the sea shore. After dismissing for the occasion the use of the dredge, partly on account of the amount of apparatus, and partly because of the jealousy of fishermen, who don't show their favourite places to strangers, and of the 'obstructiveness of the fishery officials', Dr. D. details skilfully the search amongst weeds on rock and sand, especially near low water, and under stones, and in the sand and mud.

He recommends search on the shore on any coast at high and low water, from the end of autumn to the beginning of May. The sand molluscs burrow less deeply and the weed-eating mollusca come up after January to feed on the young weed and to lay their eggs;—many species coming especially amongst *Zostera*. At this season the bank of St. Marc at Brest is often strewn with *Acera*, *Bulla*, and *Aplysia*. *Pleurobranchus* occurs in occasional seasons. On the sands, particularly in the early spring when the *Zostera* begins to grow, *Scalaria* is to be found burrowing or creeping, also *Dentalium*, *Natica alderi*, and *Pandora*, while by sweeping this weed before the tide has left it, many small *Trochus* and *Rissoa* may be taken. So also *Lacuna*, *Phasianella*, and *Cerithium*, especially in the cooler months.

It is better to follow the retreating tide than to meet it as it rises, *i.e.*, to catch specimens before they have secreted themselves. Where the rocks at low water are overgrown with weed, collect the bushy masses and shake them over a cloth, or better, in a pot of fresh water at home, for many small species.

On the coast of Brittany there appears to be a more systematic shore hunt for crabs, etc., than with us. Dr. D. suggests as a fruitful plan for collectors, to follow the hunters and search the large stones and slabs of rock overturned, for *Haliotis*, *Fissurella*, *Patella*, *Lottia*, *Emarginula*, *Pleurobranchus* (*plumula*), *Galeomma*, and *Murex*. The so-called roots of *Laminaria* and bunches of *Corallina* and of the horny Zoophytal growths are to be minutely searched for *Patella pellucida*, *Odostomia*, and *Chemnitzia*, and for *Kellia*, and other small bivalves; also large *Echinus* and *Asterias* for *Stylifer* and *Montacuta*.

The September and March equinoctial tides are particularly productive, as the commotion and the great recess and advance of the waves send up on the beach many species not otherwise easily met with.

A search amongst the shell fish brought up to market is often fruitful. *Avicula*, *Pectens*, *Capulus*, *Fissurella*, and *Emarginula* may be looked for amongst Oysters and scallops; and sometimes a *Pinna* or a *Triton* may turn up. The stomachs of fish often yield specimens of deepwater shells rarely procurable. 'The Wrasse devours *Lottia*.' Codfish and haddock are great collectors.

Particular localities for exploration are the following:—The entire circumferences of the roadstead of Brest, especially on the N.W. from Kerhuon to the narrow entrance of the harbour, particularly the surroundings of the port, and under the fortifications of Brest; below the castle at Postrein and the ancient polygon; at Lanninon; the new pier heads of the commercial port; the piers of St. Marc, called Tristchler; the sand bank of St. Marc and Moulin Blanc; the creeks of the same name and of St. Barbe; the rocks surrounding the N.W. entrance to the harbour on the south coast; the sand bank of St. Jean; the coast of Plougastel; the bay of Poulmic; Fret; the coast of L' Ile Longue, opposite Quelern, in the direction of Châteaulin; the environs of Landivennec

and the entrance to the river Faou. Beyond the roadstead of Brest :—Camaret ; the bay of Toulinguet ; the bay of Dinant ; the strands of Morgat and of Crozon, which form part of the Bay of Douarnenez ; the island Laber ; the beach of Grèves ; then, in the direction of Quimper, the bay of Audierne and the Isle of Tudy. In the direction of the Channel : Label, Ildul ; Paimpol, Argenton ; the bay of Goulven ; Plouescat, and l'île Vierge, near Laber Varch ; further still Roscof, Isle of Baty, and the mouth of the river at Morlaix.

It may here be of interest to notice the local names given by the inhabitants, fishermen, and even the children, playing on the shore, to the different molluscs which they commonly pick up. One can thus know the whereabouts of these molluscs more easily, and get the fishermen and children to help in seeking for them.

The following are the most common :—

<i>Pholas</i> ... ..	... Bonne-Sœur religieuse.
<i>Teredo</i> ... ..	... Percebois Tariere.
<i>Solen</i> ... ..	... Pied de couteau.
<i>Lutraria</i> ... ..	... Pied de sabot.
<i>Venus verrucosa</i> ...	... Preire.
<i>Tapes</i> ... ..	... Palourde.
<i>Cardium</i> ... ..	... Coques.
<i>Pecten maximus</i> ...	... Coquille de St. Jacques.
<i>Pecten varius</i> ...	... Pétoncle.
<i>Pecten opercularis</i>	... Pétoncle.
<i>Littorina littoralis</i>	... Vignon, Bigorne.
<i>Trochus magus</i> ...	... Bigorne de chien.
<i>Buccinum undatum</i>	... La grande Bigorne.
<i>Patella</i> ... ..	... Brenique.
<i>Haliotis</i> ... ..	... Ormeau.
<i>Pinna</i> ... ..	... Jambonneau.
<i>Sepia</i> ... ..	... Morgatte.
<i>Loligo</i> ... ..	... Encornet.
<i>Octopus</i> ... ..	... Chat de Mer, Pieuvre.
<i>Aplysia</i> ... ..	... Lièvre de mer or Vache de mer.

## NOTES ON THE LIMNÆIDÆ.

*Limnæa peregra* var. *Burnetti* (Alder).

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 BY WILLIAM NELSON.
 

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*Limnæa Burnettii* (Alder) Ann. and Mag. Nat. Hist., 1848.

*Limnæus Burnettii*, Forbes and Hanley, Brit. Moll., vol. iv., 1854.

*Limnæa peregra* var. *Burnetti* (Jeffreys) Brit. Con., vol. i., 1862.

Shell large, ovate, globular, rather solid; dull, of a dark horn colour; finely and rather deeply striate in the lines of growth; whorls 5-6; apex intorted; the two apical whorls are quite sunk below the third one, after which they begin to fall away from the plane of convolution, giving to the shell an appearance of a spire; the body whorl is very large and rounded; the inner lip is reflected on the columella, which is not much twisted, and forms a subumbilicus; the suture is moderately deep. Length 19 mill., breadth 18 mill.

This shell was first described as a species by Mr. J. Alder in the 'Annals and Magazine of Natural History' in 1848. It was discovered by Mr. Burnett in the stomach of trout caught in Loch Skene, Dumfriesshire; afterwards living specimens were obtained from that wild, secluded, and lonely locality, from which this most able of British conchologists drew his diagnosis. The young shell has somewhat the appearance of *Limnæa involuta*, but is darker in colour, more solid and globular. The mature shells are usually much eroded, and has, as Mr. Alder happily describes it, somewhat the appearance of a *Nerita*.

The only additional locality that has been recorded is Llyn-y-van-fach, Carmarthen, Wales. I have, through the kindness of Mr. J. W. Taylor, had an opportunity of examining specimens from the Welsh locality, and, though I think they may perhaps be referred to this variety, they are by no means so characteristic, and would, I think, point to a shorter period of isolation than those from the original locality.

LAND SHELLS  
OF ILFRACOMBE AND NEIGHBOURHOOD.

By J. R. B. TOMLIN.

THE following list is the result of intermittent collecting from March 17th to 31st, by Mrs. McKenny Hughes, Miss Alford, and myself, during a geological expedition. The ground explored may be included in a radius of about eight miles from Ilfracombe. Geologically this area belongs to the Middle Devonian group, passing into the Upper Devonian near Braunton, which was the southern limit of our investigations. On the east we did not get beyond the 'great Hangman.' Most noticeable is the hillside at Hele (two miles to the east of Ilfracombe), where white vars. of *Arion hortensis*, *Hyalina cellaria*, and *Helix rotundata* all occurred.

*Limnæa peregra* (Müll.). At Lee only.

*Ancylus fluviatilis* Müll. In all fast streams.

*Arion ater* (L.). Not common; the black and brown forms noticed.

*A. hortensis* Fér. Abundant everywhere; two albinos at Hele.

*Amalia marginata* (Müll.). Common on east side of Hele Bay.

*Limax maximus* L. Very seldom seen; at Combe Martin and Challacombe.

*L. agrestis* L. Ubiquitous.

*Testacella haliotide* Drap. At Hele Bay—four live specimens and one shell—under stones, deeply buried in the ground. The animals were small and light-coloured.

*Vitrina pellucida* Müll. Dead shells everywhere; alive at Watermouth, Hele, Combe Martin, Widmouth, etc.

*Hyalina cellaria* (Müll.). Common everywhere—finest at Hele.

*H. cellaria* var. *albinos* Moq. Some lovely specimens with the *Testacellæ*.

- H. alliaris* (Miller). Sparingly at Hele, Combe Martin, and Bittadon.
- H. nitidula* (Drap.). Equally common with *H. cellaria*.
- H. crystallina* (Müll.). Only at Hele and Widmouth Cove.
- H. pura* (Alder). At Hele and Combe Martin.
- Helix aculeata* Müll. One specimen at Woollacombe and two at Hele Bay.
- H. aspersa* Müll. A most abundant species in this district, especially in the stone walls, and generally much weathered.
- H. nemoralis* L. Not uncommon on the Combe Martin road, after rain ; dead shells everywhere.
- H. nemoralis* var. *libellula* Risso. 12345, 00300, 00000.
- H. nemoralis* var. *rubella* Moq. 12345, 00300, 00000.
- H. nemoralis* var. *castanea* Moq. A single immature shell, 00000.
- H. hortensis* Müll. With *H. nemoralis*, and more plentiful.
- H. hortensis* var. *lutea* Moq. 12345, 00000.
- H. rufescens* Penn. Not plentiful ; found at Ilfracombe, Hele, Watermouth, etc.
- H. rufescens* var. *alba* Moq. On the Combe Martin road.
- H. concinna* Jeff. On east side of Hele Bay.
- H. hispida* L. Sparingly but widely distributed.
- H. hispida* var. *albida* Jeff. A single adult on the Combe Martin road.
- H. sericea* Müll. Decidedly rare ; it occurred at Widmouth Cove, Hele, and elsewhere.
- H. fusca* Mont. One live and one dead shell under stones in Combe Martin village.
- H. virgata* Da Costa. Swarming on Braunton burrows, but mostly dead. Equally common on the slopes of the 'Little Hangman,' but nearly all alive and adult. A scalariform monstrosity occurred at Braunton. Also found at Morthoe and Woollacombe.
- H. virgata* var. *hypozona* Moq. 'Little Hangman.'
- H. virgata* var. *albicans* Grat. 'Little Hangman.'



- H. virgata** var. *subalbida* (Poiret). 'Little Hangman.'
- H. caperata** Mont. Ubiquitous; finest on the 'Hangman.'
- H. caperata** var. *ornata* Pic. At Combe Martin.
- H. rotundata** Müll. Very common everywhere; and of extremely fine size.
- H. rotundata** var. *alba* Moq. In marvellous abundance in a dell on the cliff to the east of Hele Bay. Amongst several hundred specimens we observed only three or four of the type. Elsewhere the variety never occurred.
- H. pulchella** Müll. Occurred only twice on the cliffs between Ilfracombe and Lee (the 'Torr's Walk').
- Bulimus acutus** (Müll.). Plentiful on the sandhills in Morte Bay.
- B. obscurus** (Müll.). Common in hedgerows on the road to Combe Martin. Also plentiful in the Hele Bay locality.
- Pupa umbilicata** Drap. Ubiquitous and generally very fine indeed.
- Balea perversa** (L.). A single live specimen in a copse south of Bittadon, on slate.
- Clausilia rugosa** (Drap.). Plentiful everywhere.
- C. rugosa** var. *tumidula* Jeff. A swollen and stumpy form, corresponding to this variety, occurred near the sea.
- Cochlicopa lubrica** (Müll.). Not common; at Combe Martin, Hele, and Ilfracombe.
- Carychium minimum** Müll. Plentiful with *H. rotundata* var. *alba*.
- Cyclostoma elegans** (Müll.). Also common in the Hele locality. Not found elsewhere. Most of the specimens were of a dark purplish colour.

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**Clausilia rugosa** var. *gracilior* at Clapham, Yorks.

—I can add this variety to Mr. Hugh Richardson's list of the 'Mollusca of the Neighbourhood of Clapham,' published in the April No. of this Journal, 1886; specimens of which I found in August, 1884, not far from Clapham Church.—C. H. PIERSON.

## CONTRIBUTION TOWARDS

## A LIST OF THE SHELLS OF MERIONETH.

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 BY THOS. RUDDY, of Palé, Corwen.
 

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*Sphærium lacustre*.—Plentiful in ponds and ditches.

*Pisidium fontinale*.—Most abundant and general in ditches, ponds, &c.

*Unio margaritifer*.—Plentiful in the river Dee. I have seen colonies of fifty to sixty together. All the shells are eroded at the hinge.

*Planorbis nautilus*.—Llyn-y-Gwernen, near Dolgelly.

*P. nautilus* var. *cristata*.—With *P. nautilus*.

Llyn-y-Gwernen is a small lake two miles from Dolgelly, on the road to Cader Idris. It is mostly overgrown with water plants. The climate is mild at Dolgelly.

*P. spirorbis*.—Llyn-y-Gwernen, near Dolgelly, and Llyn-Creini, near Bala. The latter is a cold moorland lake.

*Physa fontinalis*.—Llyn-y-Gwernen, Dolgelly.

*Limnæa peregra*.—Abundant in pools, lakes, and ditches. I have seen it in a lake at Cader Idris, at an altitude of about 1,500 feet.

*L. truncatula*.—Common in ditches.

*L. glabra*.—Boggy ditches near Llanderfel.

*Ancylus fluviatilis*.—Abundant and general in the river Dee and in mountain streams.—I have seen it at an altitude of about 1,000 feet.

*Succinea elegans*.—I picked up one specimen of this in a field near Bala. I kept it in a little box from the middle of April until the middle of July, in a full sun exposure; and, on opening the box at the end of the three months, the creature crawled about quite lively.

*Vitrina pellucida*.—Common and general.

*Zonites cellarius*.—Very common and general.

*Z. crystallinus*.—Plentiful and general.

- Helix aspersa.**—Very rare inland, but is very abundant on the sea coast near Barmouth and Towyn.
- H. nemoralis.**—General and plentiful.
- H. nemoralis var. hortensis.**—About Llanderfel.
- H. arbustorum.**—Hedge roots near Llanderfel, but does not seem to be either general or plentiful. This species is a very recent find, but I traced it along two hedges for about half-a-mile.
- H. caperata.**—General and plentiful.
- H. ericetorum.**—On the Carboniferous limestone rocks at Trevor, near Llangollen, which is a little beyond the boundary of Merioneth, but I have not seen any in this county.
- H. hispida.**—General and plentiful.
- H. rotundata.**—Very general and plentiful.
- Bulimus obscurus.**—On the Carboniferous limestone rocks at Trevor, near Llangollen, a little beyond the boundary of Merioneth; I have not seen any in this county.
- Pupa marginata.**—About Llanderfel.
- P. umblicata.**—With *P. marginata*. About Llanderfel.
- Balea perversa.**—In old walls about the village of Llanderfel, near Bala.
- Clausilia rugosa.**—Found about Llanderfel, but is very plentiful along the out-crops of the Bala limestone (Lower Silurian) in several places in the county.
- Cochlicopa lubrica.**—Plentiful between Bala and Corwen.
- Cyclostoma elegans.**—On the Carboniferous limestone rocks at Trevor, near Llangollen, beyond the Merioneth boundary; not yet found in this county.



**Physa fontinalis var. albina** at Farington, South Lancashire.—On March 4th, I found two specimens of *Physa fontinalis* v. *albina* at Farington.—W. H. HEATHCOTE, March 28th, 1887.

## ON SOME NEW BRITISH SHELLS.

BY J. T. MARSHALL.

*Terebratula papillosa*, Marshall. Pl. I, figs. 1—3.

IN August last Mr. B. Sturges Dodd submitted for my opinion a minute brachiopod he had recently found at Skegness on the Lincolnshire coast, during a visit there of the Nottingham Naturalists' Society. It was a small species, about three-quarters of a line in length and half a line in breadth, shaped as *Terebratula caput-serpentis*, but having wider interstices between the ribs, with rather prominent tubercular prominences. I could not identify it with any European species, and expected it to be the young of an exotic brachiopod, probably imported with ballast. I advised him therefore to send it to Mr. Edgar Smith, who might be able to identify it as the young of some foreign species in the British Museum, and Mr. Smith returned the specimen with the following note:—

“I have been unable to identify it with any species in the Museum collection. The prickly sculpture is very peculiar, and of very unfrequent occurrence in *Terebratula*. A small form with somewhat similar ornamentation was described by Jeffreys from the ‘Porcupine’ dredgings. He called it *T. tuberata*.”

He advised Mr. Dodd to send it to the Rev. Merle Norman, who replied:—

“There is only one European species that it at all resembles, and that is *Terebratula tuberata*, Jeffreys. I have never seen that species, but your specimen is very close to his figure, except that it does not show the scaly striation of the surface, but that in a larger specimen might result from the breaking down of the spines. But *T. tuberata* is only known in from 300 to 800 fathoms, and the question remains not only

what your shell is, but how it got where it was found. . . . The specimen does not look like a fossil washed out of the cliff."

At my suggestion Mr. Dodd then sent it to the Rev. Boog Watson in a registered letter, whence, owing to a wrong address, it was returned in a fragmentary condition, having been opened by the Post Office officials and tampered with. They had removed it from the card on which it was mounted, broken it in pieces, and marked on the outside "No Value"! On a close examination of the interior of the box, however, nearly the whole of the lower valve was found intact, and this was sent to the Rev. Boog Watson, for his opinion, who replied:—

"I regret to see that a previous difficulty about the address has resulted in sore damage. Of course, from such a fragment not much can be made out. Mr. Smith's suggestion was a happy shot, but I have no doubt it is not *Terebratula tuberata*. The ribs in your shell are much wider apart, the hollows much deeper, and the concentric cross bars very much finer and more irregular. That I infer from his figure, for if I have ever seen his species I have certainly nothing but the vaguest impression of it. The Jurassic *Rhynchonella spinosa*, Schlot., presents some interesting points of resemblance in the spines. In regard to the place of origin of the shell, I may mention, as bearing on the improbabilities of a deep-sea brachiopod turning up on our coasts, that I once dredged a single worn valve of a deep-water Brazilian brachiopod at Madeira."

Finally, Mr. Wilson, curator of the Bristol Museum, who knows the coast of Lincolnshire well, stated that "he could not accept the ballast theory, as Skegness is not a place where ballast is discharged, and the chances must be enormously against the tiny shell being an exotic."

The fragments were then returned to me, and I was endeavouring to make a drawing of the perfect shell from the fragments, when a note from Mr. Dodd announced the discovery by him of another perfect specimen,—this time from

Sutton-on-the-Sea, fifteen miles from Skegness—a very gratifying discovery, not only as simplifying the drawing and detailed description, but as tending to emphasize the evidence of its British origin. He at once sent it to me, and the following description is taken from this second and perfect specimen:—

Shell, upper valve ovately triangular, lower valve squarish, both rather convex in the middle; it is solid for its size, semi-transparent, and slightly lustrous; sculpture, longitudinal fine and rounded ribs, which are eleven in number on the upper valve and twelve on the lower, they radiate from the beak to the margin, and are separated by interstices nearly equally as broad, they are surmounted with tubercles, varying from six on the side to eight or nine on the centre ribs, and disappear towards the beak, the tubercles becoming more raised and pointed towards the margins; when examined with a Coddington lens the whole of the surface appears crowded with microscopical points, being the termination of the tubular perforations characteristic of the genus; colour glassy white; margins rounded and scalloped by the ribs, slightly flexuous in front; beak and auricles very prominent, the latter rather pointed; foramen or byssal passage large, nearly round; deltidium (or triangular space below the beak) broad and concave. Length 0·06; breadth 0·04.

The hinge-plate and teeth are omitted for the present, as the valves would not easily open and I was averse to using pressure.

Although *T. tuberala*, Jeffreys, with which I have compared it, may be considered its nearest ally, it differs in several essential respects from the species now under notice. *T. tuberala* has no interstices between the ribs, and the latter are crowded with cross bars, while *T. papillosa* has short and blunt tubercles with spaces between, the sculpture resembling *Cardium papillosum*. *T. tuberala*, again, is opaque and lustreless, while *T. papillosa* is crystalline white and semi-transparent. Lastly, *T. papillosa* is more triangular in shape.

The figures have been admirably drawn by Chas. T. Musson, Esq., F.L.S., and lithographed by Messrs. Taylor Brothers, and leaves nothing to be desired as a faithful reproduction. It is also figured in Sowerby's new edition of the "Illustrated Index of British Shells," published this month.

I am afraid its probable size cannot be satisfactorily determined until more specimens are found. Both shells, though dead, were quite fresh, as much so as if just vacated by their tenants. The home, also, of the species must at present remain doubtful; it is probably in deep water, though not necessarily. *Argiope capsula* was very rare until a few years ago, when my friend Mr. Duprey found it comparatively abundant at Jersey, under stones between tide-marks; and *T. caput-serpentis*, which is quite common in many parts of Scotland, was unknown as British until a stray example was brought up on the anchor of a vessel in Loch Broom, which led the late Dr. Jeffreys to get his first dredge made and undertake a search for it, when he was rewarded with hundreds of specimens. It is therefore natural to hope and expect that more specimens may be found of this interesting little shell, as the brachiopoda are a gregarious family.

Perhaps its non-discovery hitherto may be owing to the Lincolnshire coast not being a promising one for naturalists. Beyond a few hauls of the dredge from the Lynn Deep, which I examined about twelve years ago, I do not know of any dredgings having been undertaken on this part of the British coast. The character of the sea-bed is that of a submerged forest deposit for many fathoms, with a peaty soil, much burrowed by *Pholas*, and so far not conducive to Brachiopoda, which are usually found on rocky and stony ground. A vast quantity of Hydrozoa (*Sertulariidae*=*zoophytes*) together with the sandy cases of annelides and other rejectamenta, are thrown up after storms, which are sometimes very severe, exposed as the coast is to the full fury of the North Sea.

Mr. B. Sturges Dodd is to be congratulated on his keenness and enthusiasm in adding this minute species to the British fauna, a preliminary notice of which appeared in the "Nottinghamshire Weekly Express" at the time of discovery, and a short paper on which was read before the Nottingham Naturalists' Society at their meeting of December 14th last.

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### *Scalaria pseudoscalaris*, Broc. Pl. I, fig. 4.

Another species that may now be considered conclusively established as British is *Scalaria pseudoscalaris*, Broc., as six specimens have been found in recent years from three widely different localities—Scilly, North Devon, and Kent. Miss Fairbrass, of Faversham, an old and trustworthy correspondent, is the discoverer of all six specimens, three of which were found at Pegwell Bay in Kent, one at Ilfracombe, and two at Scilly. In all three cases they were found on the shore with our common *S. communis*.

It is only quite recently that Miss Fairbrass submitted them to me, although they have been in her possession and noted as distinct for some time. She wrote to me :—" I picked up these *Scalaria* at Pegwell Bay and I placed them with the *S. communis* I also found there, but always thought them very different, and hoped for an opportunity of sending them to a conchologist who could inform me if they were distinct." I may add that she is always very particular as to her localities, her shells as she collects them being entered and numbered in books. It is a shell not easily recognisable from our *S. communis*, except to one acquainted with the European species, especially after being rolled on the beach. The differences are slight except in one important particular—the last whorl is encircled at the base by a prominent white ridge, giving the appearance of an additional whorl having been broken off at that part.



Pegwell Bay, again, is a part of our coast not very accessible nor very inviting to collectors, and was perhaps unvisited by a conchologist until Miss Fairbrass went there. She describes it as "a desolate place, without a house near the shore, and some of the 'Preventives' live in shelters made out of old vessels, with a boat attached to enable them to get inland in the winter when the marshes are overflown."

None of the specimens are quite adult; three are half-grown, and the others about two-thirds. Those from Scilly are freshest and quite perfect. I should not have been surprised had this species been found at Scilly or even at Ilfracombe, but the Pegwell locality is more remarkable, and one of the last places where I should expect this shell to occur. The nearest extra-British habitat recorded for this species is in the laminarian zone at Morbihan, on the coast of Brittany. The following is a detailed description:—

Shell of a conical shape, rather thin, opaque, and somewhat glossy; sculpture, slightly curved longitudinal ridges, which are arranged in continuous oblique rows, crossing the suture; these ridges are thin at their edges in fresh specimens, and are usually nine in number on the last four whorls, and one less on the upper four; the first three or four whorls are smooth; there is also a ridge encircling the last whorl, which is more or less flattened, and is crossed by the longitudinal ridges; it commences at the upper angle of the mouth and ends at the lower angle; between the ribs are microscopic lines only; colour milk white, more or less tinged with the animal in fresh specimens; spire tapering to a fine point; whorls 12-13, convex, gradually enlarging; suture very deep; mouth nearly round, angulated above and below; outer lip encircled and thickened by the last-formed ridge; inner lip very broad and solid, especially at the base; umbilicus none. Length 1·3; breadth 0·5.

From *S. communis* it differs in being generally more wide at the base, not so solid, in the ridges being finer and more raised, and especially in the transverse rib encircling the last whorl. Jeffreys, in "British Conchology," vol. iv., p. 98, says that "Miss Lavars picked up a specimen in Porthcurnow Cove, near the Land's End, with other *Scalariæ*. . . . Its nearest ally is *S. communis*. . . . This species may be British." I have seen this specimen, which was found many years ago, and which has hitherto remained unique as British. Probably the shell may have been overlooked as a worn *S. communis*, and more specimens may come to light if collectors will look over their stock and compare them with my description. I shall be pleased to verify any doubtful specimens that may be sent me. A figure of the shell is given in the additional plates to Jeffreys' "British Conchology," and also in Sowerby's "Illustrated Index of British Shells," a new edition of which is just published.

*Scalaria grænlandica* is also encircled by a keel at the base, but is easily distinguished from *S. pseudoscalaris* by the strong and conspicuous spiral striæ between the ridges.

Sevenoaks, Torquay,  
March, 1887.

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**Colonizing Land and Freshwater Shells in East Sutherland.**—Some of my colonies near Brora are doing well. *Helix virgata* and *Bulimus acutus*, from Llandudno, are now in hundreds stretching north from mouth of Brora river for upwards of half-a-mile. *Clausilia parvula*, from Normandy, seems also to hold its ground. I had a few of several others—*H. pisana*, *H. cantiana*, and *H. rufescens*—some of which survived last winter, and may hold their ground. *Clausilia laminata* also holds on as yet. *Cyclostoma elegans* also may be alive, as I put them in some rockwork among the roots of ferns. *Limnæa stagnalis* seem to have been picked by birds, as I cannot find any trace of them as yet.—WILLIAM BAILLIE.

ON THE POSITION OF THE OPERCULUM IN  
*CONCHOLEPAS PERUVIANUS*, Lam.

BY THE REV. A. H. COOKE, M.A., F.Z.S.

Curator in Zoology, Museum of Zoology and Comparative Anatomy, Cambridge.

SOME 'living' specimens of this fine shell having recently come into my hands, the position of the operculum at once struck me as being very remarkable, and I am not aware that it has hitherto been noticed. Küster, in his Monograph of the Purpuridæ in Martini and Chemnitz, 'Conchylien Cabinet,' 1858, Taf. A., f. 3, gives a figure of the animal in motion, and so do H. and A. Adams, 'Genera of the Mollusca,' vol. iii., pl. xiv., fig. 2. Both these illustrations are copied from Kiener, Monograph of Purpura,' pl. 23, fig. 65, and represent the animal in colours whose brilliancy is wholly imaginary. The operculum is represented, no doubt rightly, in the ordinary position on a Purpura in motion.

The accompanying sketch ('Journ. of Conch.,' April, 1887, pl. i., fig. 5) is an attempt to represent the animal in a state of quiescence, as seen from the under side. Almost all that presents itself is a very broad tough fleshy foot, standing out from the mantle quite as much as the foot of an ordinary Patella. The tentacles are small, almost hidden under the front edge of the foot, while the proboscis works up and down in the shallow groove of the canal. The mouth is almost equal in length to the whole length of the shell.

The operculum differs from most opercula which are too small to cover the mouth, for it makes no attempt to cover it at all. In the Strombidæ and the Conidæ the operculum by no means fits the mouth, but it covers part of it, and lies in the same plane. But in *Concholepas* the operculum lies across the mouth, in a plane at right angles with its length,\* and thus assumes an entirely abnormal position.

\* The sketch shows a little too much of the surface of the operculum; it should lie more edgewise.

It would be interesting to trace the steps by which so remarkable a genus as *Concholepas* became derived from *Purpura*, and by which the operculum, as the mouth grew in size, gradually gave up the attempt to cover it. In the only other Purpuroid which, for size of mouth relative to the whole shell, bears any comparison to *Concholepas*, viz., *Monoceros muricatum*, the operculum is very large and of the normal type, covering the entire mouth. I collected a few living specimens of this rare shell at Panama, in 1879, at extreme low water mark of an unusually low spring-tide.

The present position of the operculum of *Concholepas* would seem to be, in a certain sense, protective. The animal feeds on *Mytilus edulis*, which, with *M. Magellanicus*, abounds on the Chilian coasts. In order to enable the proboscis to work with most effect, viz., more or less at right angles to the bivalve attacked, the hinder (or spire) end of the shell must be slightly elevated. When this is done, the operculum forms a sort of fence or barricade, covering the soft parts which would otherwise be exposed.



## LAND SHELLS OF GIBRALTAR.

By J. H. PONSONBY.

At page 1. of vol. iv. of this Journal will be found a list, published by Dr. Kobelt in 1883, of the land shells of Gibraltar. This was supplemented by a further list, published in 1885 (see page 226, vol. iv., of this Journal), in which the number of species was brought up to twenty-seven.

A recent visit to the Rock has enabled the following additions and alterations to be made, and even now it would not be safe to predict that the subject is by any means exhausted :—

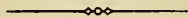
28. *Pupa cylindracea* Da Costa,

which we are now told is an older and better name than the familiar *umbilicata* Dp. No doubt the former is an older name, but whether it is therefore, like wine in bottle, any better than it was when Jeffreys rejected it, must be settled by more competent judges.

29. *Testacella* — ?

There can be no question that a species of this genus inhabits Gibraltar. Some two or three years ago two specimens were found there by an English clergyman. The shell of one of these specimens is now in the collection of Mr. Dautez, an indefatigable naturalist, who resides at Gibraltar. The other may still be in the original collector's hands. This year again a single specimen turned up in damp grass interspersed with stones, but was most unfortunately lost before it had been examined. Mr. Dautez states that the *Testacella* is to be found among the rocks above the Moorish Castle, and it is to be hoped that some one will be able to verify this assertion before long.

This year also a number of *Hyalinia* of the *Vitrea* group were collected, and these have been, as were the former specimens, submitted to Dr. Boettger, of Frankfort. He has now satisfied himself that the shell which he had before considered to be *H. Botterii* Pfr. is really the *H. eustilba* Bgt., which, it may be added, has also been found at Tangier, on the opposite African coast.



**Additions to the 'Mollusca of Clapham.'**—In looking over my collection I find I have taken at various times the following species not enumerated in Mr. Richardson's list:—*Helix concinna* Jeff., foot of Ingleborough, *Pisidium pusillum*, *Planorbis vortex*, *Physa hypnorum*, and *Limnæa glabra* in a pond on Clapham Common, and *Limnæa truncatula* in a brook near Clapham Station and on Ingleborough.—W. E. COLLINGE.

## MARINE MOLLUSCA OF LYME REGIS.

By J. W. CUNDALL.

(Read before the Conchological Society).

The ancient little town of Lyme Regis is situated at the western extremity of Dorsetshire, and is immediately contiguous to Devon. It is a picturesque primitive place, and may be made the scene of a pleasant, if quiet, holiday. The beach is sandy, but the most careful search fails to reward the conchologist with any extensive or very special results. At low water numerous low-lying, weed-covered rocks are revealed, but these are singularly destitute of littoral molluscan life. They are to a great extent composed of the soft blue lias of the neighbourhood, and are burrowed in all directions by 'rock-borers,' fine and typical examples of which abound, belonging to the three following species :—

**Pholas dactylus****Saxicava rugosa****Pholas candida**

Upon the rocks a few common species may be obtained, these consist of

**Chiton fascicularis****Patella vulgata****Littorina littorea****Patella athletica****Littorina littoralis****Trochus umbilicatus****Littorina rudis**

The place is, however, a great resort of lobster smacks, and the empty pots, in considerable numbers, are frequently deposited on the 'Cobb.' These generally well repay examination, and from them the following additional species were procured :—

**Nassa reticulata****Turritella communis****Nassa incrassata****Murex erinaceus****Trochus cinerareus****Cypræa Europa****Trochus ziziphinus****Puncturella Noachina****Phasianella pullus**

But the best results accrued from a trip in a trawler one bright, breezy morning; the wind was fresh, and kept up a heavy 'lop,' but fortunately we were good sailors and felt no inconvenience from the lively motion. Mackerel fishing on the way out to the trawling ground, some dozen miles from Lyme, proved an agreeable recreation, and the hauling of some fifty or sixty lobster pots also added to the pleasures of the trip, but when at length, after being down some hours, the trawl was hauled aboard and our deck became<sup>r</sup> covered with soles, brill, skate, dabs, dogfish, *cum multum aliis*, with great spider crabs (*Maia squinado*), hermit crabs (*Pagurus Bernhardus*), and numerous examples of *Hyas coarctatus*, &c., moving in all directions, the mind became embarrassed with the richness and variety of the spoil from the bottom of the sea. In addition to its other contents the following mollusca were brought on deck :—

Loligo vulgaris	Anomia ephippium
Sepia officinalis	Lucinopsis undata
Aplysia hybrida	Venus striata
Cyprina islandica	Mactra subtruncata
Buccinum undatum	Tapes virginea
Pecten opercularis	Psammobia ferroensis
Trochus ziziphinus var. Lyonsii	

By the time we had overhauled our spoil the sun had set and we were still far from our harbour, before we reached it darkness had set in, and a bright path of phosphorescent light was left in our wake. It appears from the foregoing that we succeeded in enumerating but very few species of the Lyme mollusca.

As regards the Land and Freshwater Shells, we did not devote much attention to their collection, and as the few occasions on which a diligent search was made only resulted in the discovery of a few of our commonest kinds, we were not induced to further extend our investigations in their direction.

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## MOLLUSCA OF MERIONETHSHIRE.

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 By F. G. FENN.
 

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(Read before the Conchological Society).

The following is a list of land shells collected during a short stay at Bont-ddu near Dolgelly. Owing to the short time which I was able to devote to collecting, it is very far from complete, the more so, as I devoted the greater part of the time to the slugs, merely collecting the others as I came across them.

Where not otherwise given, the locality is in all cases Bont-ddu.

**Arion ater** (L.). This is far the commonest slug in the district.

It exists in profusion in the valleys, and occurs more sparingly on the hills. The greatest elevation where I found it was about 2000 feet above the sea, on the slopes of Cader Idris. The type is subject to a little variation, the commonest form being completely black, the next having the sole grey, and the last the back black and sides with a slight brown tinge.

**A. ater** var. **albolateralis** Roebuck. I found this of frequent occurrence with the type, but never at any great elevation.

A small variety intermediate between this and *bicolor* is common on the lower slopes of Cader Idris.

**A. ater** var. **bicolor** (Moq.). One or two specimens from Cader Idris evidently belong to this variety, though they merge by insensible gradations into var. *albolateralis*.

**A. subfuscus** (Drap.). Common in low-lying ground.

**Limax cinereo-niger** var. **nigra** Moq. One or two specimens beneath stones in an oak copse.

**L. cinereo-niger** var. ——— ? Animal grey, with two dark bands on each side; foot white. One specimen only, beneath stones with var. *nigra*.



- L. agrestis* L. Only in one place near Dolgelly. Very pale, approaching var. *albida*.
- L. arborum* B.-Ch. Common in similar position to *L. cinereo-niger*.
- Zonites cellarius* (Müll.). Bont-ddu.
- Z. alliaris* (Miller). Dolgelly,
- Z. alliaris* var. *viridula* Jeffr. Bont-ddu.
- Z. glaber* (Stud.). Bont.-ddu.
- Z. purus* var. *margaritacea* Jeff. Dolgelly.
- Z. radiatulus* (Alder). Dolgelly.
- Z. excavatus* (Bean). Bont-ddu.
- Z. excavatus* var. *vitrina* (Fèr.). Dolgelly.
- Z. crystallinus* (Müll.). Dolgelly.
- Helix aspersa* Müll. Very common.
- H. nemoralis* L. Two specimens only. Type.
- H. rufescens* Penn. Near Barmouth. Spire rather produced.
- H. rotundata* Müll. Very common.
- Clausilia rugosa* (Drap.). Dolgelly.
- Cochlicopa lubrica* Müll. Near Barmouth.

A peculiarity of the Arions which I dissected is that the rudimentary shell, instead of being composed of a few irregular granules, consisted of an even layer of calcareous matter spread over the interior of the shield in the same form as the shell of *Limax maximus*. I do not know whether this is of common occurrence, but I have never observed it before in any specimens from the home counties that have come under my notice.

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**Zonites fulvus re-discovered in its ancient locality in Lincolnshire.**—On the 4th of June inst. I collected *Zonites fulvus* in Burwell Wood, near Louth, where its occurrence is chiefly interesting as confirming the record by Dr. Martin Lister at page 123 of his "Historiæ Animalium Angliæ," dated 1678. *Cyclostoma elegans*, which was recorded for Burwell Wood in the same work, has also been re-discovered, see "Naturalist," 1886, p. 347.—H. WALLIS 'KEW, Louth, Lincolnshire, 10th June, 1887.

## PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY.

## REPORT ON THE RECORDS MADE TO DEC. 9TH, 1886.

DURING the twelve months just expiring as many as 3,137 records have been authenticated and registered, bringing up the number for nine years to no less a total than 20,178, equivalent to an average of 2,242 records for each year of the nine. The numbers show a large diminution from those registered in 1885, being less than half the figure (3,137 as against 7,069). This diminution is partly to be accounted for by the fact that now for the first time the statistics given are inclusive only of the records actually registered in the final books, and do not include the records in the preliminary stages of registration. Former statistics have always been complete and included all the records to date, but in future they will include only such as have reached the final stage of registration and can be summarised with the least expenditure of time.

The counties for which more than a century of records have been made during the year are 7 in number, as follows:—Mid-West York, 604; South-West York, 353; West Norfolk, 190; North Lincoln, 133; North-East York, 131; Worcester, 128; and Warwick, 117.

Last year 30 counties were mentioned from which specimens had never been seen. These have been reduced to 20 in number at the present date, specimens having been submitted from North Wilts., Peebles, Selkirk, Kincardine, South Aberdeen, Easternness, Westernness, Dumbarton, Cantire, and West Ross.

The 20 virgin counties are now 14 Irish, 5 Scottish and 1 Welsh, while not a single English county remains which can in this sense be regarded as quite a *terra incognita*. The Welsh county is Cardigan, the Scottish ones are Wigton, North Aberdeen, Elgin, East Ross, and Orkney, while the 14 Irish ones are, as last year; Monaghan, Fermanagh, Cavan, Louth, Carlow, Kilkenny, Queen's County, Longford, Leitrim, East Mayo, East Galway, Limerick, and North Tipperary.

The referees and recorder are much indebted to all the Conchologists who have shown their appreciation of the value of the authentication-system by sending specimens, and especially to those by whose endeavours so much has lately been done for the Scottish counties, for Norfolk and Lincoln, Worcestershire, Warwickshire and Staffordshire, and for Devon and Cornwall, and they trust that a paper on the distribution of Irish mollusca which will be printed in the Proceedings of the Royal Irish Academy, will prove effectual in eliciting a full measure of assistance from the Naturalists of Ireland.

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## Meeting

HELD JANUARY 10TH, 1887.

The President, Mr. J. W. Taylor in the chair. Several letters from members were brought before the meeting.

### NEW MEMBERS.

The following gentlemen were duly elected members of the Society :—Mr. J. W. Williams, B.A., D.Sc., Park Village East, London ; Mr. W. Hy. Heathcote, Avenham Lane, Preston ; Rev. A. H. Cooke, M.A., F.Z.S., King's College, Cambridge ; Mr. R. C. Chaytor, Middleham, Yorks. ; Rev. Geo. Gordon, LL.D., Birnie, Elgin ; Mr. Robert Renton, Fans Road, Greenlaw, Berwickshire ; Mr. John Beaulah, Raven-thorpe, near Brigg ; Mr. Conrad Gerland, B.Sc., Ph.D., Church Hall, Church, Lancashire ; Mr. Alexander Shaw, Dover Street, Glasgow ; Mr. H. Wallis Kew, F.E.S., Louth, Lincolnshire.

The following were nominated for membership :—Rev. W. C. Hey, M.A., York ; Rev. J. E. Somerville, M.A., B.D., Glasgow ; Lieut.-Col. G. S. Parry, London ; Messrs. A. Brown, Glasgow ; A. H. S. Newstead, Epping ; T. W. Reader, London ; and F. R. Fitzgerald, Harrogate.

### DONATION.

The following donation was laid on the table, "Proceedings of the Royal Physical Society of Edinburgh," session 1885-1886.

## SPECIMENS EXHIBITED.

The President exhibited a number of slides from Mr. B. Sturges Dodd, of the lingual ribbons of *Zonites Draparnaldi*, *Arion ater*, *Helix sericea*, *H. aspersa*, *Limax maximus*, &c. ; a series of shells sent by Rev. J. E. Somerville, B.D., which had been collected in October and November last in West Ross, North Sutherland, and Inverness ; for the Rev. W. L. W. Eyre, of Alresford, an example of *Helix virgata* from Alresford, and other species from Suffolk ; on behalf of Mr. E. Collier, of Manchester, *Planorbis dilatatus* from canal at Reddish, and *P. spirorbis*, curiously distorted, from a ditch at Rusholme ; and a collection of *Limnæa peregrina* sent by Mr. R. D. Darbishire, from various Swiss and Italian localities, and *Parmacella Valenciennesii* from Gibraltar.

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## Meeting

HELD FEBRUARY 3RD, 1887.

The President, Mr. J. W. Taylor, in the chair.

### NEW MEMBERS.

The following gentlemen were elected members of the Society :—Rev. W. C. Hey, M.A., St. Olave's Vicarage, York ; Mr. S. W. North, 84, Micklegate, York ; Mr. Alfred Brown, 7, Bowmont Terrace, Glasgow ; Lieut.-Col. G. S. Parry, 48, Duke Street, St. James', London, S.W. ; Mr. Thos. Wm. Reader, 171, Hemingsford Road, Barnsbury, London, N. ; Mr. A. H. L. Newstead, Roseacre, Epping ; Mr. Francis R. Fitzgerald, Clifford House, Harrogate ; Rev. James E. Somerville, M.A., B.D., 11, Southpark Terrace, Hillhead, Glasgow.

The following gentlemen were nominated for membership : Mr. Jas. T. Marshall, Torquay ; Mr. Chas. Oldham, Sale ; Mr. J. A. Hargreaves, Shipley ; and Mr. Clement H. Pierson, Leeds.

Correspondence from members and societies was brought before the meeting. The President announced that the gentlemen elected at the annual meeting, as the Society's referees

on Land and Freshwater and Exotic Mollusca, had consented to act on those committees.

The following printed circulars from the Royal Society of New South Wales were laid on the table :—

1.—A report of a “Preliminary meeting of the Australasian Societies for the formation of the proposed Australasian Association for the Advancement of Science,” held at the house of the Royal Society of New South Wales, Sydney, on Wednesday, 10th November, 1886.

At this meeting, which appears to have been thoroughly representative, it was resolved that such an association should be formed. The rules of the “British Association” were adopted provisionally until the first meeting of the new association, which it is intended to hold in 1888, the centennial anniversary of the foundation of the Australian Colonies.

2.—A list of subjects on which the Royal Society invite original research or observation, and offer the Society’s medal and money prizes to the best communication on each subject, providing it is of sufficient merit.

#### DONATIONS.

“Bulletin of the Brookville Natural History Society,”  
No. 2.—From the Society.

“Societatum Litteræ,” January, 1887, No. 1.—The Editor.

#### PAPERS READ.

“Description of *Terebratula papillosa*,” by Mr. J. T. Marshall.

“Note on *Scalaria pseudoscalaris*,” Broc., by Mr. J. T. Marshall.

#### SPECIMENS EXHIBITED.

Specimens of *Testacella scutulum* from Guernsey, sent by Mr. Tomlin ; specimens of *Planorbis glaber*, from the Isle of Bute, sent by Mr. T. Scott ; a collection of Canadian shells, chiefly from Ontario, shown on behalf of Mr. L. B. Ross, of Driffield ; a collection of Land and Freshwater shells from South

and West Lancashire, mainly from the vicinity of Preston, from Mr. W. H. Heathcote; all the above were brought forward by the President, Mr. J. W. Taylor.

Mr. W. E. Collinge showed specimens of small *Limnæa palustris* from Bingley.

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## Meeting

HELD MARCH 3RD, 1887.

The President, Mr. J. W. Taylor, in the chair.

### NEW MEMBERS.

The following were duly elected members of the Society:— Messrs. Jas. T. Marshall, Torquay; Chas. Oldham, Sale; J. A. Hargreaves, Shipley; and Clement H. Pierson, Leeds.

The President announced that the gentlemen appointed as a committee of referees for British Marine Mollusca had intimated their willingness to act.

### DONATIONS.

The following donations were announced:—

- “Proceedings of the Linnean Society, N.S.W.,” vol. i., part 3;
- “Abstract of the Proc. of the Lin. Soc., N.S.W.,” for Oct., Nov., and Dec., 1886.—Presented by the Society.
- “Catalog der Familie Melaniadæ”; “Exkursionen in Nordafrika”; “Die Wilhelmshavener Giftmuschel”; and “Erste Nachtrag Nassauischen Mollusken”; presented by Dr. von Kobelt.

The following specimens presented by Mr. Wilfrid Bendall:—*Helix Preslii* Schmdt., Achenal Tyrol; *H. Fontenllii* Mich., Gde Chartreuse (Isère); *H. incerta* Drap., Pau (Beàrn); *H. meda* Porro., Malta; *H. apicina* Sk., Tangier; *H. cornea* Drap., Bordeaux; *H. cariosula*, Mich., Oran; *Zua folliculus* Gron., Malta; *Pomatias carthusianus* Drap. = *apricus*, Mous., Gde Chartreuse; *P. Nouletiana* Drap., San Sebastian, Guipuzcoa; *P. septemspirale* Raz., Gde Chartreuse; *Bithinella Schmidti* var. *bavarica*, Bavarian

Alps; *Clausilia oscitans* Fér., Malta; *Cyclostoma melitensis* Sby., Malta; *Pupa variabilis* Drap., Uriage près Grenoble; *P. avenacea* Drap., Savoie; *Physa acuta* Drap., Bordeaux; *Nanina vitrinoides*, Calcutta; *Limnæa pinguis* Dohrn., Colombo; *L. ovalis* var. *strigata* Gy., Calcutta; *Melania lirata* Bens., Calcutta; *Assimineæ francesiæ*, Calcutta; *A. conica*, Calcutta; *Paludina bengalensis* var. *gigantea*, Nepal Frontier; *Cerithidea fluviatilis* Pot. & Mich., Madras; *Paludomus chilinoïdes* Rve., Kandy; *Corbicula subradiata*, Ismailia; *Nerita marmorata* Rve., Suez; *Euchelus tricarinatus* Sh., Madras; *Patella rota* Chem., Suez; *Cerithium tuberosum*, Suez; *Rotella vestiaria*, Madras; *Littorina undata* Gray, Madras; *Melampus doliolum*, Suez; *Turbo elegans* Phil., Madras; *T. coronatus*, Aden; *Purpura sacellum*, Madras; *Ranella olivator* Meusch., Madras; *Planaxis Savignyi*, Aden; *Mactra olorina* Phil., Ismailia; *Lithophaga Hanleyana* Desh., Suez; *Mytilus variabilis* Kien., Suez; *M. smaragdinus*, Madras.

## PAPER READ.

“The Marine Mollusca of Lyme Regis,” by Mr. J. W. Cundall.

## SPECIMENS EXHIBITED.

The President had received numerous specimens from several members, which were now brought forward:—Mr. Heathcote, of Preston, sent examples of *Limnæa peregra* from Herm; *Bythinia tentaculata*, curiously and extensively eroded, from Tarleton, South Lancashire; *Helix hispida* and var. *albida* from Penworthan; *Cochlicopa lubrica* var. *hyalina* from Morecambe; and others. A collection of shells, embracing some very interesting specimens, from the vicinity of Bradford, and other places, from Mr. J. A. Hargreaves, Shipley. Mr. Poulton, of Oxford, sent a living specimen of *Testacella haliotideæ*, found in his garden a few days ago.

Mr. C. H. Pierson showed *Clausilia rugosa* var. *gracilior*, found at Clapham.

## Meeting

HELD APRIL 7TH, 1887.

The President, Mr. J. W. Taylor, in the chair.

### NEW MEMBERS.

The following were duly nominated for membership:—  
Mr. F. B. Webb, Cheadle, Staffordshire; and Miss Honoria Galwey, Dublin.

### DONATIONS.

The following donations were announced:—  
Sowerby's "Illustrated Index of British Shells."—By Mr. G. B. Sowerby.  
"Annual Report of the New Cross Natural History Society."—  
By Mr. A. J. Jenkins.  
"Smithsonian Report," 1884, part ii.—By the Trustees.  
"Journal and Proceedings of the Royal Society of New South Wales," vol. 19, 1885.  
Specimens of *Limnæa glabra*, from Swillington Common.—By Mr. W. Nelson.  
A small collection of shells found about Dublin.—By Dr. R. Scharff.  
The thanks of the Society were accorded the donors for their generous gifts.

### PAPERS READ.

"On the genus *Cuma*," by the Rev. A. H. Cooke, M.A., F.Z.S.  
"Conchological Notes on a visit to Fifeshire," by Mr. T. Scott.  
"The Land Shells of Ilfracombe and Neighbourhood," by Mr. J. R. B. Tomlin.  
"Note on *Limnæa Burnetti*," by Mr. W. Nelson.

### SPECIMENS EXHIBITED.

The following were shown by the President—On behalf of Mr. S. C. Cockerell specimens of *Pisidium roseum* and *Vertigo antivertigo* from Minster, near Sandwich, Kent; for Mr. Wilfrid Bendall, a collection of Clausiliæ from the Tyrol, Bavarian Alps, and Switzerland; for Mr. F. W. Wotton, of Cardiff, a



collection of the shells of Brecon and Glamorgan,—this interesting series contained some specimens differing slightly from the ordinary varieties; for Mr. Quilter, a collection of shells from Evington, Leicestershire.

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## Meeting

HELD MAY 6TH, 1887.

The President, Mr. J. W. Taylor, in the chair.

### NEW MEMBERS.

The following were duly elected members of the Society: Mr. Frederick B. Webb, Cheadle, Staffordshire; Miss H. Galwey, Dublin.

The under-named were duly nominated for membership: Mr. G. W. Mellors, Nottingham; Mr. J. R. B. Masefield, Cheadle, Staffordshire; Mr. J. M. B. Taylor, Paisley; Mr. S. M. Luther, Garrettsville, Ohio.

### SPECIMENS EXHIBITED.

The number of specimens exhibited was very large and varied, it included living examples of *Zonites Draparnaldi* from Middlesex, sent by Mr. Fenn; a small collection of the shells of Merioneth from Mr. Ruddy, illustrating his paper in the April number of the 'Journal of Conchology'; a number of Slugs and Land and Freshwater Shells from Howth, near Dublin, and from Powerscourt Park, Co. Wicklow, sent by Dr. Scharff, of the Museum of Science and Art, Dublin; examples of *Bulinus montanus* and other shells from Neufchatel, Switzerland, collected by Mr. J. W. Wood, of Bedford; a number of landshells collected a week ago at Yarmouth, Isle of Wight, by Mr. C. Ashford; and others; all brought forward by the President.

Mr. C. H. Pierson showed examples of *Zonites cellarius*, *Z. nitidulus*, *Z. purus* and var. *margaritacea*, *Z. glaber*, *Azeca tridens* and var. *crystallinus*, and *Cochlicopa lubrica*, collected at Addingham, on April 11th, 1887.

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## Meeting

HELD JUNE 2ND, 1887.

The President, Mr. J. W. Taylor, in the chair.

### NEW MEMBERS.

Mr. G. W. Mellors, Sherwood Rise, Nottingham; Mr. J. R. B. Masefield, Rosehill, Cheadle; Mr. J. M. B. Taylor, Paisley; and Mr. S. M. Luther, Garrettsville, Ohio; were duly elected members of the Society.

Mrs. A. M. Dyer, of Swansea, was nominated for membership.

The President announced that nominations for the different offices of the Society for 1888 were now desired, namely, one President, four Vice-Presidents, Treasurer, Secretary, Recorder, and six Members of Council. All nominations to be sent to the Secretary in time for insertion in the October issue of the 'Journal of Conchology.'

### DONATIONS.

The following donations were brought before the meeting: "Proceedings of the Linnean Society of New South Wales," vol. i., part 4.—By the Society.

"On the varieties of the shells belonging to the Genus *Nassa* Lam.," by F. P. Marrat.—Presented by Mr. B. Hudson.

The following shells collected at Llwngrwl, near Barmouth:—*Helix caperata*, *H. rotundata*, *H. hispidata*, *Zonites cellarius*, *Pupa umbilicata*, *Arion ater*, *A. Bourguignati*, and *Limax maximus*.—By Mr. Wm. Cash, F.G.S.

### SPECIMENS EXHIBITED.

The number of exhibits brought before the meeting was very large, and included from Mr. L. E. Adams fine example of *Arion ater* var. *albolateralis*, collected at Minsterly, Shropshire, and other species from the same locality; from Dr. R. Scharff several specimens of *Limax cinereo-niger*, collected at Derrygore, co. Tyrone, by Mr. W. F. de V. Kane; examples of *Planorbis lineatus*, *Valvata cristata*, &c., from near Welshpool, Montgomeryshire, collected by Mr. J. B. Morgan; from Merioneth-

shire, *A. ater*, *A. Bourguignati*, *Limax maximus*, *L. arborum*, &c., collected by Mr. T. Ruddy, and specimens of *Arion Bourguignati* from Mr. G. S. Tye, Handsworth, were shown.

The President exhibited *Helix rotundata*, *Zonites excavatus* and *Z. alliarius* alive from Bramley Fall, near Leeds; and on behalf of Mr. T. Scott, a collection of species of shells mainly collected from the shores of Loch Fad, Bute, a locality which has been reported as nearly destitute of molluscan life; also for Mr. Chas Ashford, examples of *Amalia gagates* from Christchurch, Hants.

Mr. C. H. Pierson showed *Unio tumidus* and *Anodonta cygnea* from the mud heaps on the banks of the Leeds and Liverpool Canal at Kirkstall, and *A. cygnea* and var. *rostrata* from Roundhay Park, Leeds.



#### ADDITIONAL NOTE ON THE GENUS *CUMA*.

By WILLIAM E. HOYLE, M.A.

In the April number of this Journal, the Rev. A. H. Cooke published a valuable paper in which he discussed the various species of the genus *Cuma*. The object of the present note is not to criticise any of his statements, but to show what follows as a further consequence of their acceptance. It appears from Mr. Cooke's investigations that Humphrey [1797] cannot be regarded as the creator of the genus, but that this distinction belongs to Swainson [1840]. Between these two dates, however, the name was given to a Crustacean by Milne-Edwards [Ann. Sci. Nat., xiii., 1838] and this application obviously has priority over that of Swainson. It is therefore Mr. Cooke's right to complete his revision by giving a new name to the group, and if he would at the same time give within the limits of a page a brief formal diagnosis of the genus and of the sufficiently characterised species with synonyms he would confer an additional boon on conchologists.

NOTES ON THE LAND AND FRESHWATER  
MOLLUSCA OF THE UPPER ENGADINE AND THE  
BREGAGLIA VALLEYS, EAST SWITZERLAND.

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BY THE REV. S. SPENCER PEARCE, M.A.

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I have not been able to find much recorded about the mollusca of the Engadine Valleys. In the 'Journal of Conchology' for April, 1883, Mr. R. M. Christy, in a short paper entitled "Notes on the Mollusca collected in Switzerland," gives some interesting notices of different species, and amongst them he speaks of some twenty species which he took in the Upper Engadine Valley.

A five weeks' stay in this valley, at its southern end, on the summit of the Maloja Pass, enabled me to explore much of the same region, as well as a large portion of that adjoining warmer valley—the Val Bregaglia, which extends due south from the Maloja Pass. Roughly speaking the ground I went over stretched twenty miles north and south, and comprised the valley of the Upper Engadine, from the Maloja Pass northwards to St. Moritz village, and the Val Bregaglia from the Maloja Pass southwards as far as the villages of Promontogno and Bondo. The Maloja Pass—the steep descent from the Upper Engadine into the Val Bregaglia—thus formed the natural centre of one's rambles. The chief interest of this region lies in its great elevation above the sea. The average altitude of the valley of the Upper Engadine is 6000 feet; St. Moritz, the highest village, is 6,090 feet above sea-level, while the head of the Maloja Pass is 5,941 feet. Lofty mountains, with snow-clad peaks rising to 10,000 feet, more or less, bound the valley on its eastern and western sides.

From the Maloja Pass, which represents a sudden fall in elevation of not much less than 1000 feet, the Val Bregaglia is a continual descent southwards into Italy. Promontogno, about nine miles from the pass, the southernmost village I reached in this valley, is only 2,687 feet above the sea. It is at this place that the Alpine pines, larches, &c., suddenly yield to the chesnuts and walnuts of a more southern vegetation.

The rocks of these valleys are chiefly of crystalline limestone, gneiss, and mica-schist. Granite (or a granite-like rock), occurs at various points in the Engadine Valley. The altitudes given in the following notes are taken from Baedeker's "Switzerland" (11th edition).

All the species enumerated in this paper, excepting three slugs—the names of which have been bracketed in the list—have been examined by Mr. Roebuck and Mr. Taylor, of Leeds. My best thanks are due to them for having so kindly identified the more doubtful forms, as well as for favouring me with their notes on most of the species.

*Pisidium fontinale* Drap.—Shallow ditches at Isola, Upper Engadine.

*P. pusillum* Gmelin.—Plentiful in the shallow pools and ditches by the Engadine lakes; also in a ditch above Maloja, near a farm, at the height of about 6,500 ft. I did not take this and the preceding species together.

*Planorbis spirorbis* Müller.—Not uncommon in the Upper Engadine, in shallow sluggish water at Sils Maria, Baseglia, Isola, Maloja and Silvaplana.

*Limnæa peregra* Müller.—Abundant in the shallower waters of the Upper Engadine; and also in the Bergel Valley. Not taken in the deeper water of the lakes proper. While varying considerably in form and size, the shells as a rule, are solid looking, dark in colour, and often much eroded. The following seem the chief variations:—

(a). The type from both the Engadine and Bergel valleys.

(*b*). A form with an elongate spire, especially abundant in the stream that connects the Silzer and Silvaplana Sees. Mr. Taylor thinks this probably the variety *elongatissima* Gredler.

(*c*). Several specimens having small and very obese shells, taken in the Silvaplana and Campfer Sees.

(*d*). A distortion apparently not uncommon in the Silzer, Silvaplana, and Campfer Sees. The ordinary shape of the last whorl is destroyed by the anterior portion being bent outwards from within, so that the shell has the appearance of a large *Physa fontinalis*.

**L. auricularia** L.—In the large lakes of the Engadine. Evidently prefers deeper water than the other species, feeds wholly off the confervoid growth to be found on the rocks and stones. No ordinary aquatic plants flourish in the cold waters of the lakes themselves, but only in the side streams and ditches. The shell attains a large size and is generally eroded.

**L. auricularia** var. *angulata*.—Mr. Taylor informs me that one specimen from the Silzer See belongs to this variety.

**L. truncatula** Müll.—Plentiful in the Upper Engadine. Associated with *L. peregra*.

**L. truncatula** var. *minor* Jeff.—Not at all plentiful.

**L. truncatula** var. *oblonga*.—The more abundant form.

[**Arion** — sp. ?].—A not uncommon brown chocolate slug, sometimes greyish, with two black stripes on back and shield, having the flanks and foot of a paler tinge; in size intermediate between *Arion ater* and *A. hortensis*.

One individual occurred above 6,000 feet near Maloja, but far more frequent on and below the Pass.

[**Arion hortensis** Fér.].—In the Upper Engadine; a few individuals of a small size taken at Sils Maria and Maloja at the roots of a *Rumex* and other plants in damp spots.

In the Bergel Valley at Casaccia and Promontogno they are more frequent and of the ordinary size.

*Amalia marginata* Müll.—Plentiful at Promontogno and Bondo (2,600 ft.) in the Bergel Valley, but did not find it higher up.

*Limax agrestis* L.—Rather plentiful in the Engadine, even as high as 7000 and 8000 feet. Taken frequently at these altitudes on the way to the Surlej Fuorcla over against Silvaplana, and by the track leading to the Longhino See, west of Maloja. Specimens from these high places are very diminutive. Below the Maloja Pass and throughout the Bergel Valley it is very common and of the usual size.

*L. arborum* Bouchard-Ch.—A single small darkish specimen occurred under a stone just above Promontogno (2,700 ft.) in the Bergel Valley.

[*Limax* — sp. ?].—The mere record of a slug, a single specimen of which I found in a pine wood between Casaccia and Vicosoprano, but unfortunately lost before all its characteristics could be noted. It was of the size of *L. agrestis*, only more slender, of a uniform yellow colour with a transparent look about it, tentacles darkish brown; quick in movement.

Mr. Christy in his list records an unidentified *Limax* from a pine wood near St. Moritz.

*Succinea putris* L. var. *parvula*.—By the Silzer See near Maloja and Sils in the Engadine, and at Casaccia in the Bergel Valley.

*S. oblonga* Drap.—Wet pasture land near Casaccia in the Bergel Valley.

*Vitrina pellucida* Müll.—One specimen, high up above Maloja, at about 7000 feet.

*V. elongata* Drap.—Abundant in the Upper Engadine. It reaches a higher altitude than any other species, except perhaps *Helix arbustorum*. Often it is associated with *Limax agrestis* (the diminutive form), *Zonites fulvus*, *Zua*

*lubrica*, and *Helix rudrata*, more especially delighting in damp shady places by the side of the streams which tumble down the mountain sides, moistening everything near with spray.

**Zonites cellarius** Müll.—Under stones near buildings. At Casaccia the specimens taken were small, but at Bondo and Promontogno larger than usual.

**Z. nitidulus** Drap.—A single individual (dead) found with *Z. cellarius* at Casaccia.

**Z. petronella** Charp.—Plentiful in the Engadine and Bergel valleys; most frequent between 6,500 feet and 5000 feet. It is a beautiful little shell.

**Z. fulvus** Müll.—A plentiful Alpine species, reaching to a great height (8000 feet circa) and affecting damp places.

**Helix pomatia** L.—In the Bergel Valley. The highest point it reaches to is the base of the zig-zag roadway descent just above Vicosoprano; below that spot it is plentiful among the loose stone walls.

**H. pomatia** var. *brunnea*.—The commonest form. The brown colour well diffused over the shell.

**H. pomatia** var. *albida*.—A single specimen near Borgonuovo.

**H. arbustorum** L.—Plentiful; found at a great elevation on the Engadine mountains. The variety *pallida* of the ordinary size was brought to me having been taken at a point above 8000 feet, to the east of Maloja. Individuals were very numerous in the Bergel Valley. Especially shall I ever remember the very great abundance of this species in the alder groves beside the Maira River near to Vicosoprano; it was impossible to avoid crushing very many as one walked, they were as plentiful as *Helix virgata* is with us on the chalk downs of England. Those from the Bergel Valley differ from the Engadine ones in having thinner shells, but more colour.



Mr. Roebuck and Mr. Taylor have kindly pointed out the following variations :—

- H. *arbustorum* var. *flavescens* Jeff.—Maloja Pass and Vicosoprano.
- H. *arbustorum* var. *marmorata* Rofficœn.—Vicosoprano.
- H. *arbustorum* var. *pallida* Taylor.—At base of Septimer Pass, and Vicosoprano ; above Maloja at about 8000 feet, and Sils Maria, 6000 feet.
- H. *arbustorum* var. *Poiretia* Moq-Tandon.—Maloja Pass, a single specimen.

Mr. Roebuck further gives me the note that one specimen from Vicosoprano agrees with the variety *icterina* Rossm. except that the markings are yellow instead of grey.

- H. *zonata* Studer.—Under stones in the Bergel Valley. The highest altitude reached by this species coincides with that of *Helix pomatia*, viz., the top of a zig-zag roadway just above Vicosoprano (3,600 ft.). Dead specimens far more abundant than live ones. Mr. Edgar Smith, of the British Museum, kindly assisted me in identifying my specimens. There are three examples of this species in the national collection labelled "Europe."
- H. *hispida* L. — Plentiful in the Bergel Valley, from the base of the Maloja Pass southwards as far as just above Vicosoprano, below which village I did not find it.
- H. *runderata* Studer. — Plentiful, though somewhat local. In the Engadine it reached certainly as high as 7000 ft. on the eastern side of Maloja ; also found on the Maloja Pass and down the Bergel Valley, as far south as the zig-zag above Vicosoprano. The clear hyaline variety frequent.
- H. *rupestris* Drap.—Plentiful in the Engadine, as high as 7000 feet at least. Also occurred in the Bergel Valley. Mr. Taylor informs me that while the Engadine forms have a moderately produced spire, those from the Bergel Valley belong mainly to the form that M. Bourguignat considers characteristic of south of Europe.

- H. pygmæa** Drap.—Among moss and damp stones with *Vertigo pygmæa*, near Maloja (6000 feet), also at Casaccia in the Bergel Valley. This species is commoner than is generally supposed.
- H. pulchella** var. **costata** Müller.—In the Bergel Valley from Casaccia southward.
- H. obvoluta** Müller.—Not uncommon. Occurred on the Maloja Pass, and at different points throughout the Bergel Valley.
- H. holoserica** Studer.—Under large stones within the ruined walls of the very interesting old Gothic church above Casaccia. Only a few specimens taken.
- Pupa marginata** Drap.—On rocks at Sils Maria in the Engadine (6,100 ft.), associated with *H. rupestris*. In the Bergel Valley plentiful, especially about Casaccia and along roadside to Vicosoprano.
- P. marginata** var. **albina** Menke.—On ruined wall of old Gothic church, Casaccia.
- Vertigo pygmæa** Drap. var. **athesina**.—Several in damp moss by stream on east side of the Maloja lake (6000 ft.).
- V. edentula** Drap.—Plentiful in the Engadine at the roots of grass, and especially *Saxifraga aizoides* by the side of mountain streams. It extended above 7000 feet.
- V. edentula** var. **columella** Von Martens.—A few specimens after a diligent search among the loose stones and rubble in the nave and chancel of the ruined church near Casaccia. The typical form not taken with the variety.
- Balea** — sp. ?—A solitary fragment of a *Balea* (probably *perversa*) found under a large stone in the Fedoz Valley, in the Upper Engadine, at a spot about 7000 ft., and not very far from the glacier of that name.
- Clausilia plicatula** Drap.—Has a somewhat limited range in the Bergel Valley. Abundant near Casaccia, especially so about the ruins of the old Gothic church, and extending thence as far as the zig-zag in the road above Vicosoprano.

**Cochlicopa lubrica** Müller.—Plentiful in damp places. In the Engadine it is of the usual size, even high up on the mountains above 7000 ft. Just as plentiful in the Bergel Valley. A small form also occurred at Stampa, Vicosoprano, and Promontogno.

**Garychium minimum** Müller.—At roots of grass by the mountain streams about Maloja, 6000 ft. ; also at Casaccia in the Bergel Valley.

Beyond noticing the great altitudes at which most of the above thirty-seven species were taken, it is of interest to realise how many of these Alpine forms are the same as our English species. While thirty-one agree exactly with English species, and five others—*Vitrina elongata*, *Zonites petronella*, *Helix ruderata*, *H. holoserica*, and *Clausilia plicatula*, are closely allied to English forms, only one, *Helix zonata* Studer is southern and un-English.

Further, of the species mentioned by Mr. Christy in his paper as found at the St. Moritz end of the Engadine Valley, all (except two forms, viz., *Planorbis contortus* and *Succinea elegans*) are found at the Maloja end as well, together with several additional kinds not recorded by that writer.

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**Occurrence of *Planorbis lineatus* in Montgomeryshire.**—It may interest some of your readers to know that *Planorbis lineatus* has been discovered in this county. In the beginning of May last, I was fortunate enough to find several specimens of this elegant little Planorbis, in a pool of stagnant water in a field near the Welshpool Railway Station. The pond is very small in size, its original dimensions having been greatly curtailed by an accumulation of mud, which occupies the greater portion of it. Specimens of the Planorbis are not at all scarce, and are associated with *Sphærium corneum*, *Bythinia tentaculata*, *Limnæa peregra*, *Succinea elegans*, &c. Mr. Wotton has already recorded the occurrence of *P. lineatus* at Cardiff, and these two localities are, I believe, the only places in the Principality where it is known to occur.—J. BICKERTON MORGAN.

ON PLANORBIS DILATATUS, P. GLABER, AND  
SPHÆRIUM OVALE.

By THOS. ROGERS.

(Read before the Conchological Society.)

In the summer of 1869 the American mollusk *Planorbis dilatatus* was discovered in a canal on the west side of Manchester, and in the autumn of the same year it was found in another canal on the east side of Manchester—the two localities being about five miles apart. In March of this year I sent some of these specimens to Mr. Bates, of Burnley, and he immediately wrote to say that he identified them with some shells that he had collected in a water lodge at Burnley, and sent a number for my inspection. The theory set up by Dr. Jeffreys and myself, after examining both the Manchester localities, was that it had been introduced by means of American cotton, as a good deal of the refuse from the cotton cleaning machines of the mills found its way into the canal where the shells were found. I, myself, went a little further with this theory, and surmised that the mollusk had been introduced during the cotton famine, occasioned by the war of secession, and that the introduction into these two localities were distinct and separate introductions. A few years after its discovery in Manchester, and when the canal was run dry for repairs, I saw in it countless numbers on the sides of the canal, extending about a mile from where it was first found, and I ventured to predict at that time that it would ultimately become a very common species; but unfortunately, nearly all these vast numbers were killed by the men who “re-pointed” the joints of the bricks of the canal waterway with mortar containing a good quantity of lime. It is interesting to know that after a lapse of eighteen years the mollusk has again been found abundantly at Burnley, and it is also interesting to enquire if the theory first set up still holds good. From enquiries I have made relative to the environment of the lodge in which it is found and the habitat in which it

lives at Burnley, the argument is not conclusive. At the time of its discovery at Burnley I enquired if there was a canal, and, if so, were there any spinning mills ; the answer was that there was a canal about a furlong off and there had been a mill, but it had been burned down. I suggested, too, at the time, that the canal in the vicinity of a cotton mill, on or near its banks, should be examined, and a few days ago I received a letter from Mr. Bates announcing that they had found it in thousands near a cotton mill on the canal banks, but I do not know all the particulars of this locality. It is rather singular that in all the localities, both at Burnley and Manchester, that there are three identical associations. First, that it is found amongst a green algæ, which I take to be the same species in each case. Second, that there is an abundance of a form of *Plumatella repens*, which Prof. Allman describes as a somewhat unusual form, and that it is found in water artificially higher in temperature through the discharge of water from condensing engines. I expressed my opinion to Dr. Jeffreys at the time it was first found, that the Planorbis lived upon the decaying substance of this Plumatella and other Hydroid Zoophytes. Mr. Bates also informs me that Mr. Long discovered *Planorbis glaber* along with *P. dilatatus* in the same water lodge at Burnley—might we not ask ourselves, although *P. glaber* is a well established British species, whether the form of *P. glaber* found along with the *P. dilatatus* may not be introduced American *P. parvus*? May I say, in conclusion, that many persons express a doubt that the vitality of the Planorbis would not sustain it during a voyage from America to England, and the subsequent passage through a blowing machine. Dr. Jeffreys expressed himself that it was no difficulty with him to accept this part of the theory, and from examinations made of the waste from cotton blowing machines by myself, I can readily believe that the shells could pass through undamaged. I think too that this last Burnley habitat is a direct American introduction, about the same time as the introduction in Manchester.

There is another curious coincidence in reference to American shells, *Sphærium ovale* is considered by some conchologists (Dr. Jeffreys amongst the number, I think) to be equal to *S. transversum* of the United States, and *S. ovale* is found in the same canal that *P. dilatatus* was first found. It is also found in the same canal where it was found in the second instance, and Mr. Bates reports that dead shells are found in the canal at Burnley where *P. dilatatus* is found. The *S. ovale* about Manchester seems to be dying out, owing to greater pollution of the canals; this may also be the case at Burnley.



**A Dextral *Physa fontinalis*.**—While collecting on June 8th, at Barnes Common, Hammersmith, I took a good quantity of *Physa fontinalis* out of the brook, and among these was a dextral one. The mouth in this last was a more elongated-oval than what we find in the type generally—an errant-knight from the conventionalities of an otherwise sinistral genus.—J. W. WILLIAMS, D.Sc., June 10th, 1887.

**Discovery of *Clausilia Rolphii* in North Lincolnshire.**—Mr. H. Wallis Kew, who is engaged in working out the molluscan fauna of Lincolnshire, recently sent me amongst other interesting species, three specimens of this uncommon shell. Two of the specimens were found on the 7th of May at Haugham-pasture and Maltby Wood respectively, and the third on the 4th of present month at Grisel Bottom, Burwell Woods. These three localities are old oak woods—Haugham-pasture is really an oak wood, its local name is misleading—and though not very close together are all in the same neighbourhood, and are situate on the eastern flank of the wolds; in some parts the chalk is slightly covered with clay, but it is interesting to note that all three shells are from the same long post-glacial ravine, where the surface is chalk. Its occurrence so far removed from its previously known area of distribution is of the greatest interest.—JNO. W. TAYLOR, June 16th, 1887.

ADDITIONAL NOTE ON PLANORBIS DILATATUS  
AND PLANORBIS GLABER AT BURNLEY.

BY J. BATES.

Mr. F. C. Long and myself for the first time took *Planorbis dilatatus* in June, 1886, amongst some *Valvata piscinalis*, in the Paper Works lodge, Burnley. This lodge has no connection whatever with any cotton-blowing machinery, the nearest cotton-blowing room being near half-a-mile distant, and in the canal near this mill I could find no trace whatever of *P. dilatatus*. On July 5th, 1887, Mr. Long found it in thousands in the canal opposite Temple's factory, where the cotton refuse is blown into the canal, they were found along the canal for over a mile in the direction of Hapton, but were most plentiful opposite the mill. The specimens are not so fine as those from the Paper Mill lodge. Our first idea was that the warm water had something to do with the lodge specimens being so large, but the canal specimens are very much smaller although the water is very much warmer. In both localities they are found upon a kind of Algæ.

Mr. Long also found *P. glaber* in June, 1886, at the Paper Mill lodge, and has since also found one specimen in the canal by the new bridge at Gannow, near Temple's factory.

NOTES ON THE EPIDERMIS OR PERIOSTRACON  
OF MOLLUSCA.

BY G. SHERRIFF TYE.

(Read before the Conchological Society).

All molluscous shells, at some period of their growth, have an outer coat of animal matter which is formed and deposited by the margin (collar) of the mantle, the shelly matter being deposited by the mantle itself, of which indeed it was once a part as membrane or cellular structure, the cavities of which having

been filled up with carbonate of lime are thrown off layer after layer in the form of a symmetrical (in some cases the grotesque) shell.

A shell being broken in any part remote from the mouth is repaired with shelly matter secreted by the *visceral* mantle, but without an epidermis; but if broken at the margin, it is repaired with its epidermal covering, the collar of the mantle (the front edge) alone having the power to produce epidermis which is formed over the shell deposit in all cases where the mollusc can withdraw itself sufficiently into its shell to bring the front edge of the mantle into play in repairing the fracture.

The epidermis is formed in advance of (i.e. before) the shell, the latter being added as an inner coating; this may well be seen in *Helix aspersa* and in the *Unionidæ* during their periods of growth. The epidermis will be found as a chitinous fringe or collar round the mouth of the gasteropod in advance of any carbonate of lime.

This covering is in many cases, to a large extent indestructible as is shewn by its presence upon fossil shells of the glacial epoch, e.g. *Cyprina islandica*, *Saxicava norvegica*, &c.

Its office is to preserve the shell against the action of eroding agents. "It has life but not sensation, like the human scarf skin."

If a shell be dissolved in a solution of hydrochloric acid it leaves behind it a chitinous skeleton (*Clausilia rugosa* shews it well). The shell is probably connected in some way with its chitinous envelope by minute channels which serve to keep it "alive" although shells may lose it without materially shortening their period of existence.

It varies much in thickness in different species, in some cases being easily rubbed off, in others destroyed by atmospheric action or water e.g. *Helix virgata*, *Neritina fluviatilis*.

In some species it is present only in the young state, being afterwards lost as in *Oliva* and *Cypræa* the shells being polished by folds of the mantle.



The colouring of the *Unionidæ* is due to the epidermis.

It varies in texture and pattern in different genera and species, being sometimes studded with barbed blades as in *Mytilus barbatus* and *M. modiolus*. In *Buccinum*, *Fusus*, *Triton*, and others it consists of a complete network of short blades. Some species have a roughened or hispid epidermis before birth and retain that appearance for a short time only, losing it as they grow older. Several of our species of *Planorbis* shew this.

*Planorbis albus* var. *Draparnaldi* has from 45 to 50 ridges extending round the whorl, each of which bear close rows of three bristles each on a ridge or wrinkle of the epidermis.

*Planorbis contortus* and *P. corneus* are both beautiful microscopical objects when newly hatched out. Both our English species of *Paludina* are hispid when born, *P. contecta* having the longest hairs.

Beautiful examples of the hispid periostrakon are to be found in the genus *Helix*, the species bearing it are widely distributed. I am familiar with many from Europe, Asia, America, and Australia.

It occurs in every stage of development roughened, dotted with points or incipient hairs, to frills of long hairs or bristles, plaited (*H. lamellata*) or in a lovely coronet of spines (*H. aculeata*).

It is noticeable that all our hispid *Helices* spend their life in damp places, hence none of them are brilliantly painted, but like the human sojourner in mental or material darkness shew few of the attractive attributes of light. Beautifully coloured *Helicidæ* are destitute of hairs. It is worthy of note that so far as I have observed the more globose (hispid) species of this family have the shortest and stoutest hairs, the flatter-spined ones the longest.

These hairs possess the property of becoming erect when brought into contact with moisture, no matter how pressed down they are—and they are apt to become so during seasons of rest—so soon as they are damped they immediately form a perfect *cheveaux-de-frise*.

I subjoin a list of such species of *Helix* as I know have a hispid epidermis, with their place of habitat :—

<i>H. rufescens</i>	}	Britain	<i>H. edwardsi</i>	}	United States		
(when young			<i>H. labrosa</i>				
„ <i>hispidata</i>			<i>H. hornii</i>	}	California		
„ <i>concinna</i>			<i>H. leaii</i>				
„ <i>sericea</i>			<i>H. infurcata</i>				
„ <i>revelata</i>			<i>H. loricata</i>				
„ <i>fusca</i>			<i>H. columbiana</i>				
„ <i>obvoluta</i>	}	Con- tinent	<i>H. gheisbrihtii</i>	}	Central America		
„ <i>personata</i>			<i>H. elegantissima</i>				
„ <i>lefeburliana</i>			<i>H. hartmani</i>	}	China		
„ <i>setosa</i>			<i>H. mackensii</i>				
„ <i>angigyra</i>			}	United States	<i>H. kurri</i>	}	I. of Formosa
„ <i>conspurcata</i>					<i>H. tagalensis</i>		
„ <i>cyclolabris</i>					<i>H. coxeni</i>	}	Molluccas Phillippines
„ <i>pellita</i>	<i>H. hombroni</i>						
„ <i>monodon</i>		Australia					
„ <i>barbigera</i>		Fiji Isles					
„ <i>hirsuta</i>							

There is a field of interesting research for conchologists in trying to work out the cause and uses of this peculiar structure; why molluscs having a hispid coat should be sombre coloured, shy and retiring in habit, unlike their more brilliantly coloured brethren. As the smooth epidermis serves as a protective coat for the shell, there would seem to be a further use for a hairy one other than merely as a conserving agent against erosion.

*Helix sericea* has a habit of creeping over leaves in damp weather and of dropping immediately it perceives the proximity of danger, the slightest touch is sufficient to cause it to loose its hold, and so silent is the fall, broken by its springy coating of hairs, that even though it be from a considerable height, it is not heard, and it receives no hurt however far it falls. This habit is shared by *H. hispidata* in a less degree.

The hairs may be irritating to creatures apt to prey upon snails—birds or frogs? It is most perfect and in finest condition during those periods in which the creatures possessing it are most active, for the hairs being hygrostatic then become erect.

Probably all molluscs have some protective peculiarity. The Zonites having a thin glossy shell inhabit dark places, under stones, &c., and have more or less an alliaceous odour and probably a nauseous taste. The larger Helices which creep about boldly have a thick strong shell requiring (as the Thrushes know) hard rapping on a stone to break it. It is a significant fact that many species (I believe observation will elicit a great number) have a hairy epidermis when newly born, and this points to some protective capacity. Mr. Jeffery quotes the case of *H. Cantiana* as observed by Mr. Adams, (J. C., No. 1, vol. v, p. 24), few would expect to find a trace of hairs on such a shell, yet it is seen in the young.

It is only fair to say that the original notes (here slightly extended) were written for the conchological section of the Birmingham Nat. His. and Microscopical Socy., in 1874. I sent them—with all the drawings I made to illustrate them—to Mr. Jeffery, when I saw his paper (J. C., No. 1, vol. v., p. 17), which adds to our knowledge by shewing the method of production of the hairs. My notes were afterwards (at his request) sent to Mr. J. W. Taylor, hence they are honoured—as I think above their deserts—by being here. If there should be anything in them which awakes a desire in my fellow workers for further observation upon the same line, I shall be the first to avail myself of it, feeling sure that I have much yet to learn.



**Helix arbustorum monst. sinistrorsum in Derbyshire.**—Early in August Mr. C. Oldham sent me a fine specimen of this rare form, which he had found on nettles by the roadside, at Ashwood Dale, near Buxton, on August 1st. The specimen belongs to the var. *flavescens*, in this respect differing from the only other example I know of, which was of the normal colouring, and figured by Ferussac as monst. *a*, on pl. xxix. of his great work.—JNO. W. TAYLOR, Sept. 29th, 1887.

NOTE ON THE PEARLY *NAUTILUS*.

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

Zoological Department, British Museum.

A specimen of *Nautilus pompilius*, captured at Port Blair, Andaman Islands, has recently been presented to the British Museum, by Mrs. E. Kenny, who has given the following account of its movements during captivity :—

“It was caught at the surface, near the anchor-cable of H.M.S. ‘Osprey,’ in this harbour, in a fairly rough sea. The shell, when brought to me yesterday with the fish in it, appeared chipped and broken at the edge, from contact with the chain cable. I at once placed it in a bucket of salt water (it had not been out of its element more than half an hour), and the fish seemed to begin to breathe strongly. The rough, skin-like covering to the mouth [the hood] of the shell appeared to rise, and on each side of it the gills commenced to work in regular pulsations. At the same time the tentacles were protruded in front, and gas or air was expelled, bubbling up at the surface of the water at regular intervals. The whole creature seemed to expand and grow looser, until quite suddenly it became detached from its shell entirely, and lay breathing or working, at the bottom of the bucket. I may remark that once out of its shell, the fish showed no apparent desire to re-enter it. In the empty shell were then seen a few small tad-pole-like creatures, very active in their movements, whether parasites or not I do not know. These were washed off into a glass jar with rum, and the fish was then put into the same jar.”

Unfortunately the specimen was placed in fresh spirit before the above notes were read, the so-called parasites being thus unconsciously thrown away with the discoloured spirit. This is much to be regretted, for doubtless these animals, if really parasites, would have proved of very great interest, as no parasite is as yet known in connection with the *Nautilus*. It seems

possible that the irritation created by these creatures may have been the cause of the *Nautilus* quitting its shell. If so, it tends to show that the animal possesses the power of *suddenly* detaching the shell-muscle from the shell. This is not surprising when the feebleness of the scar and the fact that a thin transparent membrane is secreted between the muscle and the scar upon the shell are taken into consideration. The muscle evidently has such a slight hold on the shell that a very small effort of contraction would release it. If the theory be correct that the *Nautilus* moves forward a certain space to form a fresh chamber, relaxing its hold on the shell by the lateral muscles of attachment, were there not some means of holding on there would be considerable risk of the shell falling away from its inhabitant. The siphon then, as suggested by Reeve, may be the means by which the shell is held in position during that process. It might be stretched the required length, or if moveable within the siphonal tube it might be pulled forward the length of the compartment, to be parted off by a new septum, and still leave sufficient in the old siphonal tube to hold the shell from slipping away. When the specimen observed by Mrs. Kenny quitted its shell, it appears to have snapped the siphonal membrane, for only about half an inch is still attached to the body.



**Abnormal *Helix aspersa*.**—I was much surprised when dissecting a specimen of *Helix aspersa*, a few days ago, to find that it was without a mandible, and had only an exceedingly small portion of the lingual ribbon. Where the mandible should have been there was a hard muscular band, about the length of the mandible but much broader, giving the animal the appearance of one with its mouth wide open. With the exception of a very narrow strip of chitin, the floor of the mouth was covered with the usual cartilaginous cushion, such as the ribbon usually lies upon. The specimen was one which I had had in confinement for some four years or so, and was full-grown when I collected it.—W. E. COLLINGE, Leeds.

## CONCHOLOGICAL NOTES.

—  
BY THOS. SCOTT.  
—(Read before the Conchological Society).  
—

During last summer I happened to come across the nests of several land molluscs, and the following are some jottings from my note book concerning them :—

***Helix aspersa.***

Seven nests of this species were observed—the first was found on the 17th June, and contained fifty-one eggs. Between the 21st and 26th of the same month, three more were observed; they contained respectively, forty-three, forty, and sixty-nine eggs. Three more were observed on July the 16th, and contained—one seventy-three, one seventy-seven, and the other ninety-six eggs. The eggs were, without exception, deposited in little hollows, such as would be made were a boy's marble pushed into the soil till about level with the surface and then withdrawn. These little hollows were generally made by the mollusc at the roots of grass, and the eggs, after being deposited, were covered with a thin layer of earth, so that to find them, a careful and judicious search required to be made. According to Dr. Jeffreys,\* Bouchard-Chantreaux "has often counted from 100 to 110 eggs, which had been laid by a single individual," so that in only one instance do the numbers observed by me, approach near to those given on the authority of Bouchard-Chantreaux. The eggs had a tough membranaceous covering, so that though one happened to fall, it sustained little or no injury. The average size of the eggs, as far as I could make out, was 4.25 × 4 millimetres. In one nest the development had proceeded so far that the

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\* "British Conchology," vol. i., p. 183.

embryo shells occupied nearly the whole interior of the egg. The shells had fully one and a half whorls, and measured fully four mill. in breadth, by three mill. in altitude, and were of a pale cream colour.

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#### H. nemoralis.

On June 17th I collected a few molluscs of this species, and by the following morning one of them had deposited a cluster of eggs in the bottle in which they were confined. Though I kept them for some days longer, no more eggs were deposited. There were sixteen eggs in the cluster, and the outside skin, unlike that of the eggs of *H. aspersa*, was calcareous, hard, and brittle; they were pure white, and measured  $3 \times 2\frac{1}{2}$  mill. In fact they looked very much like miniature eggs of the domestic fowl.

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#### Arion ater and Limax agrestis.

On the 22nd of August I observed the nests of one *Arion ater* and five *Limax agrestis*. That of *Arion* contained thirty-six eggs, those of *Limax* twenty, twenty, twelve, seventeen, and nineteen eggs respectively. They were not deposited in hollows as were those of *H. aspersa*, but were in clusters under stones. They were of a pale blueish-white colour. Their outside coating was a thin semi-transparent membrane. I find I have no measurement of these.

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#### Limax flavus.

I had no opportunity for watching the development of the eggs in any of the preceding cases, but with regard to *L. flavus*, I am able, from a series of observations made by my son, Andrew Scott, to give a few details bearing on this point.

At a place in Greenock, where *L. flavus* is of frequent occurrence, my son noticed on the 15th of September last year, that three clusters of eggs had been deposited on the under side of a log of wood. They had been deposited within the preced-

ing two, or at most three days at which time the log was last examined. There were seven eggs in one, eleven in another, and sixteen in the third cluster. They were almost transparent, pale whitish in colour, and of large size, measuring from  $6\frac{1}{2} \times 5$  to  $8 \times 5\frac{1}{2}$  mill. Though we are not certain that these three clusters were deposited by separate individuals, yet taking into account the size of the eggs, and that the under side of the log referred to was frequented by eight, ten, and sometimes thirteen individuals of *L. flavus* at one time, it is quite probable that the three clusters were deposited by different molluscs. Between the 28th and 29th October, the embryo slugs began to break through their prison, and lead a free and independent existence, so that from the time the eggs were laid till the young limaces were hatched, at least forty-five or forty-six days elapsed. From the time the eggs were observed till the young were hatched, frequent and regular observations were made as to temperature, state of the weather, &c. These showed a minimum temperature of 8° cent., maximum 15° cent., and an average of about 12° cent. (=53·6°F), and wet or showery days averaged fully 20%.

Among the adult *L. flavus* noticed by my son, was one of a much lighter colour than the others, this Mr. Denison Roebuck identified as var *grisea*.

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#### H. arbustorum—Shell growth.

On the 24th of April last my son and I were taking a walk in the vicinity of Greenock, when he happened to observe a specimen of *H. arbustorum*, v. *flavescens*. On examining the specimen it seemed as if it had just begun to make an addition to its shell. We took it home and fed it on bits of cabbage leaves, turnips, &c., keeping it about the kitchen window, and allowing it as much freedom as possible. After feeding on the cabbage, &c., awhile, it would make its way direct as if it knew the road, and locate itself under the water-tap, where every now and again it would be subjected to a douche, which it seemed to



enjoy very much. When first found there was about half a millimetre of new shell formed. By the end of the first week, thereafter, the new addition measured three millimetres ; by the end of the second week 6.25 millimetres ; by the end of the third week 11.5 millimetres, and by the 17th of May the mollusc had begun to form a lip, very little being thereafter added to the length of the new shell, for at the end of the fourth week, by which time the lip was well formed, the total growth measured 12.5 millimeters, so that only one millimeter of an addition had been made during that week. The new shell was much darker in colour than the rest, but was similar in the absence of any band ; the specimen thus formed a sort of link, joining *v. flavescens* with *v. marmorata*. Possibly the difference in colour might be due to difference in the kind of food it had lived on. As long as the new growth was proceeding vigorously the mollusc fed greedily, but after the lip was fairly well formed this avidity for food ceased, and it would fix itself to some part about the window, and remain quiescent for a considerable period, ere showing an inclination to feed.

I had begun to anticipate the securing of an interesting addition to my collection in this parti-coloured *Helix*, when one day it was found on the floor crushed to pieces. One might introduce an "if" here, but after the accident has happened the "if" may as well be left out. I find that "ifs" generally lead to either needless recriminations or regret, and are not philosophic.



#### Obituary.—Thomas Glover.

Amongst the few men in Manchester, who took an interest in Conchology from the early part of the present century, must be mentioned the name of Mr. Thomas Glover, who died in August last at Southport, aged 92 years, having been born in Blackburn, in May, 1795. His father and mother died whilst he was yet a young man. When quite a little boy he evinced a great delight in collecting plants, shells, and insects, and the

experimental turn of mind, which was so prominent a feature in his later life, showed itself very early in his boyhood, from the fact of sowing comfits in a flower pot in the greenhouse, his father having laughingly persuaded him that he had shaken them from a comfit tree when he visited Manchester, so young Glover thought he would grow his own comfits.

Mr. Glover was a cotton manufacturer until the advent of the power loom, when he gave the business up. He married somewhat early, and lived with his wife 67 years. He had an extensive botanical garden in the neighbourhood of Manchester, where he reared many new varieties of ferns and flowering plants. His collection of foreign shells was a large one, including importations from China, Philippine Island, South America, Tasmania, and New Zealand. His British shells were very fine, and collected for the most part by himself. His duplicates were very numerous, and with these he was ever ready to help young conchologists or old friends. He made numerous presentations of shells to the Manchester and Southport Museums. He rented a fishery in the West of Ireland for the purpose of experimenting with the Natural History of the Salmon. It was during this time that he brought away many shells from Ireland, both terrestrial and marine. He first found in the foraminiferous sand of Dog's Bay, Connemara, the beautiful semi-fossil shells of *Helix nemoralis*, and his friends were always sure of a bag of this sand when he returned from Ireland. It was extremely rich in foraminifera, which have been well worked out by Dr. Thos. Alcock. He also paid great attention to the shells of Southport; and it was from this place that he colonised Manchester with *Paludina contecta*. About fifty or sixty years ago he placed 70 living specimens in the waterworks reservoir, and some subsequently in the brickfield ponds, near his own house at Smedley, and it is from these specimens that Manchester has supplied so many fine specimens. He tried to establish a colony of *Testacella* in his garden at Smedley. When on a visit to his brother at Exeter he collected

a large quantity of the Testacella, and "planted" them in his garden, but saw no more of them until a man reported he had found a snail with a shell on the end of its tail at Crumpsall, about a mile from his garden, and Mr. Glover concluded that this was one of the survivors of his Smedley colony. They have not been seen or heard of since, now more than 25 years ago.

Mr. Glover was a correspondent of Dr. Gwyn Jeffreys, a friend of all the old Naturalists, especially the botanist of the artisan class in the neighbourhood of Manchester. He was ever ready to give a plant or a shell, and a friendly welcome to visit his gardens, hot-houses, and ferneries. T. R.

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A LIST OF MARINE SHELLS OBTAINED AT FILEY  
IN AUGUST AND SEPTEMBER, 1887.

BY REV. CARLETON GREENE, M.A.

(Read before the Conchological Society).

Having spent five weeks here, in the hope of finding out something about the Conchological interest of Filey Bay, as far as is possible in a mere summer holiday trip, I send you a few facts in case they may be of use to persons interested.

- (I.) List of shells found on the beach.
- (II.) List of those brought by fishermen from the Doggerbank and shown to me.
- (III.) Specimen (not British) procured from a fisherman, and stated to have come from the neighbourhood in the course of trawling.

(I.)

*Cyprina islandica*.—Very plentiful, and often alive towards Speeton.

*Lutraria elliptica*.—Very plentiful, and often alive towards Speeton.

- Mactra stultorum*.—Very common ; var. *cinerea* found.  
*Venus striatula*.—Very common.  
*Psammobia ferroensis*.—Uncommon.  
*Donax anatinus*.—Very common.  
*Artemis lincta*.—Rare.  
*Solen siliqua*.—Very common.  
*Tellina tenuis*.—Very common.  
*Tellina solidula*.—Not common.  
*Cardium edule*.—Not common.  
*Mactra subtruncata*.—Not common.  
*Nucula nucleus*.—One specimen.  
*Patella vulgata*.—Very common.  
*Littorina littorea*.—Very common.  
*L. obtusata*.—Common.  
*L. rudis*.—Common.  
*Rissoa ulva*.—And some other species not fully identified.  
*Purpura lapillus*.—Very common.  
*Mytilus edulis*.—Very common.  
*Murex erinaceus*.—One specimen.  
*Trochus cinereus*.—Not very common.  
*Natica catena*.—Not common.  
*Fusus antiquus*.—Not common.  
*F. propinquus* (?).—One specimen.  
*Buccinum undatum*.—Not common.  
*Anomia ephippium*.—Rare.  

(II.)

*Modiola modiolus*.—Very large.  
*Pecten opercularis*.—Fine and varied in colour.  
*Natica alderi* var. *nitida*.  
*Natica catena*.  
*Pleurotoma turricula*.  
*Scalaria communis*.  
*S. Turtonis*.—One specimen.  
*Turritella terebra*.  
*Cardium echinatum*.

*Anomia ephippium*.

*Aporrhais pes-pelecani*.—Very good specimens.

*Littorina obtusata*.

Doggerbank shells may be had in the spring from Robert Morrison, the man on Filey Brigg.

(III.)

*Crepidula*.—Fine specimen. Brought by Stockdale fisherman from some rocks in the neighbourhood; locality uncertain. There are some in the Scarborough Museum, marked as found at Scarborough, but not native.

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NOTES ON AUSTRALIAN SPECIES  
OF *BITHINIA*, *SEGMENTINA* AND *FUSUS*,  
AND DESCRIPTION OF A NEW *MELANIA*.

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

Zoological Department, British Museum.

In the list of Australian species of the genus *Bithinia*, which I published in the Journal of the Linnean Society, Zoology, vol. xvi., 1881, pp. 266, 267, I omitted to mention *B. victoriæ*, described by Tennison-Woods.\* This omission was the result of relying upon "the Zoological Record," in which no mention was made of the publication of this species.

The British Museum has recently received from Mr. John Brazier, of Sydney, two series of *Bithiniæ*, the one from Eastern Creek, New South Wales, which he informs me consists of typical examples of his *B. hyalina*, the other from Parramatta Park, Parramatta, New South Wales, comprising specimens of the species described by Tryon, as *Gabbia australis*.

On carefully comparing these two series I fail to discover any distinguishing features in the shells, and therefore unite them under the name of *Bithinia australis*.

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\* Trans. and Proc. Roy. Soc. Victoria, 1878, vol. xiv., p. 65.

The generic division *Gabbia*, proposed by Tryon for this species, appears to be altogether unnecessary. The character upon which he founded the group was a supposed peculiarity in the operculum which he describes† as “paucispiral, calcareous.” His own figure and the shells before me show that the operculum is *not* paucispiral, but normally concentric, as in other species of *Bithinia*. Such being the case, the genus *Gabbia* may be cast aside, but as the specific name imposed upon this species must, according to the laws of priority be retained, it becomes necessary to re-name the form from Victoria River, which I described as *B. australis*; this I would therefore propose should be called *B. tryoni*.

Messrs. Tate and Brazier, in their Check List of the Fresh-water Shells of Australia,‡ have already recognised the inutility of the section *Gabbia*.

### Segmentina australiensis.

A large series of specimens from Waterloo, Sydney, which I consider belong to this species, differ from the type in some respects. None of them are of so dark a colour, and not a single specimen has the internal lamellæ nearly so strongly developed. Some have only two very small tubercles, one upon the upper and one upon the lower wall of the body-whorl; others are entirely destitute of teeth of any description, and but very few exhibit the parietal lamella so conspicuous in the type. The greater or less development of these internal processes is probably regulated by age, so that in old shells they would more frequently be present, and more strongly developed than in younger specimens.

In a second series from Bundaberg, Queensland—also presented to the Museum by Mr. Brazier—I cannot detect a single example with any indication of teeth, but in all other respects these shells agree exactly with those from Waterloo.

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† American Journ. Conch., 1865, vol. i., p. 220, pl. 22, f. 7.

‡ Proc. Linn. Soc., New South Wales, 1882, vol. vi., p. 562.

The second Australian species of *Segmentina*, which I described as *S. victoriæ*, is also characterised by the total absence of these internal processes, but, as shewn in the figure, it is somewhat different in having more tightly coiled whorls (vide l. c., fig. 12), but to determine whether this is an individual rather than a specific character requires further material, for at present the species is known only by the unique specimen in the British Museum.

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### Melania supralirata.

*Testa elongata, turrita, decollata, nigra, vel saturate olivacea; anfractus persistentes 5—6, superne constricti, inferne convexi, prominentes, infra suturam sulcis duabus conspicuis spiralibus sculpti, undique minutissime transversim striati, lineisque incrementi tenuibus decussati, ultimus parvus, ad basim sulcis paucis sculptus; apertura rotunde ovata, superne acuminata, antice acuminata effusa, intus sordide cærulea; labrum tenue, superne late sinuatum; columella arcuata, cæruleo-albida.*

*Longit. anfract. sex 24 mill., diam. 9; apertura 7 longa, 5 lata.*

Hab.: Prince of Wales Island, Torres Straits.

This species is remarkable for the shortness and peculiar shape of the whorls. They are slopingly contracted above, and bulging below the middle, somewhat as represented by Reeve's figure of *M. Wallacei* ('Conch. Icon.' fig. 66). Besides the two grooves at the upper part of the whorls, others are sometimes more or less traceable over the rest of the surface. The ridge between the two sulci is in some specimens inclined to be nodulous. *M. Sooloensis* is another species which has some affinity with the present; in that, however, which is a smoother shell, the bulge or convexity of the volutions is higher up. From evidence afforded by some young specimens, the number of whorls in an adult shell, if not decollated, would be eleven.

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### Fusus Pricei.

*Fusus corpulentus*, Smith (non Conrad), "Annals and Mag. Nat. Hist.," May 1882, vol. ix., p. 344.

Since describing this fine shell I have discovered that the specific name had been previously used by Conrad,\* for a fossil species from Oregon, North America, but whether that form really belongs to *Fusus* is very uncertain, for Mr. Dall,† of the Smithsonian Institution, observes respecting it:—"This consists of the *internal cast* of a species of Mollusk, which may be a *Pleurotoma*, or almost anything else of a fusiform shape." However, to prevent any further difficulty, I think it best to re-name the living species, and have, therefore, associated with it the name of Mr. Charles Price, from whom the British Museum recently received two specimens of this species. These were collected either at Cleveland Bay, Queensland, or at Port Moresby, S.E. of New Guinea. The habitat of the type was unknown.

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**Occurrence of *Vertigo alpestris* Alder in Yorkshire.**—On May 1st of the present year, Mr. H. T. Soppitt, of Bradford, was fortunate in adding this species to the Yorkshire list. The locality is the top of a mossy ivy-covered wall at Cottingley, near Bingley, where the shells are found attached to the dead leaves and stems of the ivy. There is a rich vegetable humus on the wall, into which the *Vertigo* may penetrate in dry weather. It appears to be quite gregarious in its habits, and in favourable weather four or five specimens may be had from a single handful of leaves. It is associated with *Helix rufescens*, *Zonites crystallinus*, *Vitrina pellucida* and *Clausilia rugosa*. The vegetation on the wall consists of a few nettles, *Arenaria trinervis*, *Saxifraga tridactylites* and *Polypodium vulgare*. The altitude is about 300 feet, and the formation of the district millstone grit, with which stone the wall itself is built. Mr. J. A. Hargreaves first separated these specimens from *V. pygmea*, with which they were at first confounded.—JNO. W. TAYLOR, Oct. 10th, 1887.

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\* Geol. U.S. Explor. Exped., vol. x, p. 728, pl. 20, fig. 4.

† Proc. Calif. Acad. Sci., 1877, p. 3.



## HOW DOES A SNAIL CRAWL?

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BY ROBERT F. SCHARFF, Ph.D., B.Sc.  
Museum of Science and Art, Dublin.

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I SUPPOSE Conchologists have oftentimes been puzzled by this question. Does a snail wriggle along the ground like a worm or a snake? If this were the case we should be able to see a series of wrinkles appearing upon the sole of the foot. Indeed if we allow a snail to crawl on an inverted sheet of glass, so as to enable us to look at it from underneath, we fancy to perceive a faint indication of these wrinkles in shape of a number of dark bands or waves travelling slowly from behind forward.

The general notion is that the mechanism of locomotion in the snail is essentially the same as that in many footless larvæ of insects, with the difference that the number of wave motions produced by the foot is much greater, and that the attachment of the sole to the foreign body is much firmer. As I said, the waves which we recognise on the sole seem to strengthen this view at first sight. However, if we examine the phenomenon more closely, we find that the foot of the snail is intimately attached to the glass and that the waves do not appear between the sole and the glass, but in reality inside the foot, producing no change of form on its surface. Hence we must look for another explanation.

There can be no doubt that the locomotion of a snail, such as *Helix aspersa*, for instance, originates in the waves which we see gliding along the foot. The animal moves as long as the waves last. As soon as the play of waves disappears, the motion also ceases.

In order to obtain an interpretation of the significance of these mysterious waves, a study of the anatomy of the foot is requisite. Simroth is the only Zoologist, to my knowledge,

who has carefully investigated the course of the most intricate system of muscles in the snail. He found, in fact, that there is a net-work of muscles in the foot going in all directions. There are horizontal longitudinal and horizontal cross-fibres, vertical as well as horizontal and inclined oblique muscular fibres. After many experiments Dr. Simroth discovered that the horizontal longitudinal fibres brought about the movements of the foot. These are the extensile muscles. They produce the wave motion. By their action the sole of the foot is elongated in front, and shortly after it is shortened behind to the same extent. The effect of this is that a kind of sliding motion is produced. This motion is materially assisted by the intercalation of a layer of mucus between the foot and the object on which the animal crawls. The fugitive snail's course can always easily be tracked by the marks of slime left behind. Why should it leave this slime behind? Because the skin of the snail is so exceedingly sensitive, that the contact with a rough surface is apparently very repugnant to its tender feelings. It therefore provides itself with an abundant supply of mucus, which in the case of *Helix aspersa*, is furnished especially by the large foot-gland, but to a minor extent also by the mucous glands.

However, although this mode of locomotion may seem very pleasant, being at any rate quite unique among animals, the snail's lot is not a happy one. When the locomotary muscles are once set a-going, the movement is automatic, that is to say the snail can neither increase nor slacken its pace, nor can it go backwards. In that respect it is like a watch which may be wound up and which we can stop at will, but we cannot force the wheels to change their rate of velocity. Hence when the snail is pursued by an enemy, it is unable to run away or rather slide away. The only possible manner to evade the enemy is to stop the motion of the foot and wind up another series of muscles by means of which the snail is enabled to retire within its shell.

ON A NEW SPECIES OF SINISTRAL *LIMNÆA*,  
FROM CENTRAL AUSTRALIA, WITH SOME  
REMARKS ON SO-CALLED SPECIES OF *PHYSA*,  
ALSO FROM AUSTRALIA.

BY THE REV. A. H. COOKE, M.A., F.Z.S.

Curator in Zoology, Cambridge.

(Read before the Conchological Society.)

Some years ago, ten or a dozen specimens of a fresh-water shell were sent from Australia to my friend, Mr. H. M. Gwatkin, of St. John's College, Cambridge, the exact locality being given as "Paroo Creek, River Darling, 90 miles north of Mount Murchison." The shell was sinistral, the dentition Mr. Gwatkin at once determined to be that of a typical *Limnæa*, such as our own *stagnalis* or *peregra*.

Failing to find the species described in the Monographs, it occurred to me the other day to take specimens to the British Museum, to see if the shell were known there. I found that the species is probably new, but closely allied to two other sinistral species in the British Museum, both from Australia.

These however, curiously enough, were described, and have always been regarded as *Physa*, not as *Limnæa*. They are:—

1. **Physa Hainesii** Tryon, Amer. Journ. of Conch., vol. ii., p. 9, pl. ii., fig. 9.
- „ „ Smith, Journ. Linn. Soc. Zool., vol. xvi., On the Freshwater Shells of Australia, p. 281.
- „ „ Küster, Mart. and Chem. Conch. Cab., *Physa*, nr. 252, p. 366, taf. 49, fig. 1.
- „ **latilabiata** Sowb., Conch. Icon., vol. xix., *Physa*, fig. 33, *a. b.*
- „ **Schayeri** Troschel, Mus. Berolin.

LOCALITY : Australia (W. Newcomb, M.D.), India? (W. A. Haines), Victoria R. and Depuch I., N. Australia (Smith).

Described by Tryon as an *Isidora*, which subgenus, however, seems peculiar to Africa (see the monograph in Küster).

2. **Physa Newcombi** Ad. and Ang. P.Z.S., 1863, p. 416.  
 „ „ Smith, Journ. Linn. Soc. Zool., vol. xvi., On the Freshwater Shells of Australia, p. 280.  
 „ „ Sowb., Conch. Icon., vol. xix., *Physa*, fig. 21.  
 „ „ Küster, Mart. and Chem. Conch. Cab., *Physa*, nr. 131, p. 299, taf. 43, fig. 6.

LOCALITY : Ponds near Mount Margaret, Stuart's Expedition (Angas).

TYPE in Mus. Brit.

There is no evidence, in the descriptions of these two shells, that their authors examined the animal. The shells being sinistral, and rather large and ventricose, it probably did not occur to them that they were anything else but *Physa*, or that it were possible, perhaps, for a species of *Limnæa* to be permanently reversed. Mr. Gwatkin's examination of the animal of our shells was confined to the dentition, but was sufficient to establish beyond the possibility of a doubt that they were *Limnæa* and not *Physa*. If, therefore, we find that on conchological grounds these two other species from the same part of Australia, hitherto described as *Physa*, approach very closely to ours, there are strong grounds for believing—in the absence of the certainty which an examination of the radula would afford—that they also are *Limnæa*.

In a question like this, an examination of the type specimens is the most convincing test that can be applied.\* The outer surface of the shell, in all these three species, is that of a

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\* I will place the type specimen of the new species in the Mus. Brit.

*Limnæa* and not of a *Physa*, a surface comparatively coarse and rough, with none of the polish and lustre which is seen on the shell of a *Physa*, and which is produced by the constant movement of the expanded mantle lobes which cover its outer surface. Add to this the exceeding deep suture, the gaping umbilicus, and the very strongly reflected columella. Smith, on "*Physa Newcombi*," remarks (*ut supra*), "the great development of the labium is very unusual in this genus."

Sinistral species of *Limnæa* exist, according to Tryon, "Structural and Systematic Conchology," vol. iii., p. 101, in New Zealand and the Sandwich Islands. He makes no mention of any in Australia.

I will now describe the shell which appears to me a new species of *Limnæa*.

*Limnæa physopsis* n. sp., plate ii., figures 1—4.

SHELL sinistral, very ventricose, solid, opaque, scarcely lustrous, horn colour, with bands of deeper colouring at the lines of growth, strongly striated lengthwise, with faint indications of keels here and there on the last whorl; EPIDERMIS thick; WHORLS 4, the last occupying nearly all the shell; SPIRE blunt and flattened; SUTURE very deep; MOUTH very large, rotundate-oval; OUTER LIP rather strong, not reflected; INNER LIP strongly reflected on the columella; UMBILICUS large and deep; length .75 inch, breadth .75 inch.

HABITAT, Paroo Creek, River Darling, Australia.

TYPE, in the British Museum.

For purposes of comparison, I add (pl. ii., figs. 5, 6) drawings from photographs of the radula of *Limnæa physopsis*  $\times 72$ , and of a typical *Physa (acuta)* Lam.)  $\times 210$ .



DESCRIPTION OF A NEW SPECIES OF *CONUS*,  
AND A NOTE ON A WHITE VARIETY  
OF *C. EBURNEUS*.

By EDGAR A. SMITH, F.Z.S.  
Zoological Department, British Museum.

**Conus milesi.**

*Testa anguste fusiformis, alba, maculis fuscis irregularibus longitudinalibus ornata, sulcis transversis angustis punctatis sculpta; spira elongata, concava, alba, fusco maculata; anfractus 10, supremi duo globosi, lævigati, cæteri superne declives, dein angulati, ad angulum concinne coronati, supra sulcis spiralibus 1—2 arati; apertura angustissima, longit. totius  $\frac{2}{3}$  fere æquans; labrum arcuatum, superne subprofunde sinuatum.*

*Longit.* 21 mill., *lat.*  $7\frac{1}{2}$ ; *apertura* 13 longa,  $1\frac{1}{2}$  lata.

*Hab.* : Muscat, Arabia, 5—20 fathoms.

This species is well distinguished by its fusiform shape, its coronate spire, the style of coloration, and the spiral grooves, which are about thirty in number on the body-whorl, and finely punctured or pitted.

The figure of *C. scalaris*, on plate 88, in Kiener's "Coquilles Vivantes," gives a very fair idea of the form of the present species, which is, however, a trifle narrower at the shoulder. The markings are disposed very much as in *C. acutangulus*, Kiener (l. c. plate 72, fig. 1, figure on right), but are in somewhat larger patches.

The single specimen was presented to the British Museum, by Colonel J. B. Miles, with whose name I have associated the species.

**Conus eburneus var.**

The British Museum has recently obtained from Mr. Sowerby, a shell about an inch in length, which on examination, I believe to be a variety of this common species. It is probably only about half-grown, and differs from the normal

form in being destitute of the dark square spots so characteristic of the species. Upon the upper part of the spire this feature is represented however by the presence of three or four small pale spots, which are situated as usual near the outer edge, between the suture and the outer of the two spiral sulci which revolve up the spire. This is certainly not a bleached shell but a true albino variation.



PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY.

Meeting

HELD JULY 7TH, 1887.

The President, Mr. J. W. Taylor, in the chair.

NEW MEMBER.

Mrs. A. M. Dyer, of Swansea, was elected a member of the Society.

DONATIONS.

A collection of Land and Freshwater Shells were presented by Mr. T. D. A. Cockerell, and thanks unanimously voted for the valuable donation.

PAPER READ.

The President read a paper entitled "Conchological Notes," by Mr. T. Scott, in which the author gave details of the time of deposition of the eggs of several Gastropods, their number, and time of hatching.

SPECIMENS EXHIBITED.

Mr. Scott sent for exhibition, in illustration of his paper, the eggs of *Helix nemoralis*, *H. aspersa*, and *Limax flavus*.

The Chairman also exhibited, on behalf of Mr. Knight, living specimens of *Bulinus montanus*, from Callow, Somersetshire; for Mr. Wallis Kew, examples of *Clausilia rolphii*, from the neighbourhood of Louth; on behalf of Mr. Alexander

Shaw, a large collection of shells collected in the neighbourhood of Glasgow ; and for the Rev. S. Spencer Pearce, M.A., specimens of *Helix lapicida*, var. *albina*, from stone walls, near Wells.

Mr. W. Nelson showed the following living mollusca on behalf of Mr. G. S. Tye—*H. undata*, from Madeira ; *H. vermiculata* and *B. decollata*, from Malta ; and *H. aperta* from Nice.

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## Meeting

HELD AUGUST 4TH, 1887.

The President, Mr. J. W. Taylor, presided, and formally opened the meeting to receive nominations for new members.

### NEW MEMBERS.

Mr. Joseph S. Galizia, of Valetta, Malta, was nominated for membership by Miss Fairbrass and Mr. Taylor.

Mr. T. Mawson Harvard, of Leyland, near Preston, was nominated for membership by Messrs. C. Harvard Pierson and Robert Standen.

### SPECIMENS EXHIBITED.

A number of specimens were brought forward for exhibition, but further consideration of them was postponed until next meeting.

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## Meeting

HELD SEPTEMBER 1ST, 1887.

Mr. W. D. Roebuck, F.L.S., Vice-President, presided.

Minutes of the July and August meetings were read and confirmed.

### NEW MEMBERS.

Mr. Joseph S. Galizia, of Malta, and Mr. T. Mawson Harvard, of Leyland, near Preston, were duly elected members of the Society.

### DONATIONS.

“Transactions of the Wagner Free Institute of Science,”  
1887.—By the Institute.



"Smithsonian Report," part 1, 1885.—By the Trustees.

"Proceedings of the Linnæan Society of New South Wales," vol. ii., part 1.—By the Society.

*Succinea putris*, from Niagara Fall, N. Y.; *Helix pulchella*, var. *costata*, *Patula cooperi*, *P. striatella*, *Zonites fulvus*, *Pupa* sp.? from West Cliff, Colorado.—By Mr. T. D. A. Cockerell. Specimens of *Leda pygmæa* (Münst.), *Axinus flexuosus* (Mont.), *A. croulinensis* (Jeff.), *A. ferruginosus* (Forb.), *Rissoa abyssicola* (Forb.), *R. zetlandica* (Mont.), *R. vitrea* (Mont.), *Odostomia conoidea* (Broc.), *O. acicula* (Phil.), var. *ventricosa* (Forb.), *Pleurotoma brachystoma* (Phil.), *Cylichna nitidula* (Lor.).—By Mr. A. Somerville, B.Sc.

The thanks of the Society were accorded the donors for their valuable gifts.

#### PAPER READ.

"On a New Species of sinistral *Limnæa* from Central Australia, with some remarks on so-called species of *Physa*, also from Australia."—Rev. A. H. Cooke; M.A., F.Z.S.

#### SPECIMENS EXHIBITED.

Mr. W. Nelson showed examples of *Planorbis albus*, from near Harrogate, collected by Mr. F. R. Fitzgerald. These specimens measure nine millimetres, and are quite as large as those mentioned by Dr. Jeffreys, in his work on British Conchology. Also *Planorbis albus* var. *Draparnaldi*, from Sandal, nine millimetres, and *P. albus* from Kibworth, Leicestershire (and not co. Durham, as quoted by Dr. Jeffreys), collected by Dr. Norman.

Mr. J. W. Taylor showed a number of shells collected at Folkestone, and sent by Mr. Whitwell; also an example of a sinistral *Limnæa* from Brisbane, sent by the Rev. A. H. Cooke, with a description and photograph of the dentition. Mr. Taylor further exhibited a number of specimens of *Helix arbustorum*, sent by Mr. Charles Oldham, of Sale, Cheshire. These included examples of the type, and the varieties *alpestris* and *flavescens*—

a fine specimen of the latter being sinistral—from Buxton ; type shells from Marple, Cheshire ; and specimens of *H. rotundata* var. *alba*.

Correspondence from Messrs. Somerville, Duncan, Brazier, Galizia, Melvill, and Mrs. Dyer was brought before the meeting.

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## Meeting

HELD OCTOBER 6TH, 1887.

The President, Mr. J. W. Taylor, in the chair.

The minutes of the preceding meeting were read and duly confirmed.

### NEW MEMBERS.

Rev. Churchill Babington, D.D., V.P.R.S.L., F.L.S., &c., of Cockfield Rectory, Suffolk, proposed by Rev. Carleton Greene, M.A. ; Mr. Thomas Hey, Bloomfield Street, Derby, proposed by Mr. J. A. Hargreaves.

### PAPER READ.

A short account of the Marine Shells of Filey, collected during a few weeks stay in August and September, 1887, by Rev. Carleton Greene, M.A.

### SPECIMENS EXHIBITED.

The President exhibited, on behalf of Mr. Brockton Tomlin, B.A., *Pupa ringens*, *Z. purus*, &c., from Amlwch, Isle of Anglesea, and *B. acutus* var. *bizona* from Guernsey.

On behalf of William Whitwell, a large collection of Land and Freshwater shells from Margate, Folkestone, Minster, and other localities. Also a large number of shells from sand dredged from the Thames at Chelsea, including *Pisidium henslowana*, *P. corneus*, *P. vortex*, *P. albus*, &c.

On behalf of Mr. W. H. Heathcote, specimens of *Unio margaritifera*, from the River Lune at Halton.

On behalf of Misses Laura and Katharine Mason, *Vertigo pygmea*, *Helix caperata*, &c., from Chapel Sandhills, Lincolnshire.

On behalf of Dr. Churchill Babington, specimens of *H. cantiana*, from Sudbury and Bardwell, Suffolk.

On behalf of Mr. E. Collier, specimens of *H. cantiana*, from Heyst-sur-mer, near Antwerp.

On behalf of Mr. Richard Howse, specimens of *Limax arborum*, from Akeld, and *Limax lævis*, *Arion Bourguignati*, *Zonites radiatulus*, *Z. purus*, *Z. crystallinus*, and other species from West Woodburn, Northumberland.

On behalf of the Rev. J. E. Somerville, B.D., a fine collection of Land and Freshwater shells and slugs, collected in Caithness, Sutherland, Inverness, Ross, Perthshire, and other Scottish localities.

There was also a collection shown of the shells of Queensland, embracing *H. pachystyla*, *Incei*, *blomfeldii* and *rustica*, *Succinea strigata*, *Bulinus pacificus*, *Paludina Essingtonensis*, &c., some of which were added to the Society's collection.



DESCRIPTION OF A NEW VARIETY OF *PLANORBIS*  
*CARINATUS* MÜLL.

BY BAKER HUDSON.

(Read before the Conchological Society).

*Planorbis carinatus* v. *albida*.

Form similar to type, but colour pellucid white.

This variety was taken by me in the mill race Blue-stone Mill, near Norton, co. Durham, on April 18th, 1885.

At the same place I have met with very pale-coloured specimens of *Limnæa peregra*, the variety *excavata* Jeff., of *Bythinia tentaculata*, and variety *albida* Rimmer, of the same species.

## BIBLIOGRAPHY.

**Catalog der Conchylien-Sammlung** von Fr. Paetel. Parts i.—iii. (Gebrüder Paetel, Berlin).

Herr Paetel has published a new and extended edition of the catalogue of his shell collection. He purposes publishing the catalogue in three sections, the first of which will contain the Cephalopods, Pteropods, and Marine Gastropods. The second will contain the Land and Freshwater Shells, and the third will comprehend the Bivalves and Brachiopods.

The catalogue, which is beautifully printed on good paper, will be of great service in arranging collections, and for many other purposes, as the great number of species enumerated, though arranged alphabetically under each genus, gives references to the different sub-genera to which they should be properly referred.

The three parts already issued complete the Cephalopods and Pteropods, and reach the genus *Scalaria* in the Marine Gastropods.

**A Complete Catalogue of British Mollusca.**—Compiled from "Jeffrey's British Conchology," with alterations and additions to date.—By CHARLES JEFFREYS.

This useful catalogue, which is one of a series of Natural History Lists, published by Mr. H. W. Marsden, of Midland Road, Gloucester, is intended to supply Conchologists with a list for labelling collections. It is in a convenient and handy size, and printed on good paper on one side only. The ordinal, family, and generic names are all given with suitable distinctness for labelling. The generic and specific names of every species is given in full in a bold and readable type; the varietal names are also given without abbreviation, and in a less prominent type than the chief form.

For a work of this character there are remarkably few errors or omissions.

The complete list is published at 1/3, and may be had from the Author or the Publisher direct, or the Land and Freshwater section may, if desired, be had separately, price 4d.

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**Handbook of Manchester.**—Prepared by the Local Committee for the members of the British Association, at the Manchester Meeting, 1887.—Mollusca, by J. Cosmo Melvill, M.A., F.L.S., F.E.S., &c.

Mr. Melvill has compiled a very excellent account of the Land and Freshwater Mollusca of the district twelve miles round Manchester, thus including portions of Cheshire and Derbyshire. In all eighty-three species are enumerated, forty-one of which are freshwater and forty-two land shells. Under each species is given precise information as to the localities where they have been found. The most interesting species is undoubtedly *Planorbis dilatatus*, which has not yet been found out of Lancashire.

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**Manual of Conchology, Structural and Systematic,** with illustrations of the species. Second series: Pulmonata, by Geo. W. Tryon, Junr. Parts i.—x.

To expedite the completion of this great work, upon which the author has been engaged for some years, the happy idea was carried out of issuing simultaneously with the marine species, a second series embracing the Pulmonata, of which ten parts have appeared up to the present time. Mr. Tryon divides the group in the first instance into Stylommatophora, which broadly speaking, embraces the land snails and Basommatophora which contains the aquatic species.

These parts consist of no less than 757 pages of letter-press, in which every species is briefly described and very often its relationship indicated. The plates, 155 in number, are full of well executed figures of every species described. The work, when finished, will be indispensable to the Conchologist.

**The Land and Freshwater Shells of Montgomeryshire** (Extracted from collections Historical and Archæological, relating to Montgomeryshire and its borders, issued by the Powys-land Club for the use of its members.—Vol. xxi., part xi., April 1887), by J. Bickerton Morgan.

This welcome list helps us to a knowledge of a little known district. Prior to this publication, only seven species were on record for the county, viz., *Cyclas pallida*, *Succinea Pfeifferi*, *Helix aspersa*, *hispida* and *nemoralis*, *Clausilia rugosa* and *Ancylus fluviatilis*. Now it is shown by Mr. Morgan's exertions that 24 land and nineteen freshwater shells inhabit the county, and this cannot by any means be regarded as a complete list as the author's investigations have been mostly confined to the district round Welshpool. The most interesting species are perhaps *Zonites radiatulus* and *glaber*, *Helix aculeata*, *Unio margaritifera*, *Limnæa glabra* and *stagnalis*.

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**Manual of Conchology, Structural and Systematic**, with illustrations of all the species.—By Geo. W. Tryon, Junr. Parts xxv.—xxxv.

This great work continues to appear with great regularity, and the excellence of the illustrations and exactitude and accuracy of the text maintains the high standard to which we have become accustomed. In these parts the following genera are exhaustively treated—Terebridæ, Cancellariidæ, Strombidæ, Pediculariidæ, Doliidæ, Cassididæ, Naticidæ, Calyptræidæ, Xenophoridæ, Vermetidæ, Turritellidæ, Cæcidæ, Eulimidæ, Pyramidellidæ, Turbonillidæ, Sculariidæ, and Cerithiidæ. The monograph of the family Cypræidæ is prepared expressly for the work by S. Raymond Roberts, who is so well and favourably known in connection with his labours upon this group. The family Solariidæ has been undertaken by William B. Marshall, B.S., who has made this section of the Mollusca an especial study.

The parts we have under our notice contain nearly 1,000 pages of text, embracing full indices of the various family and no less than 185 excellently executed plates.

**The Wesley Naturalist.**—Monthly Journal of the Wesley Scientific Society, edited by Rev. W. H. Dallinger, LL.D., F.R.S., &c., Rev. W. Spiers, M.A., F.G.S., &c., and Rev. H. Friend. F.L.S.—London: T. Woolmer, 66, Paternoster Row, E.C.—Monthly 6d.—No. 5, July 1887.

This periodical, which we understand is more especially aimed to become a means of inter-commuication among Scientists of the Wesleyan denomination, is full of varied and clever articles by well-known authors. In Conchology there is a short, general account of the *Pteropoda*, by Rev. C. Crawshaw. There is given on the last pages a list of Referees who offer their services to the less experienced collectors. The Conchological Referee is Rev. C. Crawshaw, Falmouth.

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**The Naturalist's Monthly.**—A Journal for Nature-Lovers and Nature-Thinkers, edited by Dr. J. W. Williams, M.A., and published by Walter Scott, 24, Warwick Lane, E.C.—Monthly 6d.

This is a new monthly, and two numbers have already appeared. The scope of the work is very wide, embracing in the parts already issued a lengthy and interesting contribution on the "Mollusca of Guernsey and Herm," by Brockton Tomlin. Mr. Geo. Roberts supplies "The Snails and slugs of my garden," and Mr. H. E. Quilter "The origin and History of Freshwater Faunas," in which the mollusca have frequent mention. In addition to these articles, specially interesting to ourselves, there are contributions by Rev. Dr. Dallinger and others, bearing upon almost every branch of Science. Amongst the papers may be mentioned "The Pathology of the Celandine," "The Evolution of the Fishing Hook," "Binary Suns," "Biography of Darwin," "A chapter on the Centipedes and Millipedes," &c., &c. The proceedings of the Learned Societies are well reported, and there are numerous items of current news and reports of captures.

**Les Mollusques Marins du Roussillon**, par E. Bucquoy, Ph. Dautzenberg and G. Dollfuss. Parts xi.—xiii.

These parts, which complete the first volume of this exquisite work, contain sixteen photographic plates executed with the same skill that has characterised all the preceding. Part xi. treats of the Turbinidæ, Adeorbidæ, Haliotidæ, Janthinidæ, and Fissurellidæ. Part xii., of the Calyptridæ, Capulidæ, Patellidæ, Siphonariidæ, and Gadiniidæ. Part xiii., completing the volume, deals with the Chitonidæ, Actæonidæ, Bullidæ, Aplysiidæ, Oxynoëidæ, Pleurobranchidæ, and Dentalidæ. In addition to the figures of the shells as previously given, there are added representations of some portions of the accessory parts of internal organs as the calcareous plate found in the stomach of Scaphander. In Chiton there are given views of the anterior, median and posterior valves, isolated from the rest, and showing both exterior and interior. We are glad to give this work unqualified commendation, not only for the carefulness, precision and accuracy of the text but the beauty and scope of the photographic illustrations.

**Histoire Malacologique de l'Abyssinie**, par M. J. R. Bourguignat.

This work is mainly the outcome of the examination of the Mollusca found by M. Achille Raffray, Vice-Consul at Massowah, who had charge of a mission to King John of Abyssinia, in the course of which he traversed many parts of Abyssinia practically unknown to Europeans.

M. Bourguignat enumerates all the species hitherto recorded from Abyssinia, and points out all those which in his opinion are synonymous. He also describes the following as new *Helixarion* Raffrayi, pl. vii., f. 12—14; *Thapsia* euriomphala, f. 17—20; *Sitala* Raffrayi, f. 15, 16; *Vitrina* Milne-Edwardiana, f. 7—9; *V. Raffrayi*, f. 1—3; *V. Herbini*, f. 4—6; *Succinea* Poirieriana, pl. viii., f. 55—58; *S. Æthiopica*, f. 47, 48; *Helix ferretiana*, pl. vii., f. 34—37; *H. Herbini*, pl. vii., f. 25—28; *H. galinieriana*, pl. vii., f. 30—33; *H. Raffrayi*, f. 21—24; *H. Achilli*,



pl. viii., f. 38—40; *H. hamacenicæ*, pl. viii., f. 40—43; *H. subnivellina*, f. 44—46; *Bulimus Raffrayi*, f. 77, 78; *B. Herbini*, f. 74; *B. simonis*, pl. ix., f. 63; *B. Achilli*, f. 75, 76; *B. Tamisierianus*, pl. x., f. 80; *B. abbadianus*, f. 79; *B. Galinierianus*, pl. ix., f. 60; *B. Lejeanianus*, f. 61; *Raffraya* (new genus); *Milne-Edwardsi*, pl. x., f. 84—87; *Abbadia* (new genus) *æthiopica*, f. 82—83; *Ennea Raffrayi*, f. 88—91; *Pachnodus Rochebrunianus*, f. 81; *Subulina perrieriana*, pl. ix., f. 64; *S. mabilliana*, f. 68, 69; *Limnæa acroxa*, pl. x., f. 94; *L. Alexandrina*, f. 95, 96; *L. Raffrayi*, f. 97, 98; and *L. æthiopica*, f. 92, 93. There is also in addition to the four plates upon which the new species are figured, a map of the African continent, upon which are colored the limits of the four faunal regions which are found in that continent.



#### A New Variety of *Sphærium corneum*, Linn.—

In a pool which stands in a field (locally known, I believe, by the name of Spratt's Farm) near Hampstead Heath, on June 4th, I came across a pretty, and so far as I know, unnamed, variety of *Sphærium corneum*. It is paler than the type, and has the umbones shaded with brown colour, in which there are three just-discernible bands forming segments of a circle, and of darker brown. Externally to these and separated by a band of ground-colour, is another similar band of the same tint as the others but much better defined in outline. I purpose to name this variety *brunneo-fasciata*.—J. W. WILLIAMS, D.Sc.

*Helix lapicida* L. var. *albina*.—This variety is to be found in the vicinity of the old cathedral city of Wells, in Somersetshire. During 1883, on several occasions, and quite lately in May of the present year, I have taken this white form on a loose ivy-covered, stone wall on the old Bristol Road, just outside the city. The variety is associated in this place with individuals of a pale pinky brown colour, as well as with the ordinary dark brown form. The pale brown specimens are the most frequent. It is easy indeed to arrange a complete series which will show every variation in colour from the dark brown to the purest white. The wall in which this variety flourishes is composed of rough blocks of liassic limestone, taken from a small pit close at hand.—[REV.] S. SPENCER PEARCE, B.A.

HOGG'S LIST OF THE MOLLUSCA OF  
THE NEIGHBOURHOOD OF STOCKTON-ON-TEES.

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WITH ANNOTATIONS

BY BAKER HUDSON, M.C.S.

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(Read before the Conchological Society).

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[The work in which this list was originally published—Brewster's History of Stockton—being a very scarce one, we have pleasure in reprinting it, with the additional notes supplied by Mr. Hudson from his own intimate personal acquaintance with the district. The reprint is a verbatim one.—ED.].

The full title of the work is as follows :—‘ The | Parochial  
History | and | Antiquities | of | Stockton-upon-Tees |  
including an | account of the trade of the town | the naviga-  
tion of the river | and of | such parts in the neighbourhood |  
as have been connected with that place. | ——— | Second  
Edition | with additions and alterations. | ——— | *Celebrare  
domestica facta.*—Hor. | ——— | By John Brewster, M.A. |  
Rector of Egglecliffe | Fellow of the Society of Antiquarians  
Newcastle-on-Tyne. | ——— | Stockton on Tees | printed by  
Thomas Jennett ; | and sold by John Richardson, 91, Royal  
Exchange, | London. | MDCCCXXIX. |

On the back of the page containing advertisement to second edition, the author returns thanks to helpers—‘ and more particularly to John Hogg, Esq., M.A. F.L.S., and Fellow of Saint Peter's College, Cambridge, for his laborious and valuable appendix on the natural history of the district.’

[APPENDIX II. Page 23].

A list of fluviatile shells found in the environs of Stockton.

In this list the following works have been consulted : ‘ Linnæi, *Systema Naturæ*,’ vol. 2, edit. 12 ; ‘ The Linnæan Transactions,’ vol. 8 ; ‘ Draparnaud *Histoire des Mollusques Fluviatiles*,’ &c. ; and ‘ Donovan's British Shells.’

## SECTION I.—UNIVALVE SHELLS.

1. **Nerita fluviatilis**, Drap., Lin. Syst.—River nerite ; Don., vol. i., tab. 16, fig. 2. Extremely rare in our rivulets. J. H. has also found this shell at Seaton Snook and in the slake near Hartlepool.

[*Neritina* is scarcely likely to be native to the district, but may possibly have been brought in with ballast. I have never met with it. Dixon and Watson ("Land and Freshwater Shells," Darlington, 1858), say, "We have frequently obtained dead specimens from the ballast hills near Middlesbrough, which have been brought from the mouths of other rivers."—B. H.]

2. **Cyclostoma obtusum**, Drap. } Obtuse top shell.  
*Turbo fontinalis* Lin. Trans. } Don., vol. iii., t. 102.  
 Common in all the streams about Stockton. [This is *Valvata piscinalis*.]

[Page 24].

3. **Cyclostoma impurum**, Drap. } Olive water shell.  
*Helix tentaculata*, Lin. Syst. } Don., vol. iii., tab. 93.  
 A very abundant species. [This is *Bythinia tentaculata*.]
4. **Planorbis contortus**, Drap. } Thick, river cheese snail.  
*Helix concerta*, Lin. Syst. } Don., vol. iii., t. 99.  
 In the Billingham becks. [An *erratum* at the end of the index reads: "P. 24, No. 4, for *concerta* read *contorta*."]
5. **Planorbis vortex**, Drap. } Common whirl shell.  
*Helix vortex*, Lin. Syst. } Don., vol. iii., t. 75.  
 Exceedingly common.
6. **Planorbis marginatus**, Drap., t. 2, f. 11, 12 } Marginated  
*Helix complanata*, Lin. Syst. } whirl shell.  
 In a ditch by the Osier Halt, near Norton Mill.
7. **Ancylus lacustris**, Drap. } Oblong fresh water limpet.  
*Patella oblonga*, Lin. Syst. } Don., vol. v., t. 15.  
 This shell is occasionally found in some of our rivulets.
8. **Ancylus fluviatilis**, Drap. } Lake limpet.  
*Patella lacustris*, Lin. Syst. } Don., vol. v., t. 147.  
 J. H. has found this and the preceding species sparingly in the mill race near Billingham Mill.

9. *Lymnea palustris*, Drap. } Marsh snail.  
*Helix palustris*, Lin. Gmel. } Don., vol. v., t. 175  
*Helix fragilis* and *Helix fontinalis*, Don. }  
 Not unfrequently met with in ditches.
10. *Lymnea minutus?* Drap. } Mud snail.  
*Helix limosa*, Lin. Syst. }  
*Helix putris*, Lin. Trans. }
- Plentiful in ponds and rivulets. [This is *Limnaea peregra*.]
11. *Physa fontinalis*, Drap. t. 3, f. 89 } Fountain dipper.  
*Bulla fontinalis*, Lin. Syst. - }
- Abundant in the mill dam and in a pond near Norton Mill.
12. *Physa hypnorum*, Drap., t. 3, f. 12, 13 } Moss dipper.  
*Bulla hypnorum*, Lin. Syst. }
- The species inhabits in abundance the field called Miry Carr, between Norton Mill and the Billingham road.

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13. *Succinea amphibia*, Drap. } Amber snail.  
*Helix succinea*, Lin. Trans. } Don., vol. v., t. 168, f. 1.  
*Helix putris*, Don. }
- Very common on the plants by the sides of ditches in all our marshy grounds. [This is *Succinea putris*.]
14. *Helix hispida*, Drap., Lin. Syst.  
 Bristly snail. Don., vol. v., t. 151, f. 1.  
 An amphibious species which is frequently seen both in the water and on plants by the sides of ditches.

## SECTION II.—BIVALVE SHELLS.

15. *Cyclas cornea*, Drap. } Horny Tellen.  
*Tellina cornea*, Lin. Syst. } Don., vol. iii., t. 96.  
 Common in most ditches and streams.
16. *Cyclas lacustris*, Drap., t. 10, f. 6, 7 } Lake Tellen.  
*Tellina lacustris*, Lin. Gmel. }
- A rare shell. It is found in a pond about half-a-mile to the north-east of Portrack.

[I have found *Sphærium lacustre* fairly abundant in the district, and particularly so near Port Clarence and all along Cowpen Marsh. It is not uncommon near Norton.—B. H.]

17. *Tellina rivulis*, Lin. Trans. } River Tellen.  
*Tellina amnica*, Lin. Gmel. } Don., vol. ii., t. 64, f. 2.  
 This species occurs sparingly in the same rivulets with  
 the horny Tellen. [This is *Pisidium amnicum*.]
18. *Unio pictorum*, Drap. } Painters' muscle.  
*Mya pictorum*, Lin. Syst. } Don., vol. iii., t. 89.  
*Mya ovalis*, Don.

In the ponds at Wynyard, Mr. W. C. Trevelyan.

[This record of *Unio pictorum* is quoted by Dixon and Watson (Mr. Watson, a native of the district, however, never confirmed it) also in Alder's Cat., 1848.

I have visited Wynyard with a view to confirming this but without success, and am inclined to think Sir W. C. Trevelyan has been mistaken in his species, which might possibly have been *Anodonta cygnea* var. *rostrata*, a variety or approaches to which I have met with close to Wynyard.—B. H.]

19. *Unio margaritifer*, Drap. } River pearl muscle.  
*Mya margaritifera*, Lin. Syst. } Don., vol. iii., t. 73.

Da Costa mentions that this muscle inhabits the Tees. J. H. has found it in great plenty in the small River Browney, near Bearpark, about three miles to the north-west of Durham. Linnæus says, "*habitat in totius orbis arctici cataractis.*"

[Is not Da Costa's species more likely to be *Mya arenaria*, common at the 'Tees' mouth? I have not seen his notice. I have visited Bearpark this year, and very carefully worked the stream from a mile above Bearpark to a mile below the same place, but could find no signs of this species. The bed of the stream and the current would be favourable to the mussel, but since Mr. Hogg's time many collieries have been opened in the valley and their pumpings and waste water may have to no small extent affected the water and rendered it unfit for the reproduction of the species. The poisoning of the water has certainly materially reduced its value as a trout stream since I was a boy.—B. H.]

20. *Anodonta anatina*, Drap. } Duck muscle.  
*Mytilus anatinus*, Lin. Syst. } Don., vol. iv., t. 113.

Most abundant in all our ditches, ponds, and rivulets, and is the food not only of fishes, but also of water birds and

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crows. This species varies much in size and colour, and like the River pearl muscle it is often found with the umbones decorticated.

[I believe the greater portion of *Anodonta* taken in the district are correctly referable to *anatina*; so far as my experience goes the type of *cygnea* does not occur, but then again the specimens are not pronounced *anatina*, but various intermediate forms. All my specimens, however, are taken from moving water, not ponds. Alder, in his catalogue, refers only to *anatinus*.—B. H.]

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NOTES ON *LIMNÆA PEREGRA* VARS. *BURNETTI*  
 AND *LACUSTRIS*.

BY J. MADISON.

(Read before the Conchological Society).

I WAS much interested in Mr. William Nelson's very lucid article upon *Limnæa peregra* var. *burnetti* in the April number of this journal and his description of the shell from the Welch locality, which he thinks may be referred to *burnetti*. I went to find the shell and see the kind of place it inhabited. The lake is of considerable size, being about three miles round, and situated in the Black Mountains on the Carmarthenshire side. It is a very barren and desolate place, there not being a tree and scarcely a shrub to be seen.

The shells were numerous, as also were *Ancylus fluviatilis*. While the *Limnæa peregra* were very much the shape of *burnetti* in the body whorl, they varied slightly in the length of the spire, but none of them had the spire intorted. From Dr. J. G.

Jeffreys' description of *burnetti*, it is the spire being intorted that distinguishes this remarkable variety. They seem to agree more with Jeffreys' description of the variety *lacustris*. There is very little difference in the shape of these shells and those I found in Lake Windermere several years ago, the Windermere shells being shorter in the spire. In comparing the *burnetti* from Loch Skene, and the *peregra* from St. Mary's Loch, Dumfriesshire, Scotland, Llyn-y-van-fach, Carmarthenshire, Wales, Lake Windermere, Westmorland, and Lake Derwent, Cumberland, I find a great resemblance in the form, and they are all rather strong shells. It was a very good remark of Mr. Nelson that the lesser amount of modification would point to a shorter time of isolation of the Welch shells than those of Loch Skene.

I think there is a good reason why the shells in these lakes should have this form. There is a great resemblance in the conditions of all these lakes. At the time I visited them there were very few weeds in either of the lakes to protect them, the shells were generally attached to the bare stones, like the *Ancylus fluviatilis*; and although Lake Windermere and Lake Derwent, unlike the other lakes, are protected by trees, they are of such an extent that the wind has great effect upon the waters, and the waves come rolling over the stony beach, and roll the shells about. Now if they had been of the ordinary form and strength of *peregra*, they must have been broken.

This I take is an example of the survival of the fittest.

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**Helix raffrayi.**—I see that M. Bourguignat has described a species under this name from Abyssinia ("Histoire Malac. de l'Abyssinie"), but the name is preoccupied by Tapparone-Canefri for a species from Western New Guinea. I would suggest that the name of the Abyssinian species be changed to *Helix raffrayana* in order to distinguish it from the New Guinea one.—T. D. A. COCKERELL, West Cliff, Colorado, December 8th, 1887.

## A DAY'S COLLECTING NEAR HOWDEN, YORKS.

BY W. NELSON.

(Read before the Conchological Society.)

AN account of a real day's collecting amongst the *Limnæidæ* is of more real service to sound and practical naturalists than one of an ideal day's work, though the latter can be made much more interesting and certainly can be done with infinitely less trouble, all that is required being a few lists of other workers with a few species added from imagination; but after all it would have been a day's collecting that could not have been done, and nothing is more likely to damp the ardour of a beginner than falling far short of what he has been led by the account of an ideal day's work to think can be accomplished.

Having agreed with Mr. Collinge to have a day's snail-hunting, and both of us being most interested in the *Limnæidæ*, we planned to visit the flat piece of country round Howden and Wressle, being sure here to find numerous drains, slow streams and ponds, in fact the very places to find shells of this family. In addition to this I was most desirous of visiting the Market Weighton Canal where I hoped to find *Limnæa auricularia*.

On Whit-Monday of this year (30th May, 1887), I joined my companion at Leeds, Marsh Lane Station, where we booked to Selby. Arriving here we rebooked to Howden, but on arriving at this place we retained our seats and went forward to Easttrington. The morning was very dull and threatening, in fact rain fell during a short space of time at Howden, but had ceased when we arrived at Easttrington. Here we found we could save some walking by taking the train on the Hull and Barnsley line to Newport, on arriving at which we at once hurried to the banks of the Market Weighton Canal, but on getting a view of it, we were quite satisfied that we must quickly leave it again. It is evidently a tidal canal, and at the time of



our visit, between the bank and the water was a wide expanse of soft mud, on which we could not find a single track left by a crawling mollusk, and not being provided with strong nets with which to search for the Unionidæ we lost no time in vain regrets, but resolved to try and retrieve the day in some other direction.

Leaving the canal at the first road to the left, we soon came to a ditch where we obtained specimens of *Limnæa peregra* and *Limnæa truncatula*. Here I observed a very unusual sight, namely *Limnæa truncatula* in the act of floating. The *Limnæidæ* as a Family seem to be very fond of floating on the surface of the water with their shells downwards, more especially *Limnæa peregra*, *L. stagnalis*, *L. glabra* and *Physa hypnorum*, whilst *Limnæa auricularia* I have never yet seen floating, and before to-day I had not seen *Limnæa truncatula* performing this action.

Leaving this ditch we passed some distance alongside a hedge bank and saw specimens of *Helix nemoralis* and *Helix cantiana*, and resting on a blade of grass a beautiful small butterfly which I found was the Small Copper.

A little further on this lane we came to a place called Cow-bridge. Here is a rather broad drain which seems to have been somewhat recently cleaned out. There were no weeds growing in it, but here and there very sparsely distributed were small straggling tufts of grass-like plants with one or two small loose patches of *Callitriche*. There after considerable searching we obtained examples of *Limnæa peregra*, *L. palustris*, *Physa hypnorum*, *Planorbis spirorbis* and *Pl. marginatus*, and my companion obtained a single specimen of *Limnæa glabra* this—combined with the *Physa hypnorum*—proving that they had been washed down the slowly flowing drain from no doubt some smaller and more luxuriantly weed-grown ditch. A word or two here respecting the association of *Limnæa glabra* with *Physa hypnorum* and *Planorbis spirorbis*; though not invariably found together, as a rule they are generally found in the same

habitats and in this case the three species were evidently away from home, their favourite habitats being small and shallow, in fact nearly dry, ditches and grassy ponds. In searching these ditches when dry in summer *Planorbis spirorbis* will be found with a solid epiphragm waiting the return of rain.

Crossing the bridge over the drain we saw a small grass-grown pond in a field ; we pushed our way through the hedge, and after some searching obtained a few examples of *Planorbis nautilus*, the smallest and I think I may say the prettiest, of the genus, having the whorls covered with small ridges, which are in some cases produced into rather long and elegant spines ; this latter form is called var. *crista*.

Leaving the pond we regained the road and sat on the trunk of a fallen tree, and whilst we partook of refreshment an old man, a native of the district, accosted us, and during the conversation stated that the whole district had been a large common which was enclosed and drained somewhere about a hundred years before. I mention this because I have an idea that *Limnæa glabra* is a species that is likely to die out or become more rare as the old commons become drained and destroyed. I have collected it in many districts and have been enabled in nearly every case to trace its connection with commons by the survival of the plants usually met with in such localities.

Getting near to the village of Sandholme, which by-the-by has got a descriptive name, we come to a portion of the common covered with small shallow grassy ponds, with here and there holes where sand has been dug. The ponds seem to be ideal habitations for mollusks, but with the exception of *Limnæa peregra* and *Planorbis spirorbis*, there seemed to be very little in them, but in a small ditch that was almost dry we obtained *Planorbis spirorbis*, *Physa hypnorum* and *Limnæa glabra*.

Just before we entered the village we came to a drain which had not been cleaned out and which was consequently full of various species of aquatic plants and an abundance of

molluscan life, amongst which were rather fine examples of *Limnæa peregra*, also *Planorbis carinatus*, *Planorbis vortex*, *Planorbis corneus*, and *Physa fontinalis*. Close to this place is a village called Hive; it is indeed so close as to be almost a continuation of it. In a ditch quite in the village we obtained examples of *Limnæa peregra* and *Planorbis spirorbis*.

We now entered upon a number of cross roads that were very rough, and trudged along some distance before again sighting water; at length we came to a ditch near Ousethorpe, and after spending sometime in search we found we had obtained examples of *Limnæa peregra*, *L. palustris*, *Physa fontinalis*, *Planorbis vortex*, and *P. marginatus*. One specimen of *L. palustris* had the body whorl of a somewhat unusual size.

In a pond near Sleights House we examined the duckweed (*Lemna minor*) and found a good number of *Planorbis nautilæus*, but the process being a very tedious one we soon tired of it. The only shell we obtained here besides was *Planorbis spirorbis*.

Again going some distance we got into a lane rejoicing in the easy-going name of Featherbed lane. Here we went along very smoothly for some distance until we neared Yokegate; here in a ditch we got specimens of *Limnæa peregra*, *L. palustris*, *Physa hypnorum* and *Planorbis spirorbis*. The surface of the Lane now became very uneven, and was not much easier to walk on than a featherbed would be, but we plodded along, keeping a sharp look out for any water to search, as much for an excuse to stop as to get shells. Spying a pond close to the hedge, but of course at the other side, we got through and found examples of *Planorbis corneus*, *P. marginatus*, *Limnæa peregra*, *L. stagnalis*, and *L. palustris*, and in the ditch which was connected with the pond were numerous examples of *Planorbis spirorbis*, *Physa hypnorum*, and *Limnæa glabra*, but I do not think that a single example of the last three was found in the pond. The *Physa hypnorum* were rather fine and looked very pretty as they floated in the water with their dark blue-black bodies contrasting pleasingly with the bright amber colour

of their shells. The *Limnæa glabra*, *L. stagnalis*, *L. palustris*, and *Planorbis corneus* were eroded, whilst the *Limnæa peregra*, *Planorbis marginatus* and *Physa hypnorum* were not. Various theories have been put forward at different times to account for this erosion, the latest being that of Karl Semper, who ascribes it as the work of a microscopic fungus. The latter ditch and pond were near to Caville wood; leaving here we get to the end of Featherbed Lane.

We again got into cross roads that seemed to lead anywhere but the way we wished to go, and the time was getting along so that we did not do all the searching we might, but we felt compelled to stop and search a pond in the corner of a field which lies temptingly easy to get at; here we found *Physa fontinalis* and *Planorbis marginatus*. We were now getting near to Wressle, which my companion was determined to visit, to search for *Paludina contecta*, and though we can see Wressle we are compelled to describe a circle to get to it. After making one or two fruitless efforts to get at the Fleetdike we were compelled to go the usual way past the Castle along the Bubwith road and across the fields. Getting to the dyke we lost no time but began to search for *Paludina contecta*, the most local of our Yorkshire shells, this being at present perhaps the only really Yorkshire habitat known. With careful searching we soon found several examples each. I found a large *Limnæa peregra* and Mr. Collinge again found a single example of *Limæna glabra* evidently away from home. Retracing our steps across the fields we reached a pond near the dyke but found the only shell to be *Planorbis marginatus*, and in another pond in a pasture near to the Old Hall we found *Limnæa peregra*. We now got to the station where we had to sit some time waiting for our train, and arrived at Leeds at about half-past ten at night.

We found that we had taken 13 species of *Limnæidæ*. Several common and widely distributed species, such as *Planorbis albus*, *P. contortus*, and the two forms of *Ancylus*, all

shells that we were no doubt justified in expecting to meet with, were absent from our captures, but to compensate us we had two hitherto unrecorded habitats for the local *Limnæa glabra*, this of itself making the day's collecting somewhat remarkable, as years may elapse before either of us again finds this species in a new locality.

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ON THE MARINE SHELLS OF MAGILLIGAN  
STRAND, COUNTY TYRONE,

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BY MISS HONORIA GALWEY, M.C.S.

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(Read before the Conchological Society).

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HAVING read with great interest the paper of the Rev. Carleton Greene on "Marine Shells found at Filey" (read before the Conchological Society), I should like to bring under the notice of the lovers of conchology, some of the Strands in Ireland, and one in particular, Magilligan, with which I am well acquainted, believing that a visit would amply repay the trouble. The place is easy of access by the Belfast and Northern Co.'s Railway from Belfast to Londonderry, and good lodgings and accommodation can be had at Castlerock, a sea-bathing place close at hand, also at Downhill, though of a rougher description. I subjoin a short account of shells which I picked up in the course of some hours spent on the strand above mentioned, in the months of June and August, 1886, and August, 1887. I doubt not that a dredge in a few feet of water would bring in treasures in greater variety. Magilligan Strand extends in a broad belt of "golden sand" for about seven miles, from Downhill station to the mouth of Lough Foyle, in a curve of the open Atlantic lying to the North and North-west. A large number of the shells which I gathered contained the living animal, others were just emptied and left unbroken by sea-gulls, which, disturbed at their feast, flew on a few yards ahead. The

tide (neap) in gentle ripples brought in among the cast-off "sand cases" of *Sabella chrysodon* (?) specimens of more fragile shells, namely:—*Cypræa Europæa*, *Cardium*, *Tornatella*, and *Velutina*, these two last especially delicate and beautiful.

At my last visit, August, 1887, there was a great change, few shells, in comparison, were to be found, except quantities of *Donax anatinus*, very lovely and brilliant in colour, but for a considerable distance the shore was strewn with little bunches of sea-wrack, amongst which were splendid specimens of *Ianthina fragilis*, both shell and animal in excellent preservation, and the float perfect. There were also numbers of the *Hyalæa tridentata*, several of which, as well as the *Ianthina*, I have preserved in spirits of wine, others I shut up tight in a little box and found on opening, after three months' absence, that they were quite dry and in perfect form; they have the appearance of frosted silk-gauze.

I found no difficulty in taking the animal of the *Ianthina* out of its shell; after being some hours in a basin of sea-water a long pin easily brought them out.

The Rev. J. G. Wood describes these shells as of "a pale blue colour." Those I found are "deeply, darkly, beautifully blue!" but as it is probable they fade in strong light, I keep mine in a shady corner of my cabinet.

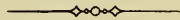
The following is a list of the shells which I found:—

- Arca tetragona.** Common, imperfect, single valves.
- Artemis exoleta.** Rare, perfect.
- A. lincta.** Very plentiful, alive.
- Buccinum** —. Common.
- Bulla (Scaphander) lignarius.** Not very common.
- Cardium rusticum.** Very common.
- C. edule.** Not common.
- C. fasciatum.** Common.
- C. norvegicum.** Rare.
- Cypræa europæa.** Very common.
- Cyprina islandica.** Very plentiful.

- Donax anatinus.** Very plentiful, alive.  
**Emarginula** —. Rather common.  
**Fissurella** —. Rather common.  
**Fusus** —. Common.  
**Ianthina fragilis.** Common at certain seasons.  
**Littorina** —. Not common.  
**Lucina borealis.** Not very common.  
**Lucinopsis undata.** Rare.  
**Lutraria elliptica.** Very common.  
**Mactra stultorum.** Very plentiful, alive.  
**M. elliptica.** Very plentiful, alive.  
**M. truncata.** Rare.  
**Modiola** —. Not common.  
**Murex erinaceus.** Not common.  
**Mya truncata.** Common.  
**Mytilus edulis.** Very common, alive.  
**Nassa reticulata.** Common.  
**Natica monilifera.** Very common, alive.  
**Natica** —. Occasional.  
**Ostrea edulis.** Occasional.  
**Patella vulgata.** Common.  
**P. athletica.** Occasional.  
**P. pellucida.** Occasional.  
**Pecten.** Several varieties, including *pusio*, *tigrinus*, *varius*,  
but these are generally single valves, some very small and  
beautiful.  
**Pectunculus glycimeris.** Very common, too often dead  
shells, but sometimes alive.  
**Pilopsis ungaricus.** Rather common.  
**Psammobia ferroensis.** Rare.  
**Purpura lapillus.** Common, alive.  
**Scalaria communis.** Rare.  
**Solen ensis.** Very common, alive.  
**S. siliqua.** Very common, alive.  
**Tellina tenuis.** Very common.

- T. solidula*. Not common.  
*Tornatella fasciata*. Common.  
*Trochus cinereus*. Common.  
*T. magus*. Rare.  
*T. zizyphinus*. Common, alive.  
*Turritella communis*. Not common.  
*Teredo navalis*. Occasional.  
*Velutina lævigata*. Plentiful occasionally.  
*Venus striatula*. Very plentiful, alive.  
*Tapes virginea*. Some very good specimens.

I may add that Magilligan is but one of many strands rich in marine treasures. Portmarnock, in the neighbourhood of Dublin, I have visited. All round the west coast of Donegal there are many. Of Cruit, Carrickfinn, Mullaghderg, Rutland, &c., a friend (himself an experienced conchologist), writes:—"These are richer in varieties than any English or Scotch strands I have read of."



## PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY

### Meeting

HELD NOVEMBER 3RD, 1887.

The President, Mr. J. W. Taylor, presided. The minutes of the October meeting were read and duly confirmed.

#### NEW MEMBERS.

Rev. Churchill Babington, D.D., V.P.R.S.L., of Cockfield Rectory, and Mr. Thomas Hey, of Derby, were duly elected members of the society.

The following gentlemen were nominated for membership: Mr. Sylvanus Hanley, F.L.S., by Mr. J. W. Taylor; and Mr. Alfred Caruana de Conti Gatto, by Mr. G. S. Tye.

#### DONATIONS, &c.

"Die Geographische Verbreitung der Heliceengruppe Macularia."—Dr. W. Kobelt.



“The Collectors’ Manual of British Land and Freshwater Shells” ; by Lionel E. Adams, B.A.—The Author.

“Tableau des Mollusques de la France” ; by J. R. Draparnaud  
Purchased.

PAPERS READ.

“A Day amongst the Limnæidæ,” by Mr. W. Nelson.

“On *Vertigo alpestris* in Yorkshire,” by Mr. J. W. Taylor.

“Notes on Hogg’s List of Shells found in the Neighbourhood of Stockton-on-Tees,” with a copy of the list itself, by Mr. B. Hudson.

SPECIMENS EXHIBITED.

Examples of *Vertigo alpestris* from Bingley were shown by Mr. W. D. Roebuck, and the president exhibited a collection of the shells of the Azores.

## Annual Meeting.

HELD DECEMBER 15TH, 1887.

The President, Mr. J. W. Taylor, presided. The minutes of the November meeting were read and confirmed.

The correspondence was taken as read.

NEW MEMBERS.

Mr. Sylvanus Hanley, F.L.S., and Mr. Alfred C. de Conti Gatto, Valletta, Malta, were duly elected members of the society.

The following were nominated for membership: Mr. Philip B. Mason, M.R.C.S., F.L.S., F.E.S., F.R.M.S., Burton-on-Trent, and Mrs. A. Evans, Thrupp, near Stroud, by Mr. J. W. Taylor; Miss L. C. Jones, Clifton, Bristol, by Mr. E. J. Lowe; and Mr. F. Akers, Mabgate, Leeds, by Mr. W. E. Collinge.

Messrs. W. E. Clarke, F.L.S., and J. A. Hargreaves were appointed to act as scrutineers. Mr. F. R. Fitzgerald was elected to audit the accounts.

DONATIONS.

The following donations were laid on the table:—

“Proceedings of the Linnean Society of New South Wales,”  
vol. ii. part 2.—The Society.

A collection of shells, numbering 110 species (the critical notes on which will be published in the April part of this journal).—Mr. John Brazier, F.L.S., C.M.Z.S.

A collection of shells from the Mediterranean, numbering 26 species.—Mrs. Fitzgerald.

Land and freshwater shells collected in Derbyshire.—Mr. J. Hagger.

Varieties of *Purpura lapillus* and *Mytilus edulis* from Newquay, Cornwall.—Mrs. A. Evans.

A hearty vote of thanks was accorded the donors for their valuable gifts.

#### ADDITIONS TO LIBRARY.

Nachrichtsblatt d. deutschen Malakozool. Gesellschaft., complete to end of 1887. Purchased.

Malakozoologische Blätter, twenty-five volumes. Purchased.

#### PAPERS READ.

“Notes on *Mitra (Costellaria) rugosa*, Swainson”; “Descriptions of Six New Species of Pecten”; “Descriptions of Fifteen New Species of Mitra”; and “Description of a New Species of Cypræa”; by Mr. James Cosmo Melvill, M.A., F.L.S.

“Notes and Critical Remarks on a Donation of Shells sent to the Conchological Society,” by Mr. Jno. Brazier, F.L.S.

#### SPECIMENS EXHIBITED.

Dr. W. H. Evans exhibited specimens of *Limnæa physopsis* from South Australia.

Mr. Francis R. Fitzgerald showed a collection of *Limnæa peregrina* from eleven localities, and the varieties *ovata* from Eccleshill, *acuminata* from Markington, and *ampullacea* from Plumpton; *Limnæa auricularia* from Henley-on-Thames, *L. stagnalis* from Burnley, Manchester, and elsewhere, *Helix cantiana* from Swansea and Huddersfield, the variety *alba* from Brighton, *H. virgata* from Askern, and *H. ericetorum* from West Witton and Christchurch.

Mr. Melvill showed the new species of *Mitra* and *Pecten* in illustration of his papers; *Conus gloria-maris* (Chemnitz) Bohol I. Philippines, one of the most perfect of the twelve specimens known to exist; *Voluta junonia* (Chem.), Gulf of Mexico, an unusually perfect specimen; *Voluta festiva* (Lam.), Africa, specimen formerly in the Dennison collection, and referred to by Reeve in "Conch. Iconica"; *Cypræa guttata* (Gray), China (?), the most perfect of the seven or eight recorded specimens.

Mr. W. H. Heathcote sent for exhibition an ingenious and novel combination collecting implement, comprising a dredge, Anodon rake, &c.

The President brought for exhibition the Album of Conchologists he is forming, and which already contains near fifty portraits of well-known persons, and to which additions are earnestly desired.

The annual report was read by the secretary, and adopted unanimously.

The recorder next presented his report of the records made during the year.

The Curator then gave a short verbal report on the condition of the society's collection.

The accounts for the year were brought forward by the treasurer, and after some discussion were passed. The receipts (including balance from last year) were £47 os. 5½d., expenses £38 7s. 2½d, and balance in hand £8 13s. 3d.

The scrutineers announced that 89 voting papers had been received, and the results of the voting was :

PRESIDENT.—Sylvanus Hanley, F.L.S., 75 votes.

VICE-PRESIDENTS (Four required).—

Jno. W. Taylor ... .. 79 A. H. Cooke, M.A., F.Z.S. 46  
 Alex. Somerville, B.Sc., F.L.S. 69 J. C. Melvill, M.A., F.L.S. 35

SECRETARY AND TREASURER.—Thos. W. Bell, 84 votes.

RECORDER.—W. Denison Roebuck, F.L.S., 81 votes.

CURATOR.—Wm. Nelson, 79 votes.

## COUNCIL (Six required).—

B. B. Woodward, F.G.S.	61	Lionel E. Adams, B.A.	... 51
R. D. Darbshire, F.G.S.	57	Wm. Jeffery	... 39
Edgar A. Smith, F.Z.S.	... 53	E. J. Lowe, D.L., J.P., F.R.S.	38

On the proposal of Mr. Denison Roebuck, Mr. W. E. Collinge was appointed Assistant Curator.

## PRESIDENTIAL ADDRESS.

The President, J. W. Taylor, gave an address "On Variation in British Land and Freshwater Mollusca." The thanks of the meeting were tendered to the President for his most valuable and exhaustive address.

## ALTERATION OF RULES.

It was resolved that the Rule relating to foreign members' subscriptions, inadvertently omitted in the reprint of January last should be reinstated, viz. :—

That foreign members pay an annual subscription of 7/6.

Resolved that Rule 8 be amended as follows : That the election of officers take place by ballot—the voting papers to be sent to the Secretary under cover of sealed envelopes addressed to the Scrutineers.

Resolved that Rule 5 be amended as under : 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.

## ANNUAL REPORT.

THE occasion of presenting the Ninth Annual Report affords an opportunity for a brief review of the society since its formation.

The society was founded in 1876 by four enthusiastic and able conchologists, namely : Messrs. W. Nelson, J. W. Taylor, Hy. Crowther, and W. D. Roebuck, at a meeting held on the 12th of October at Mr. Nelson's residence. At that time the idea of a national society does not appear to have been entertained, and the society then formed was plainly designated "The Conchological Club,"

The club worked quietly and steadily on for some time, papers were read, numerous specimens were exhibited, critically examined and compared with others, and interesting and profitable discussions followed these personal efforts. The club was also joined by a number of Conchologists non-resident in Leeds. Early in 1878 the condition of the club and its position in the natural history world were carefully considered with a view to a re-organisation on a more extended basis. In the result on the 30th of May in that year, "The Conchological Society," as at present organised, was established, with Mr. Nelson as its first president. Since then, as you will have been able to gather from the reports published in the 'Proceedings' of the society, steady progress has been made; and through the activity of its members, the society is certainly becoming the recognised authority on all matters connected with the land and freshwater section of Conchological Science. Doubtless, if in answer to the appeal made by the council last year, and now reiterated, those members who interest themselves in exotic, marine and fossil conchology would make the society the channel for their communications, similar results would be attained in those sections also.

The success that has attended the society since its formation has not failed during the past year. The meetings which have been regularly held each month have generally been of an interesting character. Thirty-five members have been elected, and three have resigned.

Papers have been communicated by the President, the Rev. A. H. Cooke, Rev. Carleton Greene, and Messrs. J. T. Marshall, J. W. Cundall, Thos. Scott, J. R. B. Tomlin, W. Nelson, and Baker Hudson; and by Messrs. J. C. Melvill and Jno. Brazier at this meeting.

The exhibits as in previous years have been both large in number and varied in character.

The Museum and Library have been enriched by several valuable donations and purchases which have from time to time been made known in the published 'Proceedings.'

Negotiations have been opened with the council of the Leeds Philosophical Society to obtain a room in which to hold our meetings, and secure better accommodation for our books and specimens in the Leeds Museum, Park Row. If an arrangement can be made, members will be able to examine the society's collection of books and specimens under proper supervision, during the ordinary museum hours. Your council deem it desirable that the specimens should be placed in cabinets of an easy portable size, and arranged in a way most suitable for ready reference to all specimens that have been authenticated by the society's referees.

In instances where considerable donations have been made by individuals it is suggested that they be kept in separate cabinets, labelled with the donor's name.

For the convenience of members it is intended to issue a catalogue of such books as the society possess ; and it may be found possible to issue a general list of the shells also.

Your council note with pleasure the widening circle of those whose interest in the society is aroused, and beg to urge all members to personal effort in promoting the interests and extending the influence of the society.

#### RECORDER'S REPORT.

DURING the past twelve months the number of records made and authenticated by our referees has been 1,577, including both British and Foreign examples of the British Land and Freshwater Mollusca, a lower figure than those of recently preceding years. This diminution is in part due to the fact that the attention of your Referees and your Recorder has of late been directed more to other departments of research, and in part to the fact that so far as England and Wales are concerned, the distribution of land and freshwater mollusca has been very thoroughly and systematically investigated during the past few years, as is evidenced by the fact that out of the total number of 21,755 records which have been made, no less than 19,402 are for England and Wales alone. For Scotland there are but

1,145 records, for Ireland but 508, and for foreign localities but 674 records on the books. It is hoped that members will facilitate the work by submitting Scotch, Irish and foreign specimens in large numbers, so as to hasten the completion of our knowledge of distribution.

The averages which have been struck as to the records of species for the various counties show that while for English counties the average is 49 species per county, for Scotland it is only 12, and for Ireland only 7 per county.

The virgin counties as they may be called, i.e. those from which not a single record has yet been made, and to which it is hoped that special attention will be paid by such as may have the chance of investigating them, are 17 in number, viz. :—1 in Wales (Cardigan), 3 in Scotland (Wigton, Elgin, East Ross), and 13 in Ireland (Monaghan, Fermanagh, Cavan, Louth, Meath, Carlow, Kilkenny, Queen's Co., Longford, Leitrim, Mayo East, Galway East, and Tipperary North). It may be pointed out that the absolutely necessary thing to be borne in mind is that the actual specimens should be submitted for determination by the referees before the recorder can enter them on his record-book. The essence of the record-system is that all specimens recorded have actually been seen by the referees and passed by them, and that in no case whatever can this rule be relaxed.

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On the motion of Mr. W. E. Clarke, the thanks of the meeting were accorded the officers for their services during the year, and all members who have aided in promoting the welfare of the Society.

On the proposition of Mr. W. Denison Roebuck, the thanks of the Society were accorded the Council of the Leeds Mechanics' Institute and Literary Society for the use of their rooms.

The question of providing cabinets for the society's specimens was considered at some length, and eventually left in the hands of the Council.

Mr. Melvill said it was desirable that cabinets should be procured, and he was authorised by Mr. R. D. Darbishire to give the sum of 21/- to a fund for that purpose, and would give a like amount himself. The Rev. H. Milnes and the President (Mr. J. W. Taylor) also gave similar amounts. Dr. W. H. Evans contributed 10/- to the same fund, to which further subscriptions are earnestly desired.

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ON *TEREBRATULA PAPILLOSA*, MARSHALL,

BY J. T. MARSHALL.

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THE discovery by Mr. B. Sturges Dodd of further specimens of this presumed recent Brachiopod, one of which, embedded in a matrix of limestone conglomerate, has prompted further investigation and consideration, with the result that its recent origin must be considered untenable.

Specimens have been submitted to Mr. Etheridge for his opinion, who gives his impression that they are the *Terebratulina striata* of D'Orbigny—a cretaceous fossil, and adds :—"There is no difficulty as to its stratigraphical position, the contiguity to the chalk of Lincolnshire and the condition of the drift materials being enough to account for their situation."

On referring to Davidson's "Monograph of the British Cretaceous Brachiopoda," where *T. striata* is described and figured, I am bound to agree with Mr. Etheridge. It is an exceedingly variable species, and has been described by Palæontologists under various names; but Dr. Davidson states that after a careful examination of hundreds of specimens, from the fry to the adult, that the many variations in form may be traced to the one species—viz. : *Terebratulina striata* D'Orb.

My description of this species, with figures, appeared in the Journal of Conchology for April, 1887.



## DESCRIPTIONS OF SIX NEW SPECIES OF PECTEN.

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

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**Pecten Gladysiæ** nov. sp. Pl. ii, fig. 5.

*P. testâ ovatâ, pertenui, planiusculâ, stramineâ, albis flocculis nubeculatâ, valvis subæqualibus, costis lirisque numerosissimis, ferè triginta, sublævibus, auriculis inæqualibus, flexuosis.*  
*Long. 28 mill., lat., 24 mill.*

Habitat ?

A very striking form, and not very nearly allied to any species with which I am acquainted. The thin, flattened valves, of a bright straw colour, are clouded here and there with flaky-white markings, the ribs and ridges are extremely numerous, about thirty altogether in either valve.

**Pecten Guendolenæ** nov. sp. Pl. ii, fig. 6.

*P. testâ globosâ, perconvexâ, subæquilaterali, valvis duo et viginti costis radiatis, triliratis ut in P. coruscante, interstitiis scabrosulis, valvâ sinistrâ roseo-brunnâ et pruno-maculatâ, dextrâ pallidiose, auriculis inæqualibus, intus coloratâ.*  
*Long. 15 mill., lat. 15 mill.*

Hab. : Mauritius.

A subglobose little species, brightly coloured with white, rose, and plum-colour arranged in blotches. Very like a small *P. nucleus*, until its sculpture and structure be examined. The only shell with which this can be compared is *P. coruscans* (Hinds), described in Moll. Voy. Sulphur, p. 61, pl. 17, f. 3. From that species this would seem to differ in its decidedly more squarrose form, its having twenty-two, as against twenty, ribs, the more lively coloration, and the difference in locality. *P. coruscans* being from the Marquesas Islands.

**Pecten Hastingsii** nov. sp. Pl. ii, fig. 7.

*P. testâ globosâ, subæquilaterali, inæquivalvi, valvâ dextrâ majore, dextro umbone altiore quàm sinistrâ, costis octodecim pulchrè sculpturatis, biliratis, totâ superficie utrimque undato-scam-*

*nata, albâ, fluctibus purpureo-brunneis hic illic conspersa, intus purpuræcente, auriculis inæqualibus.*

*Long. 25 mill., lat. 24 mill.*

Hab. : Japonia.

A conspicuous little globose shell, very beautifully concentrically striated in a wave-like fashion, the ribs being twice furrowed, or bilirate. In form a slight superficial resemblance to young specimens of the South American *P. purpuratus* may be traced, but from that the whole sculpture abundantly differs. I have much pleasure in associating with this species the name of my friend, Hastings Dent, Esq., F.L.S., F.G.S., whose recent travels round the world, including China and Japan, resulted in some very interesting discoveries.

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**Pecten hysginodes** nov. sp. Pl. ii, fig. 8.

*P. testa subquadrato orbiculari, lævi, subæquivalvi, valva sinistra subconvexa, ambabus quindecim-costatis, costis lævibus, interstitiis copiose transliratis, rosea, ad latera albescente, brunneo-sparsa, auriculis æqualibus, rectis, serratis, dentatis, intus roseo-alba.*

*Longit. 21 mill., lat. 23 mill.*

Habitat ?

This extremely beautiful shell is totally unlike any other Pecten, and ranks amongst the most exquisite of a genus famed for beauty of sculpture, form, and colour. Towards the sides of the valves, the rosy-brown and white marbling alternate in zigzag pattern. Upon the left valve, with the exception of one crescent-like brown blotch, the colour is deep rose, suggesting the trivial name. Towards the umbones the white predominates. The right valve is similarly coloured, but paler, and it is much more convex than its fellow.

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**Pecten psarus** nov. sp. Pl. ii, fig. 9.

*P. testa ovata, æquilaterali, subæquivalvi, valvis novemdecim costatis, costis eleganter serrulatis, plumbeo-alba, brunneo-fluctuata, auriculis subæqualibus.*

*Long. 20 mill., lat. 18 mill.*

Hab. : Japonia.

A prettily marked piebald species, dull-white, ornamented with brown waves latitudinally, relieved by brighter flecks of white and grey, the left valve being, as is so often the case, more conspicuously marked than the right. Ribs nineteen in number, the hook-like serræ being very regular and beautiful.

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**Pecten valdecostatus** nov. sp. Pl. ii, 10.

*P. testa subtrigona, altiore quàm longa, æquilaterali, æquivalvi, valvis quindecim costatis, costis squamulatis, interstitiis profundè sulcatis, subregularibus, auriculis inæqualibus, intus albescente.*

*Long. 26 mill., lat. 24 mill.*

Hab. : Hong Kong.

A dull-coloured but boldly-formed species, the furrows being remarkably deep for so small a shell, and the ribs therefore very well defined, they being also beautifully serrulate.

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All the foregoing species are described from the types, at present unique, in my collection.

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DESCRIPTIONS

OF FIFTEEN NEW SPECIES OF MITRA.

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

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**Mitra Marionæ** nov. sp. Pl. ii, fig. 11.

*M. testa subelongata, fusiformi, spira attenuata, acuta, anfractibus transversim sulcatis, sulcis cancellatis, albida, fulvis maculis areolatis regularitè ornata, columella quinqueplicata.*

*Long. 20 mill., lat. 7 mill.*

Habitat ?

Shell somewhat elongated, fusiform, spire attenuated, acute, whorls transversely furrowed, the furrows being cancellated, colour white, ornamented with square light-brown spots disposed at regular intervals, columella five-plaited.

A very beautiful and peculiar shell of the subgeneric group *Cancilla* (Swn.). The species to which it would appear most nearly allied, is the *M. Philippinarum* (Adams), but from this it differs slightly in sculpture and entirely in marking.

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**Mitra ærumnosa** nov. sp. Pl. ii, 12.

*M. testa oblonga, tenui, lævi, epidermide cornea tecta, olivaceo-albescente, immaculata, columella triplicata, apertura nune albescente, nune fulva, tenuicula.*

*Long. 20 mill., lat. 9 mill.*

Hab. : Algoa Bay, South Africa (collected by Mr. Furse).

Shell oblong, thin, smoothish, covered with a horny epidermis, olivaceous-whitish, without markings, columella three-plaited, mouth sometimes white, sometimes tawny-coloured within, thin.

Of this plain species, which is somewhat allied to *M. (Isara) Schröteri* (Desh.), I have two specimens, and have seen many others. It will probably be eventually relegated to the genus *Volutomitra* (Gray) when the lingual dentition of that now obscure genus has been more critically examined.

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**Mitra astyridiformis** nov. sp. Pl. ii, fig. 13.

*M. testa polita, oblonga, brunnea, subcompressa, spira acuta, anfractibus minutissime punctato-striatis, labro intus sinuato. columella quadriplicata.*

*Long. 15 mill., lat. 4 mill.*

Habitat ?

Shell polished, oblong, brown, rather compressed, spire acute, whorls very minutely puncto-striate, lip sinuate within, columella four-plicate.

This species must be placed in the subgenus *Mitreola* (Swn.), coming near *M. flexilabris* (Newc.). In general size and appearance it first recalls a *Columbelliform* mollusc of the section *Astyris*, e.g. *filosa* (Carp.), but when examined with a lens, the whole surface is seen to be regularly and minutely pitted in transverse lines, and all resemblance to the *Columbellidæ* ceases.

**Mitra caloxesta** nov. sp. Pl. ii, fig. 14.

*M. testa obovato fusiformi, spira acuminato-turrita, anfractibus superne subrotundatis, parcé costoso plicatis, interstitiis punctato-striatis, plumbeo-virescente, anfractu ultimo fascia angusta albida ornato, columella quadriplicata, apertura nigrescente.*

*Long.* 16 mill., *lat.* 6 mill.

*Hab.* : Andaman Isles.

Shell obovate-fusiform, spire turreted, pointed, whorls somewhat rounded above, sparingly costoso-plicate, the interstices punctato-striate, olive-green and lead colour, the last whorl decorated with a narrow white band, columella four-plaited, the mouth very dark within.

An elegant little polished shell, quite unlike any other member of the subgenus *Turricula* with which I am acquainted.

**Mitra chariessa** nov. sp. Pl. ii, fig. 15.

*M. testa fusiformi, spira elongata, subturrita, anfractibus subangulatis, infra suturam plicatellis, longitudinaliter creberrime liratis, interstitiis clathratis, albida, pura, columella quadriplicata.*

*Long.* 18 mill., *lat.* 6 mill.

*Habitat* ?

Shell fusiform, spire elongate, turreted, whorls somewhat angled, delicately plaited beneath the suture, longitudinally very frequently ribbed, the interstices latticed, colour pure white, columella four-plaited.

A remarkably beautiful shell, pure white with a very slight pinkish tinge, of exquisite sculpture and texture. It is very distinct from all the species known to me, and is a satisfactory addition to the subgenus *Costellaria* (Swains).

**Mitra transenna** nov. sp. Pl. ii, fig. 16.

*M. testa ovato-turrita, spira acuta, albida, anfractibus transversim impresso-striatis, longitudinaliter creberrime liratis, liris brunneo-ochraceis uniformibus, columella quadriplicata.*

*Long.* 19 mill. *lat.* 8 mill.

*Hab.* : East Indies.

Shell ovately turreted, spire acute, whorls transversely impresso-striate, longitudinally very frequently ridged, ridges of a uniform sienna brown, columella four-plicate.

This, if not a variety, undoubtedly comes very near *M. arenosa* (Lam.), which, with *M. exasperata* (Chem.), makes up one very variable species, and, whilst differing in the absence of any central fascia, and peculiar in the straight many-ridged brown lines, from any of the many specimens of the above mentioned that I have examined, I describe it as distinct with some little diffidence, although it has been pronounced by some experienced conchologists to whom it has been shown, a true species.

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**Mitra Sybillæ** nov. sp. Pl. ii, fig. 17:

*M. testa lanceolata, spira turrata, anfractibus longitudinaliter costoso plicatis, costis compressis, angustis, interstitiis valde striatis, cinereo-alba, infra plumbeo-nigrescente, apice eodem colore tincto, columella quinqueplicata.*

Long. 16 mill., lat. 5 mill.

Hab. : Andaman Islands.

Shell lanceolate, spire turreted, whorls longitudinally costoso-plicate, the ribs compressed, narrow, the interstices conspicuously and deeply striate, ashy white, below bluish lead colour, the apex being tinged with the same colour, columella five-plaited.

An ornate little shell with narrow compressed ribs, and conspicuously two-coloured, belonging to the subgenus *Turricula* (Klein).

---

**Mitra percnodictya** nov. sp. Pl. ii, fig. 18.

*M. testa angusta, fusiformi, brunnea, turrata, multicostata, costis lævigatis, interstitiis profundè cancellatis, columella triplicata.*

Long. 11 mill., lat. 4 mill.

Hab. ? Probably one of the Philippine Isles.

Shell narrow, fusiform, turreted, dusky-brown, many ribbed, ribs smooth, interstices deeply cancellated, columella three-plaited.

A dark-brown shell of the subgenus *Turricula* (Klein), somewhat resembling a small *Pleurotoma*. Of this I have two specimens.

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**Mitra cerithina** nov. sp. Pl. ii, fig. 19.

*M. testa subelongata, fusiformi, cinerea, turrita, multicostata, costis lævibus, interstitiis cancellatis, basi producta. recurva, columella triplicata.*

*Long. 9 mill., lat. 3 mill.*

Habitat ?

Shell somewhat elongate, fusiform, of an ashy-grey colour, turreted, many ribbed, the ribs being smooth, the interstices cancellated (not very deeply), recurved at the base, which is produced, columella three-plaited.

This small species is described from a dead shell, it is allied to the preceding, but differs by the base of the shell being produced and somewhat recurved, giving an angle to the shoulder of the principal body whorl, as in *M. (Thala) mirifica* (Reeve). The general aspect of *M. cerithina* is that of a small member of the Cerithidæ, hence the trivial name.

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**Mitra bela** nov. sp. Pl. ii, fig. 20.

*M. testa oblongo-acuminata, costis lævibus rotundatis decorata, interstitiis lævibus, brunnescente, nitida, balteo nigro obscuro infra suturas cingulata, apertura effusa, columella triplicata.*

*Long. 11 mill., lat. 4 mill.*

Habitat ?

Shell oblong, acuminate, with rounded smooth ribs, the interstices between the ribs being likewise smooth, shining brown, with a somewhat obscure black belt beneath the suture, mouth effuse, the columella thrice-plaited.

A pretty little shell, much like the small British *Bela rufa* (Montagu), one of the Pleurotomidæ. It probably belongs to *Volutomitra*, and its locality is to be sought for in the Arctic or Antarctic regions.

---

**Mitra tensa** nov. sp. Pl. ii, fig. 21.

*M. testa gracili, fusiformi, attenuata, cornea, longitudinaliter costata, costis rotundis subcompressis, lævigata, tenuicula, columella quadriplicata.*

*Lon.* 11 mill. *lat.* 3.50 mill.

Habitat ?

Shell fusiform, gracefully attenuated, horn colour, ribbed lengthwise, with rounded rather compressed ribs, smoothish, thin, columella four-plicate.

An Antarctic shell, of which the exact locality is unfortunately not known, superficially resembling one of the Pleurotomidæ of the Bela or Cithara group. Probably a Volutomitra.

**Mitra abacophora** nov. sp. Pl. ii, fig. 22.

*M. testa oblongo-ovata, solida, spira breviscula, obtusa, gilva, suturis impressis, anfractibus sublævigatis, leniter transverso striatis, balteo albo infra suturam cingulatis, hic illic ramuloso, infra præsertim squarrosé albi-punctatis, columella quadriplicata, labro lævi, intus superné sinuato.*

*Long.* 23 mill., *lat.* 11 mill.

Habitat ?

Shell oblong-ovate, solid, spire somewhat short, blunt, tan-colour, sutures impressed, whorls smoothish, lightly transversely striate, surrounded with a white belt beneath the suture, which here and there branches out, the whorls below especially are squarely white-dotted, the columella is four-plaited, the lip smooth, sinuate within.

This interesting shell is one of the subgenus *Strigatella* (Sw.), it comes near to *M. maculosa* (Reeve), *tristis* (Sw.), and *auriculoïdes* (Reeve), differing from all, however, in its larger size, smooth inner lip, different colour, and disposition of markings.

**Mitra rhodinosphæra** nov. sp. Pl. ii, fig. 23.

*M. testa parvula, ovato-scalari, spira obtusa, longitudinaliter crebre-costata, costis magnis, interstitiis striatis, punicea balteo albo cingulata, columella triplicata.*

*Long.* 6 mill., *lat.* 3 mill.

Hab.: Mauritius.



Shell small, ovato-scalariform, spire obtuse, longitudinally much-ribbed, ribs large, interstices striated, of a light pink colour, banded with a white belt, columella three-plaited.

A very small, brightly coloured species, of which I possess the only two specimens yet discovered. In both of them the outer-lip is damaged. It belongs to the section *Pusia* (Swn.).

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**Mitra zythochroa** nov. sp. Pl. ii, fig. 24.

*M. testa oblongo-acuminata, attenuata, spira fusiformi, longitudinaliter costulata, ad suturas uniplicifera, costis lævigatis, interstitiis obscurè striatis, fulvescente, albo balteo cingulata, columella quinqueplicata.*

*Long.* 10 mill., *lat.* 5 mill.

Habitat?

Shell oblong, acuminate, somewhat attenuate, spire spindle-shaped, longitudinally ribbed, plicate at the suture, the ribs smooth, interstices between the ribs obscurely striate, yellowish-tawny, banded with a white belt, columella five-plaited.

An interesting little addition to the sub-genus *Pusia*, having, in common with the well-known *M. turben* (Reeve), the peculiarity of the mouth being imperfect, the shell having apparently been broken away during the life-time of the animal.

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**Mitra fulvosulcata** nov. sp. Pl. ii, fig. 25.

*M. testa ovata, solida, spira subacuminata, anfractibus longitudinaliter costellatis, costis numerosis, rotundatis, transversim sulcatis, sulcis fulvescentibus præsertim apud costas, columella quadriplicata.*

*Long., in spec. majore,* 14 mill., *lat* 6 mill.

Hab. : I. Mauritius.

Shell ovate, solid, spire somewhat acuminate, whorls longitudinally ribbed, ribs numerous, rounded, transversely furrowed, the furrows being tawny coloured, especially conspicuous on the ribs, columella four-plicate.

I possess two specimens of this little shell, one mature, the other not fully grown—and have seen others. The specific name I have adopted is that given some time since in MS. by

Mr. G. B. Sowerby, but never published. The tawny colour is more striking where the transverse furrows cross the ribs, giving the appearance of oblong regular dots or streaks.

NOTE.—The types of the foregoing species are in my collection, and with the exception of *M. percnodictya* and *rhodinosphæra*, of each of which only two specimens are known, and *M. æruminosa* and *fulvosulcata*, of which there are several, are all represented as yet by single unique specimens.

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### DESCRIPTION OF A NEW SPECIES OF CYPRÆA.

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

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#### *Cypræa Rashleighana* nov. sp. Pl. ii, fig. 26.

*C. testa ovata, anticæ subprolongata, dorso convexiusculo, lilacino tribus brunneis fasciis decorato, fascia centrali distinctiore et latiore, lateribus albis parvipunctatis, extremitatibus immaculatis, dentibus albi parvulis, basi alba intente.*

*Long. 18 mill. lat. 11 mill.*

Habitat ?

Shell ovate, anteriorly a little prolonged, back somewhat convex, ornamented with three brown bands on a pale violet ground, the central fascia being the more distinct and the broader. The sides are white with a few scattered brown spots, the extremities unspotted, and colourless, teeth somewhat small, white, the base shining white.

A very pretty addition to the known species of Cowry, albeit of small size, the disposition of the brown bands on the lilac ground is a little like the arrangement in *C. sanguinolenta* (Gmelin), the shape and upper surface slightly recall *C. macula* (Adams) though the underside has a perfectly different arrangement of teeth, *C. macula* being more allied to the *fimbriata* section of the genus. Nothing at all nearly resembling this

Cowry is to be found in the National collection, or in the latest monograph (that of Mr. S. Raymond Roberts in Tryon's Manual of Conchology, vol. vii.,).

With this shell I have the melancholy satisfaction of associating the name of my late friend Jonathan Rashleigh, Esq., Junr., of Menabilly, Cornwall, who died in December, 1872, at the early age of twenty-seven. His collection of *Cypræa* was extremely large and perfect; and had he lived, he would have made great mark in a science to which he was profoundly attached. The type of this species, at present unique, is in my collection.

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ON THE VARIATION OF  
BRITISH LAND AND FRESHWATER MOLLUSCA.

By JOHN W. TAYLOR, F.L.S.

Membre Honoraire de la Société Malacologique de France.

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BEING HIS VALEDICTORY ADDRESS AS PRESIDENT OF THE CONCHOLOGICAL SOCIETY  
FOR THE YEAR 1887.

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I HAVE considered that a few of the observations bearing upon variation, which I have collected for use in the Monograph of our native species of Land and Freshwater Mollusca, upon which myself and Mr. Roebuck have been engaged now for some years, would perhaps be of some interest, and tend to give direction and point to our observations as to the manner in which natural selection or environment is modifying the various species that come under our notice, and thus producing the varieties, which under favourable circumstances may ultimately develop into new and distinct forms.

Without an intimate knowledge of the great variability of species, I submit that no one can hope successfully to correlate our recent with our fossil mollusca, and if this be acknowledged it shows clearly the immense importance of the study of varia-

tion. In addition, I also propose to endeavour to show some reasons why it is desirable to bestow—or retain if already bestowed—definite names on the more important deviations from what I may term the central form.

In this view I have the support of one of the most eminent and experienced conchologists of the day, Prof. Ed. v. Martens, who says, "It is certainly desirable that every local form, well-marked zoologically or geographically, should have a distinct name." Dr. Jeffreys also says, "Systems of classification are as indispensable to a naturalist as tools to a workman. This necessity of science equally applies to the discussion of the interesting question as to the origin and mutability of species, which in the absence of such data could not be satisfactorily conducted." Moquin-Tandon, Forbes and Hanley, Jeffreys, and almost every author of repute who has attempted to deal with his subject in a thorough and efficient manner, has adopted the principle of applying definite names to the most important or interesting variations.

But before proceeding further, it will be advisable to consider briefly what is the difference between a species and a variety. Dr. Gwyn Jeffreys, than whom we can hardly have a better conchological guide, says, "It is undeniable that certain definite forms, called species, exist, and that they constitute more or less extensive groups of individuals, which resemble each other as well as their parents and offspring, to the same extent that we observe in the case of our own kind. These groups to deserve the name of species must be distinct from others; because if any of them are so intimately blended together by intermediate links as to make the line of separation too critical, the test fails, and a subordinate group, or what is called a 'variety' is the result." This is undoubtedly an excellent and satisfactory definition as far as it goes, but I would add to it, as a basis, the necessity of structural difference in the organization of the animal, for the permanent retention of specific rank. I am aware that Jeffreys has said, "that the body or soft

parts of the mollusk taken without reference to the shell, offers an extremely slight and variable criterion of specific difference," but it is evident from the context, that he had only the external or outer appearance in mind when enunciating that statement, and did not intend it to apply to the anatomy. He did not profess to be conversant with the organization of the mollusca, and gives no information on the subject in his great work.

A forcible illustration of the necessity and value of internal examination, is shown by the establishment—mainly by the labours of Mr. Ashford—on solid, reliable and durable grounds of *Testacella scutulum* Sowerby, as a sound and perfectly distinct species. This form has heretofore been considered as only a slight var. of *T. haliotidea*, from reliance having been previously placed exclusively on the external and visible characters of the animal and shell.

On the other hand, it will probably lead us to unite together the *Helix hispida* and *H. concinna*, which Dr. Jeffreys and other able conchologists regarded as distinct and separate species, as no structural differences between them have been brought to light by the anatomical examinations that have as yet been made.

Anatomy will thus I trust lead us to sound conclusions in arriving at the limits and relationship of species and varieties, for though by Darwinian philosophy, species are considered to be unstable and changeable, they may for our purpose be considered as permanent and fixed.

Mr. Marrat, however, who has made a life-study of *Nassa*, in his article on the variations of the shells belonging to that genus, expresses some opinions on species and varieties, and he makes the statement that "the great genus *Nassa* is one shell in an endless variety of forms," but I am unable to accept as a proof of the soundness of his statement, the facts he brings forward as in a sense establishing his position. The only points that appear to me to be proved are the extreme variability of *Nassa*, and the necessity of applying definite names to what we may still call species and varieties, for although Mr. Marrat ex-

pressly denies that species as usually understood exist, he nevertheless not only retains the names of a number of the species already described—or forms as he prefers calling them—but adds a number of fresh ones to the list.

I have thus shown that I should require structural difference in species, but varieties, with which we are at present more immediately concerned I would confine to external modifications; thus I would propose to regard as varieties worthy of a definite name the extreme divergencies—if sufficiently marked—of size, texture, color, markings, shape and the difference in proportion or the exaggeration or restriction of the development of special parts of the shell.

It is I believe generally conceded that differences of form are relatively of more importance than variations in colour, markings size or sculpture.

Thus in attempting to arrange the varieties of that protean shell *Limnaea peregra*—of which I have myself catalogued near 300 names that have been bestowed upon it, either specifically or varietally by various authors, but which are probably reducible by a careful and attentive comparison to a much more reasonable and moderate number—I would regard as of first importance the form-variations, as for instance the oblong specimens which have been named var. *oblonga* by Jeffreys, the globose form which has received amongst other names that of *lacustris*, the inflated variety which has been called *obtusa*, or the varieties *burnetti* and *involuta* which are remarkable mainly for intortion of the apex. Primarily separated in this way, we can readily understand that the albine mutation for instance, is liable to occur in any of what I may term the primary varieties. To distinguish this color mutation, only by its special name *candida*, would be to lose sight of the other and more important character—its form. It seems to me therefore to be necessary to adopt in cases like these, a modified and somewhat extended system of nomenclature, to enable us to refer with terseness and precision to these subvariations, as they must be termed under this

system. I should be willing to accept for these combined or complex varieties, compound names, joining the term distinguishing the subsidiary character to that expressive of the more important one, thus I would speak of *Limnæa peregra* v. *ovata-alba* and not of v. *ovata* s. v. *alba*.

In bestowing names upon varieties which have not yet received a name, I would advocate the adoption of conventional terms expressive of the particular line of variation it is desired to distinguish, thus such terms as *globosa*, *curta*, *elongata*, &c., suggest themselves as suitable for varietal nomenclature.

Dr. Jeffreys in dealing with the variations of *Cochlicopa lubrica*, in his "British Conchology," has an instance of a colour mutation existing both in the type and in the slender variety *lubricoides*; and to avoid confusing these two well-marked forms, he applied to the same albine variation the distinct names of *viridula* and *hyalina*, thus showing he appreciated the undesirability of mixing together form-variations on account of a subsidiary character possessed in common.

Many conchologists seem to have a very incorrect notion as to what a variety really is, and are disconcerted by the insensible and gradual change from one form to another. They forget that these gradations of character fix the varietal status, and that if the specimens showed distinct and constant differences, it is probable that they would prove to be a different species. Others while admitting the variability of species would not bestow upon them definite names but would merely term them varieties. To me this does not seem at all a satisfactory mode of dealing with the difficulty, the mere fact of using the term variety at all, implies that there is some difference worthy of note, but if the method now spoken of be followed, we are left in ignorance as to the special way in which the specimen alluded to has deviated from the ordinary form, and in my opinion we might with equal reason object to the grading of meteorological instruments, because there are few if any distinct natural lines of demarcation, as object to the naming of the more definite and

expressive forms of a species. To those holding broad views, students of the subject generally, or the ordinary naturalist, the varietal names need never be used, but to the specialist it is not only a great convenience, but a necessity to be able to refer with precision to the leading variations to which a species is liable. As reasonably might we expect a resident in London or elsewhere, to be able to get along with no better knowledge of his neighbourhood than the general student of topography would possess.

At the same time I would deprecate the undue multiplication of varieties. Too great a degree of division in this subject would in my opinion defeat its own purpose, from the difficulty of exactly identifying and referring the various forms.

Specific identification is itself often far from easy to satisfactorily accomplish, thus though *Limnæa auricularia* and *L. peregrina* are universally allowed to be perfectly distinct species, specimens are occasionally met with, which can only be doubtfully referred to one or the other species. I am aware that Lovell Reeve in his "British Land and Freshwater Mollusks" remarks that "there is no fear of mistaking the most widely inflated form of *Limnæa limosa* for *L. auricularia*," but I apprehend he spoke with an insufficient and imperfect knowledge of the variability of species.

Other instances of similar approximations of good species will suggest themselves to every thoughtful and experienced conchologist.

While fully appreciating the excellent work the numerous able Continental conchologists have accomplished, and are still accomplishing, and though in entire accord and sympathy with their aim, which is to direct more minute attention to the divergencies existing amongst mollusks, the method of nomenclature they adopt, does not seem to me to be well adapted to render their labours so widely useful as they might be. Their practice of giving to these divergent forms, distinct specific names, which names are however, I believe, generally speaking, allowed to be



equivalent in value to our varietal ones, tends to divorce the form so named from its immediate and close allies, as is so clearly shown by the Rev. Professor Bonney in his address to the Mineralogical Society, where he forcibly points out the advantages of the employment of modifying terms instead of distinct and separate names to express the minor modifications or differences in the constituents of minerals, and which remarks are singularly applicable to our own study, he says, the one method—giving distinct or what we should call specific names—accentuates the distinction and loses sight of the relation, the other—that of applying modifying, or what may be considered equivalent to our varietal names—whilst noting the distinction, keeps prominent the relationship.

This last point is to some extent brought about by our gifted continental friends by the system of grouping which they adopt, which groups are I believe nearly if not quite co-ordinate with the old Linnean and Lamarckian species, thus the group *Stagnaliana* would in England be considered synonymous with the Linnean species *Stagnalis* and the different forms composing this group would be to our English views, varieties of that species.

I will now very briefly consider some of the causes of modification in our land and freshwater shells, and as far as I am able, show the direction in which the various forces operate. I shall to make the illustrations clearer and more definite, borrow some of the instances from foreign countries, so that we can note by comparison the same change in a modified degree, amongst our own species.

Environment is the most powerful and perhaps the only force inducing variation, or rather fostering those variations which are most in accordance with the surrounding conditions, and I shall give one or two instances where the influence of the surroundings have evolved variations in harmony with the forces exercised. We are, however, often unable to recognize the cause of many modifications, but as it is patent that no change

occurs without a reason and no effect without a cause, we must in those cases store away facts and observations to which we may hope sooner or later to find the key, as I apprehend it is an important part of our study to endeavour to discover and make plain the laws which govern variation.

I will first allude to some of the effects of geological conformation, thus :—Hermann Jordan in speaking of the influence of limestone says, that in the Southern districts of Europe, where favorable climatic conditions to mollusca are more universal than in the Northern and more inclement countries, mollusks are not so much confined or restricted to limestone soils as in more Northern regions, and he ascribes their greater partiality to calcareous ground, not so much to its chemical composition as its greater power of absorbing warmth, and because it gives usually a greater variety of physical conditions than do the primitive rocks. Clessin points out that the results of a deficiency of limestone are not only visible in the thinness and size of the shell, but that even the form of some species is affected, thus he states that the *Clausiliæ* have the shell shorter than usual, and that *Helix lapicida* becomes somewhat rounded on the periphery. However these may be, it is certain that the deficiency of limestone leads to the production of very thin, fragile and horny shells, which under more favourable conditions are stoutly built and strongly coloured. A well known and striking instance is the remarkably delicate form of the common shell *H. aspersa*, which is plentiful in some parts of Guernsey.

Peat moors, on account of the absence of calcareous matter, have been remarked to produce dwarfed, thin and fragile shells and often these are sufficiently diverse to form very peculiar and marked varieties.

Among freshwater shells some species like *Unio margariferus* and *Neritina* seem to have a superior power of withdrawing from the water to form their shell, the calcic carbonate it may contain, and thus in the granitic region where this substance is very limited, they produce solid and thick shells, while

*Ancylus* even when occupying the same water, is said to be remarkable for unusual thinness and delicacy.

The dry and arid regions in different parts of the world are tenanted mainly by mollusks with thick and uniformly dull-white shells, of which the Palæarctic species are grouped under the name of *Leucochroa*, and are principally found on the sterile lands to the South of the Mediterranean. In what is called the arid regions of Central North America, comprising the territories of Idaho, Utah, Montana, &c., the same character of shell is reproduced in *Helix idahoensis*, *cooperi*, &c. The Rev. Canon Tristram in alluding to the mollusks of the Sahara remarks that the snail-shells found there, were much thicker than those of the same species from the more temperate parts of Europe, and he is disposed to regard this modification as an additional means of preventing evaporation in so dry a climate. The elimination of the banding would appear to be desirable on account of the darker coloring, greater tenuity and possibly less calcified condition of those parts, which would therefore offer less obstacles to the dessication of the mollusk than the thick white shell which would absorb the least possible amount of heat. The uniformly dull-white specimens of *Helix virgata*, *ericetorum* and other shells of a similar character in our own country, agree also with the desert forms in being of thicker texture than usual. I am disposed to think they are analogous to them, and tend to be evolved by conditions similar though less in degree to those to which I have just referred.

In confirmation of this view Strobel has noticed that in Moravia the thick uniformly white variety of *Helix virgata* is exclusively found on the open cultivated lands, and attributes these peculiarities to dryness and warmth. He noticed the banded variety to be more restricted to the wooded grounds.

Those mollusks which usually live in shade and retirement, only coming forth at twilight and evening, or by the stimulus of moist, damp or dull days, are provided with shells composed largely of animal matter, of uniform and obscure colors, and

often provided with hairs and other epidermic appendages. As instances of species affecting this mode of life and showing in their exterior appearance corroboration of it, we can readily call to mind *Helix aculeata*, *H. hispida*, *H. obvoluta*, *Bulinus montanus*, *B. obscurus* and many others. We see an exposition of the same law amongst the forest-loving and frequenting Helices of Eastern North America, which are uniformly and sombrely colored, their epidermis varying in shade from yellowish horn-colour, through brown to a dark chestnut. Arboreal species which are almost necessarily exposed to the full action of air and light, are distinguished by brighter, more vivid and more varied coloration, than the purely terrestrial species loving shade and concealment. Our variegated Helices—*nemoralis* and *hortensis*—approach perhaps nearest in habit to arboreal life, living freely exposed on hedges and hedgebanks, and these species are the most gaily colored of our native shells.

We shall from these considerations see the improbability of our sombrely coloured *Bulinus montanus* with its thick brown epidermis, being an arboreal species as stated by some of our authors. Possibly the statements of our more recent writers are a modified repetition of the following direct and positive remarks, of the Rev. J. E. Vize, in his list of Wilts shells published in 1866, who says, "Its habits are unusual when contrasted with other species : it hibernates by burrowing into the ground at the roots of beech trees, it leaves its winter quarters in March, ascends the favoured tree (and by-the-bye it chooses certain beech trees in preference to others), it enjoys itself at the top of the trees from March to August, and then descends to sleep for the remaining half-year."

I have always had the strongest doubts of the accuracy of this statement, basing my judgment upon the character of the shell, which clearly shows it to be a species living usually in shade and concealment. With a view to settle the question I recently requested Mr. F. A. Knight—who resides in Somersetshire near a locality for this species, and whose experience of

it extends over a period of more than 20 years—to investigate the subject. The result of his labours and experience clearly demonstrate that instead of spending the summer on the tops of the trees, it is in dry weather buried in the ground and among loose stones, in some instances in the latter situation, being even 2 feet below the surface. Like its ally *Bulimus obscurus* and other species, it is susceptible of the effects of moisture, and I have myself seen it, in company with other species, mounting the beech trees to a considerable height immediately after heavy rain.

The effects of temperature have been studied by Rödel, who states that land and freshwater shells perish when exposed for half-an-hour or so to about  $17^{\circ}$  of frost, or if the cold be continued steadily for a couple of days  $9^{\circ}$  of frost is sufficient to cause their death. Mature specimens resist the cold better and withstand a degree or two more than young ones.. As we should hardly be prepared to expect, thinly-clad or absolutely naked mollusks withstand cold better than thickly shelled species; *Helix aspersa* for instance possessing a thick and solid shell is very sensitive to cold and retires early for the winter. The most thinly clad of our land species, *Vitrina pellucida* is most active during the winter months, and has even been noticed crawling briskly over the snow-covered herbage and ground.

The same law applies to the freshwater shells, the effects of cold having been shown to be, that species which generally present a somewhat strong shell under ordinary conditions, secrete one of much greater thinness and fragility as well as of a reduced size. Karl Semper has shown in *Limnæa stagnalis* that a temperature of  $53^{\circ}$  entirely stops the growth of the shell, though the mollusk will continue to feed at a much lower temperature, and we are led therefore to conclude that the energy thus stored up is used in some other way than in the elaboration of shell matter, possibly in resisting the depressing and destructive effects of too great a reduction of temperature. *Limnæa*

*peregra* from the icy-cold waters of the Pyrenees are thin, delicate and of a reduced size, and we have an instance nearer home in the *L. stagnalis* from Malham Tarn, an elevated body of water in Yorkshire, which produces a very thin and dwarfed variety of that species.

The most favourable temperature or that most specially advantageous, and in which *L. stagnalis* receives its greatest development, is about 77°. Under favourable conditions, the periods of growth are longer in duration, or the growth itself is quicker than in ordinary cases. This will account for the gigantic size of specimens from some localities. Under less favorable conditions, the checks in growth are more numerous, the growth period not so prolonged or the growth not so rapid and there results therefore, a smaller form. Semper has shown in the case of *Limnæa stagnalis* that if the young shells are too crowded, or have a too limited supply of water in which to live, even though food be supplied in abundance, their growth is dwarfed, and such dwarfing cannot be compensated for afterwards by any especially favourable conditions or treatment, as the shell is constructed on a more diminutive scale.

These facts enable us to account in some cases for the production of dwarfed varieties and it is probable that amongst others the small var. distinguished by M. Jules Colbeau as var. *aquarii*, had its origin in some of the causes I have mentioned.

Another effect of cold is blackness or melanism of the naked species. Herr Simroth when treating of *Arion ater* and *Limax maximus* has shown that in these species this character is developed by cold, and redness by warmth, especially when these conditions are applied for a few weeks in spring, which is the period of most rapid growth and development. Confirmatory evidence of the conclusions of Simroth that the *Arion ater* is a northern or cold form and *Arion rufus* a southern or warmth variety is afforded by *Limax maximus*, which in its northern form of *cinereo-niger* is almost wholly black, but in the genial climate of Italy it develops a series of brilliantly

colored and strikingly marked variations which have received numerous distinctive names from Italian Limacologists.

*Limax arborum* gives similar testimony as in the northern and north-western parts of this country and on the summits of the mountains in Italy it becomes very dark in color, and loses that glaucous appearance which distinguishes it on warmer or drier grounds. On the Italian mountains the transition from the ordinary to the intensely dark form can be traced.

Cold is therefore a powerful factor in inducing the formation of black pigment, but it is extremely probable according to the observations of some of our most able conchologists, that humidity has also very great subsidiary influence in inducing this variation.

Lord Walsingham in his address to the Yorkshire Naturalists' Union on Melanism in Lepidoptera has pointed out that the black color in insects may be a favorable factor in cold regions, from its power of absorbing such few heat rays as there may happen to be, and this may possibly be some explanation of the black color of these Alpine varieties.

Heat if too great in amount induces torpor in land and freshwater species. *Limnæa stagnalis* is said to be unable to endure a temperature of more than 90°. The effect on the secretion of shell of too much warmth, is similar to that of too much cold, the result being a shell of a frail and delicate character, thus *L. peregra* var. *thermalis* from the warm springs of the Pyrenees and the Vosges, and the var. *steenstrupi* from the warm water of the Icelandic Geysers are equally remarkable for their thinness and dwarfed character.

*Helix Pisana* in warm sunny places becomes tinged of beautiful rose color, at the mouth of its shell, which color is said to be deficient in those specimens living in less favoured spots. I have already pointed out under arid or desert conditions, the effects of heat when accompanied by dryness—when however associated with moisture and rich vegetation it produces some of the most richly colored and finest shells which are known to conchologists.

Many of our land species would almost seem to be changing the character of their markings. Nearly seven years ago Mr. Ashford suggested to me the probability that *Helix cantiana*, *cartusiana*, &c., were once banded species, and I am disposed to agree with his suggestion. As is well-known many of our species which are usually somewhat uniformly colored show at times a light peripheral or keel line. I may instance *H. hispida*, *rufescens* and *cantiana* as sometimes showing this clearly. Species which have not advanced so far in the process of change give us the clue to the meaning of this : thus *H. virgata* has often the upper and lower groups of bands coalesced, leaving a keel line of the ground colour, this is then exactly the corresponding variety, of say *H. rufescens* with the light keel line. When *rufescens* or *hispida* is uniformly darkly colored, they have their representative in the var. *nigrescens* of *H. virgata* in which the pigment is suffused over the whole shell. In *H. cantiana* the bands seem to be in process of elimination, and now only give signs of their existence near the mouth when the animal is at its highest vigor, with the strongest development of its organs.

In connection with this subject of banding Herr Dietz has remarked that wet seasons prevent the formation of colored bands in *H. hortensis*, and as the result of his observations, says that albine specimens are more common in wet years, and that those specimens with coloured bands have the growth of the last wet year not colored.

Another curious phenomenon is the scalariform specimens of the genus *Planorbis* which are often found in those bodies of water choked up with vegetation, and according to Herr Clessin, also on the margins of lakes amongst large stones. M. Van den Broeck considers this spiral form as a modification consequent upon and adaptive to the special and peculiar features of their environment, as he has conclusively proved by experiment, that these spirally coiled shells make their way more readily through the dense vegetation, than those of normal shape which traverse the thick masses of duckweed, &c., with great labour and difficulty.



This explanation does not account for the distortions which are also occasionally irregularly spiral, and which have been found in warm water reservoirs, and in streams of water pumped from the coal pits in Yorkshire and elsewhere, these may be the result of the unhealthy and unnatural conditions under which they live.

Even from the few foregoing illustrations and my introductory remarks, it will be seen how variable our species are and what complex forces are ever acting upon them, and producing more or less marked modifications. I regret that the time at my disposal does not allow me to discuss more than one or two points, or I should wish to have laid before you the results of the observations of some of our most observant scientists, on the influence upon their molluscan inhabitants, of brackish water, of turbulent and agitated streams and lakes, and also of deep and still water. Decollation, erosion and some of the alleged causes of several peculiarities and deformities amongst our land and freshwater shells would also have merited and received attention.

If my views of species are correct, what immense assistance the biologists could render us in striving to arrive at a true knowledge of specific and varietal limits in the mollusca. It is however to be sincerely regretted that we cannot hope for much help at present, as many even of the most eminent biologists of our own country, do not place any, or very slight value upon precise specific identification, thus the work of some of our most celebrated men loses much of its value from what I feel compelled to consider their reprehensible carelessness in not securing an exact determination of the specimens they have under examination, and which specific uncertainty often renders it necessary that their observations should be repeated and confirmed by others more mindful of specific differences before the information they have given can be fully utilised and receive the consideration its merits otherwise would demand.

In this respect, Germany, by the most advanced section of their biologists set us a good example by their exact and painstaking determinations of the specimens they study.

I could wish many of the biologists of our own country to take note of the words of M. Paul Fischer, an eminent French malacological anatomist who says :—"It is palpable that previous to describing the minute structure of an animal, it is necessary to determine its name exactly. This determination is often more fastidious and difficult than the examination of the cellules of its integument, the dissection of its viscera, or the interpretation of its organs, but it must nevertheless be the aim of our work, or we should see synonymic chaos inevitably increase."

Many biologists thus paying small heed to specific differences necessarily think lightly of the collector and the systematist, and attach little or no value to the result of their labours, and would seem often to consider industry misplaced, if not employed in biological or embryological work. Would it not be better that we should all regard with pleasure and satisfaction sound and honest work undertaken in any branch of our mutual study, whether it be morphological, embryological, or physiological, specific and varietal differentiation, study of the habits or habitat, geographical distribution or even mere collecting, or as it may be more properly termed, accumulation of material for others.

We cannot all be successful and skilful biologists and anatomists, so I would wish each to labour in the branch for which he is best adapted, and for which he feels most interest, and we shall thus, and only thus, in process of time hope to gain a complete knowledge of every organism, a result which could never be accomplished by the assiduous following of any one branch of research, even though it be so important a one as biology.



## PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY.

## Meeting

HELD AT THE MUSEUM, JANUARY 5TH, 1888.

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

## DONATIONS.

“Prodrromus of the Zoology of Victoria,” decades i. to xiv.—  
Presented by the Government of Victoria.

Nine reprints of Papers from the “Journal of Conchology,”  
presented by Mr. J. W. Taylor, as follows:—

“Notes on the Land and Freshwater Mollusca of the  
Upper Engadine, &c.”

“Authenticated List of the Mollusca of Northampton.”

“The present state of knowledge of the distribution of  
Land and Freshwater Mollusca in Britain.”

“On the distinctness of the genera *Turtonia* and *Cyamium*.”

“Land and Freshwater Mollusca round Christchurch,  
South Hants.”

“On the erosion of certain Freshwater Shells.”

“Notes on the Land and Freshwater Mollusca about  
Tarbert, Loch Fyne.”

“The Land Mollusca of Bristol County, Mass., U.S.A.”

“Label List of British Land and Freshwater Shells.”

Mr. Taylor said that as the Society was intending to procure cabinets in which to place the collection, he suggested that one should be set apart for “type” specimens of British Land and Freshwater Shells; and on condition of this being done he would increase his contribution to the Cabinet Fund to £2 5s., the estimated cost of a cabinet.

In the discussion which followed, the advantages of having such a collection of type species and varieties were fully recognised, and Mr. Taylor’s offer was accepted.

The thanks of the Society were accorded the donors for their valuable gifts.

## NEW MEMBERS.

The under-named were duly elected members of the Society: Miss L. C. Jones, Clifton, Bristol; Mrs. A. Evans, Thrupp, Stroud; Philip B. Mason, M.R.C.S., F.L.S., F.Z.S., &c., Burton-on-Trent; and F. Akers, Leeds.

## PAPER READ.

“On the Marine Shells of Magilligan Strand,” by Miss Honoria Galwey.

## SPECIMENS EXHIBITED.

The Chairman, on behalf of Mr. J. R. Redding, showed a large and fine collection of Land and Freshwater Shells from the vicinity of Dublin.

Mr. Harvard Pierson exhibited a number of species of *Clausilia*—including all the British species.

Mr. F. R. Fitzgerald exhibited *Helix pisana* from Swansea (from Mrs. Dyer), and *H. pomatia* from Hants., the Bergel Valley, and Bex, Switzerland.

Mr. H. Shaw showed examples of *Conus textile* (L.) and *C. vicarius* (Lamk.).

Mr. W. E. Collinge exhibited and presented to the Society specimens of *Limnæa stagnalis*, collected August, 1887, in the River Cherwell, Banbury.

Referring to the change of premises which has just been made, the Chairman said the Directors of the Leeds Mechanics' Institute had for several years most generously provided accommodation for us, and had on all occasions shown a desire to help the Society in its work. Unfortunately they were not able to do more in providing space for our collection and library, hence the need to secure other rooms. He trusted the Society would cordially mark its appreciation of their kindness. The removal would necessitate a change in the day of meeting, so that we should keep clear of existing engagements at the Philosophical Hall.

On the motion of Mr. W. Denison Roebuck, F.L.S., it was resolved: “That the best thanks of the Society be presented to the Directors of the Leeds Mechanics' Institute for their uniform courtesy and for the accommodation which they have so generously granted the Society during the past few years; and that Mr. Bell be requested to convey the resolution to the Secretary.”

On the motion of Mr. C. H. Pierson, it was resolved: “That the meetings in future be held on the first Wednesday in each month.”

## Meeting

HELD AT THE MUSEUM, FEBRUARY 1ST, 1888.

Mr. J. W. Taylor presided.

Correspondence was read from Messrs. R. D. Darbishire, J. C. Melvill, A. Somerville, Wm. Jeffery, B. B. Woodward, Alfred C. de Conti Gatto, and Mrs. Skilton.

## DONATIONS.

The following donations were laid on the table and the thanks of the Society were accorded the donors:—

A framed portrait of Dr. Gwyn Jeffreys, F.R.S., painted in oils and presented by Mrs. M. Skilton.

“Journal and Proceedings of the Royal Society of New South Wales,” by the Society.

“Prodrômus of the Zoology of Victoria,” decade xv., by the Government of Victoria.

## NEW MEMBERS.

The following were nominated for membership:—

E. R. Sykes, Weymouth, by J. W. Taylor and W. D. Roebuck, F.L.S.

Thos. F. Burrows, Cheadle, by J. W. Taylor and J. R. B. Masefield.

Chas. Nathaniel Peal, F.R.M.S., Ealing, by A. Somerville, B.Sc., F.L.S., and B. B. Woodward, F.G.S., F.R.M.S.

[Mrs.] Julia Hodgson, Leighton Buzzard, by A. Somerville, B.Sc., F.L.S., and Rev. R. B. Watson, B.A., F.R.S.E., F.L.S.

Fredk. Rhodes, Eccleshill, near Bradford, by F. R. Fitzgerald, F.S.Sc., and J. A. Hargreaves.

## PAPERS READ.

“On the article ‘Purpura’ in Tryon’s Manual of Conchology,” by Rev. Alfred H. Cooke, M.A., F.Z.S.

“A new locality for *H. revelata*,” by Rev. A. H. Cooke, M.A.

“On the limits of the British Seas,” by Rev. A. H. Cooke, M.A.

“Notice of a monstrosity of *Bythinia tentaculata*,” by Edgar A. Smith, F.Z.S.

“On the occurrence of *Testacella scutulum* in Leicestershire,” by H. E. Quilter.

“On a mite parasitic upon *Testacella scutulum*,” by H. E. Quilter.

“Additions to the Authenticated List of Mollusca for West Sussex,” by Wm. Jeffery.

“On *Trophon truncatus* (Ström.) var. *scalaris* Jeffr. on the West of Scotland,” by A. Somerville, B.Sc., F.L.S.

## SPECIMENS EXHIBITED.

Mr. A. Somerville, B.Sc., F.L.S., sent for exhibition specimens of *Trophon truncatus* Strom. and the rare variety *scalaris* Jeff. The variety was dredged by Mr. Somerville in October last off Soay Isles, Iona, in forty fathoms of water, and is new to the British fauna in its restricted sense.

Mr. F. R. Fitzgerald exhibited examples of *Limnæa peregra* from six different localities, *Helix revelata* from Guernsey, collected by Mr. J. R. B. Tomlin; *Planorbis corneus* from near Birmingham, *Helix nemoralis* from Bex, Switzerland, and *H. aspersa* var. *unicolor* from Horn Dean, Hants.

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## Meeting

HELD AT THE MUSEUM, MARCH 7TH, 1888.

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

The correspondence for the month was brought before the meeting.

### DONATIONS.

The following donations were laid on the table and the thanks of the Society accorded to the donors:—

“Proceedings of the Linnean Society, New South Wales,” second series, vol. ii, part 3.

List of the names of contributors to the first series of the “Proc. Lin. Soc., N.S.W.,” with titles of and references to papers and exhibits contributed by each.—By the Society.

List of shells collected by Jno. Rattray, B.Sc., F.R.S.E., on the west coast of Africa and the adjacent islands, by W. E. Hoyle, M.A., F.R.S.E.—By the Author.

“Die Bivalven Nieder-Andalusiens,” by Dr. W. Kobelt.—By the Author.

List of the Shells of Mergui and its Archipelago, collected by Dr. Jno. Anderson, F.R.S., F.L.S., by Prof. E. von Martens, M.D., C.M.Z.S.—By the Author.

Specimens of *Assimineæ grayana* from near Faversham.—By Miss Fairbrass.

*Limnæa truncatula*, from a ditch near Newark Castle, Selkirk N.B., 1886; *Balea perversa*, from a stone wall near Selkirk, Selkirkshire, N.B., 1886; *Limnæa peregra*, *Helix arbus-*

*torum*, and *H. aspersa*, from Carmarthenshire, Wales; and *Anodonta anatina* var. *radiata*, from near Birmingham.—  
By Mr. Madison.

NEW MEMBERS.

The following were duly elected members of the Society :—  
Messrs. E. R. Sykes, Thos. F. Burrows, C. N. Peal, F.R.M.S.,  
Fredk. Rhodes, and Mrs. J. Hodgson.

The following were nominated for membership :—  
Frederick Stanley, Margate, by A. Somerville, B.Sc., F.L.S., and  
W. E. Hoyle, M.A., F.R.S.E.

Mary Heitland, Shrewsbury, by A. Somerville, B.Sc., F.L.S.,  
and Alfred Brown.

Rev. Geo. Bailey, F.R.M.S., Finchingfield, by A. Somerville,  
B.Sc. F.L.S., and Rev. J. McMurtrie, M.A.

John Clegg, Millwood, by A. Somerville, B.Sc., F.L.S., and  
James Steel.

Emile Deschamps, Alepo, Syria, by J. W. Taylor and T. W. Bell.

J. T. T. Reed, L.R.C.P. & S., Sunderland, by A. Somerville, B.Sc.,  
F.L.S., and F. Coulson.

David Robertson, F.L.S., F.G.S., Millport, by A. Somerville,  
B.Sc., F.L.S., and E. J. Lowe, D.L., F.R.S., &c.

Wm. J. Jones, jun., Holloway, N., by A. Somerville, B.Sc., F.L.S.,  
and Alex. Shaw.

Mark Stirrup, F.G.S., Bowdon, by A. Somerville, B.Sc., F.L.S.,  
and J. C. Mansel-Pleydell, D.L., J.P., F.L.S., &c.

SPECIMENS EXHIBITED.

Mr. Madison sent for exhibition a very choice collection of  
about thirty species of land shells; included were several fine  
examples of varieties of *Helix nemoralis*, *H. hortensis*, *H.*  
*arbustorum*, and other species.

Mr. Edward Collier also sent a collection of about sixteen  
species and varieties of land and freshwater shells for exhibition,  
many of them being fine examples.



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

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- 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 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, 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 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.  
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 Davis, Jas. W., F.S.A., F.L.S., F.G.S., Chevinedge, Halifax.  
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 Hudson, Baker, 5, Westbourne Grove, Coatham, Redcar.  
 James, Jno. H., A.R.I. Cornwall, 3, Truro Veau Terrace, Truro.  
 Jeffery, Wm., Ratham, Chichester.  
 Jeffery, Chas., 15, Warren Street, Tenby.  
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 Kew, H. Wallis, F.E.S., 19, Stonenest Street, Tollington Park, London, N.  
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- 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.
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- Sclater, A. J. R., Bank Street, Teignmouth.
- Scott, Thomas, Fishery Board, Central Laboratory, Edinburgh University.
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- Smart, Rev. R. W. J., M.A., Bishopswood Vicarage, Ross, Herefordshire.
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- Smout, Charles L., 8, Trinity Street, Hastings.
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- Somerville, Rev. J. E., M.A., B.D., 11, Southpark Terr., Hillhead, Glasgow.  
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 Storrs, Godwyn, Sandown Vicarage, Isle of Wight.  
 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., Free Church Manse,  
 Cardross, Dumbartonshire.  
 Webb, F. B., Church Terrace, Cheadle, Staffordshire.  
 Whitwell, Wm., Roslin, Thurleigh Road, Balham, London, S.W.  
 Williams, J. W., B.A., D.Sc., 51, Park Village East, London, N.W.  
 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., Adamsdown Post Office, Cardiff.  
 Wright, Bryce M., F.R.G.S., 54, Guildford Street, Russell Square, London.



### Note on a parasitic mite of *Testacella scutulum*

Sow.—While examining a specimen of *T. scutulum* from Belvoir, under a powerful pocket lens, I noticed one or two parasitic *acari* (mites) crawling about the underside of the body. They were minute, and could scarcely be seen with the naked eye. With some difficulty, I got one under the microscope, and with a  $\frac{1}{4}$  inch obj., they presented the following characters, so far as I am able to describe them. The body was round, white and shining, the mouth having cephalic appendages forming “chelicerae,” four pairs of ambulatory legs, each of which was 5-jointed, the apical joint being elongated, and ending with small claws. The legs and thoraco-abdomen were covered with hairs.—H. E. QUILTER, Leicester.

NOTICE OF A MONSTROSITY OF *BYTHINIA*  
*TENTACULATA*.

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

Zoological Department, British Museum.

Pl. ii, fig. 27.

It is a recognised fact that most shells are subject to more or less variation in many respects, and that the limits of variation and the passage into forms, which may be called monstrous, are not clearly defined.

Although several varieties of *Bythinia tentaculata* have been indicated by several authors I have not been able to discover any mention of a monstrosity of this species.

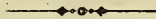
In 1830 Menke named four varieties :—(a) *ventricosa* ; (b) *producta* ; (c) *torta* (a. *major*, b. *minor*) ; (d) *obtusa*. Ten years later Garnier created a fifth, var. *curta* ; Mörch has termed a sixth form, var. *gigas* ; Jeffreys has designated two others, var. *decollata* and var. *excavata* respectively, and it is possible other authors may have employed other equally useless varietal names.

All these terms have reference to variation in form, and the specimen under consideration also presents an extreme deviation from the normal contour of the species. The spire is remarkably depressed, the apex being elevated not more than a twenty-fourth of an inch above the body-whorl. The volutions are very narrow, convex, and involute above so as to produce a remarkably channelled suture. The last whorl is broad at the upper part and obtusely angled at the periphery, producing somewhat squarish aspect. The aperture is altogether of an abnormal form, and being much narrowed above has an elongate pyriform appearance.

The *tout ensemble* of the shell is so very unlike the typical form of the species that it was pronounced by two conchologists to whom I submitted it (not informing them of its locality) to belong to the *Bullidæ* ! In texture and colour, however, it is

quite normal, and within the lip, the ledge or ridge which supported the operculum (unfortunately not preserved) is partly developed.

The specimen was found in the River Cam, not far from Cambridge, by the Rev. E. S. Dewick, M.A., F.G.S., who has kindly presented it to the British Museum.



***Helix laticida* (L) var. *albina* (Menke) in Derbyshire.**

—I have in my collection two specimens of the above variety, differing only in the uniform greenish-white colour from the typical form. Both were given me some few years ago by the late Mr. Thomas Glover, of Manchester, who found a colony of them, all precisely similar in appearance, on the limestone near Matlock on August 16th, 1879. Though not unfrequent in some parts of the continent of Europe, this variety seems to be hardly known in England. I should much like to know of other records. At the time of the publication of Jeffreys' British Conchology (1865) it was evidently quite unknown in this country.—J. COSMO MELVILL.

***Helix laticida* monst. *scalaris* Charp. in Derbyshire.**

—This monstrosity, which has a decidedly elevated spire, whorls much separated, and sutures deep, was found by Mr. J. Allen Howe while collecting during 1887 at Matlock Bath, Derbyshire.—[REV.] H. MILNES.

***Otina otis* var. *alba* at Newquay.**—Although Newquay is perhaps the most unproductive coast, as regards marine shells, which I have ever visited, specimens of *Otina otis* Turt. var. *alba* occur in considerable numbers and of large size. They occur in caves, associated with *Alexia bidentata* Mont. I have taken the type at Tintagel and at the Lizard, as well as in the Scilly Islands.—[REV.] A. H. COOKE.

**Obituary.—Mr. Andrew Garrett.**

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Mr. Andrew Garrett, the celebrated conchologist, died at his residence, Huahine, Society Island, on the 1st of November, 1887, in the 65th year of his age. For some months past he had suffered from cancer in the face, which brought about his death. Mr. Garrett was the third child in a family of fourteen, and was born on the 9th of April, 1823, in Beaver-street, Albany, New York, U.S.A. His mother was one Joanna Van Nean Campaneaux, a native of Belgium, of good education, and speaking several languages; his father being Francis Garrett, a Canadian. Both parents lived to old age, the mother attaining seventy-two years, and the father eighty-four. The early life of Andrew Garrett was spent in Vermont State, where he very soon manifested a decided scientific turn of mind. On one occasion at eight years of age he left home without warning to visit a museum some hundred miles away, which having accomplished he returned home again in safety. He had a great fondness for travel, and to satisfy the longing he went to sea at the age of 18. As a shell collector he made his first acquaintance with the South Pacific in 1848, and in 1852 adopted that island-studded ocean as his special field of research. Since that time Mr. Garrett has visited almost every island of note in the South Pacific, spending considerable time in each group. His studies not only embraced the mollusca, but also birds, fishes, botany, &c. For one period of ten years he was professionally engaged in the interests of the Goddefroy Museum, Hamburg, during which time was published Andrew Garrett's "Fische der Südsee," edited by Dr. Albert Günther, of the British Museum. Mr. Garrett was also for a time associated with Prof. Agassiz. In addition to visiting and residing in every group of islands of the South Pacific, Mr. Garrett explored many parts of the Atlantic and Pacific coasts of South America, the East and West Indies, the Sandwich Islands, &c. His diligence and knowledge soon established him as an authority amongst conchologists. Mr. Garrett's

private collection of shells (now on sale) consists of over eight thousand species, and more than thirty thousand examples, representing almost every known part of the globe. Of this large collection, Mr. Garrett has himself collected some four thousand species. The deceased was a corresponding member of the California Academy of Sciences, and Philadelphia Academy of Natural Sciences. The following is a list of Mr. Garrett's principal writings:—In "Proceedings of Zool. Soc., London": "List of Mitridæ collected at Rarotonga, Cook's Isles," "Descriptions of two new species of Separatista," "Descriptions of two new species of Cœcum," "Description of a new species of Scissurella," "On the terrestrial mollusca of the Viti Islands." In the "Journal of Conchology": "Occurrence of *Crepidula aculeata* at the Marquesas Islands," "Occurrence of *Gadinia reticulata* in Eastern Polynesia," "Annotated catalogue of the species of *Conus* collected in the South Sea Islands," "Catalogue of the Polynesian Mitridæ; with remarks on their geographical distribution, station, and description of supposed new species," "Annotated catalogue of the Cypræidæ collected in the South Sea Islands." In the "Bull. Soc. Malacologique de France": "On the terrestrial mollusca of the Marquesas Islands." In "American Journal of Conchology," vol. vii.: "Descriptions of new species of Land and Freshwater Shells from the South Sea Islands," "List of Viti *Bulimi* and descriptions of new species." In "Proceedings of the California Academy Nat. Sciences": "Descriptions of new species of shells inhabiting the Sandwich Islands," "Descriptions of new species of fishes inhabiting the Sandwich Islands," "Descriptions of new species of South Sea Shells." In "Proc. of Acad. Nat. Sciences, Philadelphia": "On the terrestrial mollusca inhabiting Cook's Islands, Society Islands, and Samoan group," "List of Land Shells inhabiting Rurutu (one of the Austral Islands), with remarks on their synonyms and geographical range," and several other papers.



*TROPHON TRUNCATUS* (STRÖM.), VAR. *SCALARIS*  
JEFFR. ON THE WEST OF SCOTLAND.

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BY A. SOMERVILLE, B.Sc., F.L.S.

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(Read before the Conchological Society, February 1st, 1888.)

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IN October, 1887, I had the privilege of some dredging at Iona, and, in forty-fathom water, south of the Soay Isles, on a bottom of shelly gravel, where *Pectunculus* valves were plentiful, and *Trophon truncatus* (Ström.), (the type), *Defrancia linearis* (Mont.), *Nassa incrassata* (Ström.), &c. were tolerably common, I obtained a dead Trophon shell of striking appearance. I forwarded it to Mr. J. T. Marshall who was able to identify it as var. *scalaris*, Jeffr. of *T. truncatus* (Ström.), his decision being amply confirmed on a comparison of the shell with some Norwegian examples belonging to the collection of the late Mr. Robert Bell, London, and kindly lent to me by his brother, Mr. Alfred Bell.

This variety is described and beautifully figured in G. O. Sars' work on the Mollusca of Norway, (Christiania, 1878), in which it bears the name given to it by Lovén, of var. *Gunneri* of *T. clathratus*, L., (a type not now inhabiting British seas, though occurring in glacial and post-glacial beds), he having considered it as a variety of that species. Dr. Jeffreys, in referring to the variety ('British Conchology,' vol. iv. p. 320), and comparing it with *T. truncatus*, of which he considered it a form, says that its "ribs are deeper" than those of the type and that "they are also abruptly truncated and crested at the top of each whorl."

The occurrence of this shell on the West Coast of Scotland is interesting, as, previously, it has not been met with further south than in Shetland waters. It is to be hoped that some one

may, ere long, take it alive in the quarter where this dead specimen was obtained, and so establish the species as one belonging to the West of Scotland.

On referring to the Rev. Canon Norman's papers on the Mollusca of Norway which appeared in the 'Journal of Conchology' in 1879, I observe that the shell now under notice is said to be met with off the Færoe Islands, Iceland and Greenland, indicating, with Norway and the Shetlands, a wide North-Atlantic and Arctic distribution.

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**Note on the occurrence of *Testacella scutulum* Sow. in Leicestershire.**—Through the kindness of W. Ingram, Esq., of Belvoir gardens, I have been able to forward to Mr. J. W. Taylor, of Leeds, specimens from there, which he has identified as *Testacella scutulum* Sow. As this record is of interest, some further particulars respecting it may be useful. The specimens were found hibernating nearly eighteen inches underground, during the removal of some masses of rock forming part of a waterfall in the gardens of Belvoir Castle, about January 18th, 1888. I am informed that these Testacellæ are not at all rare, specimens being found every season, either above ground devouring worms, centipedes, etc., or during excavations, particularly when breaking up fresh ground. They are generally found in hitherto undisturbed ground, rather heavy and moist, and have been noticed for the past twelve years. The Testacellæ have been found in various portions of the estate, within an area of at least a mile, and Mr. Ingram expresses it as his opinion that it is decidedly indigenous. Belvoir castle and gardens are situated in the extreme north-east corner of the county of Leicester, the castle itself crowning a small outlier of the Marlstone Rock bed of the Middle Lias, the soil of the gardens being the result of the decomposition of the clays of the same formation.—H. E. QUILTER.

ON THE ARTICLE PURPURA IN TRYON'S  
'MANUAL OF CONCHOLOGY.'

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BY ALFRED HANDS COOKE, M.A.,  
Museum of Zoology and Comparative Anatomy, Cambridge.

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(Read before the Conchological Society, February 1st, 1888.)

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MR. TRYON'S 'Manual of Conchology' has been received by the scientific world with the respect due to so great a work. The man who attempts\* so herculean a task as to figure and describe every known shell, deserves the gratitude of all students of conchology. Yet, without in the least detracting from the acknowledgements due to the distinguished author of the volumes, the opinion may safely be expressed that, in all probability, the work would have been better done had it been entrusted to more hands. So far as I have at present observed, out of eight volumes that have appeared, only part of one (the Cypræidæ) is the work of a collaborator. A practical student of shells is apt to become convinced that a prolonged study is insufficient to master the problems connected with even a single genus; how much more must this be the case with the monographer of all the known genera? It was inevitable, therefore, at the outset, that Mr. Tryon's work should be, in a certain sense, a failure, simply because he attempted single-handed a task which might well have occupied the brains and energies of fifty men.

Although several of what may be called congratulatory notices of the work have appeared—notably those by Kobelt in the 'Jahb. der Malak. Gesellsch.', by M. Crosse in the 'Journal de Conchyliologie,' and by an author in the 'Journal of Conchology'—nothing in the way of detailed criticism by students

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\* Since this paper was written, the news of the lamented death of Mr. Tryon has reached us. It has been thought best to make no alterations in a criticism of what every student must know to be a very difficult piece of work.

of particular genera has at present fallen in my way. I venture therefore to offer the following notes on the genus *Purpura* proper, in the hope that the example may be followed by other students better qualified than myself to pronounce on other genera.

Vol. II. p. 160.—*P. persica* L. '*P. inerma* Reeve does not differ.'

This is a serious error. Tryon has been misled by the somewhat patulous mouth and the dashes of white on the body whorl of *inerma*, which, *in a figure*, suggest a momentary reminiscence of *persica*. He cannot have seen shells named from the type, which is as different as possible from *persica* in sculpture (particularly of the spire) and coloration. The outer lip of *persica* is invariably deeply stained inside with chestnut, while the whorls are ringed with narrow bands in which white and chocolate succeed one another with great regularity. Neither of these characteristics are present in *inerma*, which has also a much higher spire. I regard the species (*inerma*, by the way, is a strange mistake for *inermis*, *i.e.* 'destitute of tubercles') as a non-tuberculated variety of *P. biserialis* Blainv., which is the West Coast American form of *haemastoma* L. The locality, unknown to Reeve, is probably Ecuador. A tablet in the British Museum gives Bay of Panama (Cuming), where I can vouch for its not occurring. D'Orbigny's collection in the same museum contains specimens (labelled *P. haemastoma*) said to be from Brazil, but it is very doubtful whether this form of *haemastoma* occurs on the Western shores of the Atlantic.

I do not advance this view of the true position of *inerma* without having examined hundreds of specimens of *P. biserialis*, and it must be recollected that the *Purpura* group is peculiarly liable to variation in the tubercles with which so many of the species are decorated.

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Page 161.—*P. columellaris* Lam. '*P. leucostoma* Desh. does not present any well-marked distinctive characters.'

Tryon banishes to his index the important fact that *P. leucostoma* is a Bourbon shell, described by Deshayes in his 'Conch. de l' Ile de Réunion,' p. 116. Nor does he attempt to explain why *P. columellaris*, a shell confined to a restricted portion of the West Coast of Central America and to the Galapagos, should turn up in the middle of the Indian Ocean and nowhere else. The distribution of the Purpuræ is very well marked, and in every case continuous, and not a single example occurs of a break in the area of distribution. This fact alone is decisive of the non-identity of the two species. *P. leucostoma* has never again been recognised; it may be doubted whether it is a Purpura at all.

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Page 162.—*P. hippocastaneum* Lam. ' *P. bitubercularis* Lam. is merely a black variety,.....it has no distinctive characters in the tuberculation.'

Few will care to follow Tryon in his union of these two species. Indeed, as I have never met a single conchologist who agreed with him on this point, but many who condemned him, it is needless to discuss the matter at length. It is a curious fact that he does not figure the typical *hippocastaneum* at all. Many of his figures are copied from Kiener, and Kiener figures as *hippocastaneum* Lam. an undoubted specimen of *bitubercularis*. The true *hippocastaneum* Lam. (that of Linné being by universal consent incapable of determination) is admirably figured by Reeve, 'Conch. Ic,' pl. viii., fig. 34c, and differs completely from *bitubercularis*. This difference is most marked in a point where Tryon says there is 'no distinctive character,' viz., in the tuberculation. The tubercles of *hippocastaneum* are always more or less foliated, those of *bitubercularis* never.

This error naturally involves others. *P. savignyi* Desh. and *P. distinguenda* Dunk. are varieties of *bitubercularis*, not of *hippocastaneum*. *P. intermedia* Kien. is a variety not of *bitubercularis* but of *pica* Bl. A much worse blunder follows. *P. ocellata* Kien. is stated to be the young of *P. intermedia* Kien.

One would have thought it impossible for any conchologist who had read Kiener's description of his *ocellata*, and looked at his figure (copied by Tryon), to avoid recognising in it the young of the well-known *Monoceros brevidentatum* Gray. Indeed, Tryon himself appears at one time to have seen this, for in his Index he gives *P. ocellata* Kien. (t. 37, f. 86) as=*Monoceros brevidentatum*. But in the very next line he says *P. ocellata* Kien. (t. 37, f. 86)=*P. hippocastaneum* var. This is somewhat bewildering. But as he does not under *Mon. brevidentatum* (p. 194) recognise *ocellata* Kien. as a synonym, we must conclude that he holds to the opinion expressed on page 162, an opinion manifestly erroneous.

The locality 'Panama' for *bitubercularis*, quoted on Cuming's authority, is incorrect. The species ranges from Suez and Aden (as the var. *savignyi*) to N. Australia and the S. Pacific (type); also to Japan. No Polynesian *Purpura* occurs on the western coasts of America.

Page 163.—*P. tumulosa* Reeve. 'The adult specimen (*P. bronni*)...is remarkable...'

This implies that *tumulosa* is an immature shell, and that *Bronni* is the full-grown form. An examination of the type of *tumulosa* at the British Museum shows that it is by no means an immature shell, but is, on the contrary, stout and thickened with age. It is, further, a very remarkable, almost monstrous variety of *P. bitubercularis*, in which the tubercles are rounded and of enormous size, almost entirely covering the surface of the body whorl. Save for the fact that it, too, possesses tubercles, *P. bronni* is absolutely distinct. It is scarcely even a variety, but only a somewhat smaller form, of *luteostoma* Chem.

Page 163.—*P. armigera* Chem. '*P. affinis* Reeve is the young.'

Reeve describes and figures ('Conch. Ic.,' f. 77) as *affinis* a shell manifestly adult. *Affinis* is a dwarf, not a young, form of *armigera*.

Page 164.—*P. mancinella* L. ‘*P. aegrota* Reeve...is one of these intermediate forms’ [between *mancinella* and *echinata*].

This is another guess from the look of the figure, in which a touch of yellow at the lips might suggest a reminiscence of *mancinella*. *Aegrota*, however, when the type is consulted, turns out to be a very remarkable variety of *textiliosa* Lam., in which the spire is somewhat produced, and blunt tubercles are formed on the shoulder of the body whorl, while the yellow colour almosts always present on the lip of *textiliosa* is slightly deepened. Although the perfect form of *aegrota* is exceedingly rare, I have noticed specimens of *textiliosa* with incipient tubercles, which form a passage to that form.

I am at a loss to understand whence Tryon has derived his locality, ‘W. Coast Central America’ and ‘Peru’ for *mancinella*. It inhabits the coasts of the Indian Ocean from Natal and Aden to N. Australia and S. Polynesia, but never occurs on the American coasts.

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Page 166.—*P. rustica* Lam. ‘*P. marmorata* Pease appears to be the same species.’

This again looks as if Tryon could not have seen specimens of *marmorata*. What that species really is I do not pretend to be able to determine. Not more than a dozen specimens appear ever to have been found (they were dead shells collected by Mr. Andrew Garrett), and those that I have seen are in such wretched condition from the scraping and oiling process which they have undergone that it is impossible to pronounce upon them, except that they bear no affinity to *rustica* Lam.

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Page 167.—*P. haemastoma* L. var. *undata* Lam. ‘By common consent the usual W. Indian manifestation of *P. haemastoma* bears this name, although the form which it characterizes is equally common on the W. Coast of America.’

Into the vexed question of the identification of the Lamarckian *P. undata* I do not propose to enter, although I suspect that ‘common consent’ is here at fault. But it is incorrect to

say that the W. Indian form now generally known as *undata* Lam. is 'equally common on the W. Coast of America.' The W. Indian and W. American forms *may* have a common origin, but at present they are completely distinct, and no one who has given careful study to large series of specimens could possibly confound them. Carpenter worked out the synonymy and the distribution of the various forms in his Catalogue of Mazatlan Shells (p. 477). Reeve, by figuring as Lamarck's *undata* an undoubted specimen of *biserialis* Blainv. (the W. coast form of *haemastoma*), and C. B. Adams, by identifying this same form ('Panama Shells,' pp. 80—81) with *undata* Lam. have both contributed to the confusion and perhaps led Tryon astray.

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Page 169.—*P. haemastoma* L. var. *Blainvillei* Desh. 'To this form belong...*P. Janelli* Kien.'

*P. Janelli* Kien., is a *Cantharus*!

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Page 178.—'*P. nux* Reeve=*Murex Edwardsi* Payr.'

Such an astonishingly bad guess as this carries its own refutation.

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Page 200.—'*Cuma purpuroides* D'Orb. (= *C. fusiformis* Blainv.). This well-known species...is said to have a fusoid operculum, it will therefore be described and figured in Vol. III. of this work.'

Turning to Vol. III. p. 109, we read:—

'*Melongenella fusiformis* Blainv. This shell is apparently very closely related to *Cuma kiosquiformis*, but the operculum, according to D'Orbigny, is not purpuroid..... I cannot help thinking that the great French naturalist was mistaken as to the operculum.'

The conviction steadily gains ground that Tryon cannot possibly have seen some of the shells about which he writes. The idea of suggesting that a shell with a stout bushy epidermis could be a *Purpura*! The idea of venturing to contradict the



man who had himself gathered the shell in its native haunts by dozens, and in whose collection they may still be seen, with their claw-shaped opercula to testify to his entire and unassailable correctness of observation!

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Page 200.—*C. carinifera* Lam. ‘Philippines, Ascension Isles, St. Helena.’

The last two of these localities rest on no valid authority. Tryon no doubt puts them down to *carinifera* on the strength of the misidentification dealt with in the next paragraph.

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Page 202.—*C. muricina* Blainv. ‘A number of authors have assigned this species erroneously to *Cuma*, among them Pease (‘Am. Jour. Conch.,’ IV., iii.), who quotes among the synonyms *P. turbinata* Blainv., which=*Cuma carinifera* Lam.’

This is a remarkable instance of the effect of haste upon Tryon’s work. In the first place Pease, in the passage referred to, never mentions a *P. turbinata* Bl., because there is no such shell. There is a *turbinoides* Blainv., and it is to this that Pease refers. In the second place, *P. turbinoides* Blainv. does not equal *carinifera* Lam. *Turbinoides* Blainv. is the same shell as *thiarella* Quoy (‘Voy. Astr.,’ pl. 39, figs. 4, 5, 6), indeed Blainville refers to Quoy’s figure of *thiarella* as illustrating his *turbinoides*. Tryon (probably without examining the figure or description) jumps to the conclusion that *thiarella* Quoy equals *thiarella* Lam., which latter is a form of *carinifera* Lam., hence his conclusion ‘*P. turbinata* Blainv.=*Cuma carinifera* Lam.’

It should in fairness be added that Quoy makes the same mistake of supposing that his *thiarella* is the *thiarella* of Lamarck, a mistake which a study of Quoy’s figures and description will at once correct.

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Page 244.—‘*P. muricina* Kien., t. 6, f. 13b=*Murex dubius* Sowb.’

Another unhappy guess. Kiener is perfectly correct in his figure of a very young shell of *muricina* Blainv. (= *turbinoides*

Blainv.), in which state the tubercles are much more erect and spinose, and the shell much more produced at both ends, than in the adult form.

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Page 252.—‘*P. rupestris* Val. ‘Voy. Venus,’ t. 9, f. 1=*P. lapillus* L. var.’

Valenciennes’ *P. rupestris* has been correctly regarded as a form of *striata* Mart., with a somewhat patulous mouth. But Tryon, not content with upsetting the received opinion without a word of discussion, actually figures this very same shell (of which t. 9, figs. 1 and 1a in the ‘Venus Atlas’ obviously represent the back and front views) as a *Monoceros*, and a synonym of *M. lugubre* Sowb. (p. 285, pl. 60, f. 293)! Who will venture to explain how the front view of *P. rupestris* Val. can be *Monoceros lugubre* Sowb., while the back view is *P. lapillus* L.?

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Page 256.—‘*P. stellaris* Hombr. and Jacq. ‘Voy. Astr.,’ 22, f. 13, 14=*Cuma rugosa* Born.’

This identification is open to serious doubt. The authors’ description of the sculpture of *stellaris* by no means corresponds with that of any form of the variable *rugosa* Born. (= *sacellum* Chem.). To me, *stellaris* H. and J. looks far more like *cuspidata* Ad. and Reeve, which latter, by the way, no one who has seen the types will agree with Tryon (p. 163) in regarding as the young of *pica* Blainv.

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Page 256.—‘*Buccinum striatum* Mart. ‘Univ. Conch.,’ pl. 7=*P. succincta* Mart.’

Martyn’s figure of his *striata*, if not magnified (it is over two inches in length), is certainly very near to his *succincta*. But the shell now generally recognised as *striata* Mart. is entirely different from *succincta*, not merely in size and in the character of the ribbing and interstitial striæ, but also in such an important point as the dentition. I am informed by my friend, Mr. H. M. Gwatkin, of St. John’s College, that in the case of *P. succincta* the central tooth has one large notched tooth on each side, al-

most equal in size to the central, crenulations beyond ; while in the case of *P. striata* there are two small teeth, not notched, on either side of the central. This constitutes a radical difference of dentition.

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Page 261.—‘*P. Woldemarii* Kien.=*Tritonidea*.’

In Vol. III. we vainly search for *Woldemarii* as a *Tritonidea*, but we find it set down as a *Cominella*. Even then, the identification seems unfortunate, as Tryon makes *P. Woldemarii* equal *C. maculata* Mart. Kiener’s figure is far more like *C. limbora* Lam.

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**Helix revelata at Newquay.**—A list of the land shells of Newquay, Cornwall, published in the “Journal of Conchology” for 1887, pp. 164—166 by Mr. J. H. James, does not include the above shell. I found *Helix revelata* at Newquay last summer, in its usual habitat, viz., high grassy downs facing, or not far from the sea. I do not think the shell has been previously recorded from the north coast of Cornwall. A few years ago I searched for it at the Lizard. For five days my quest was fruitless, until at last I happened to pick up a dead shell of *H. aspersa*, inside of which was a living specimen of *H. revelata*.—[REV.] A. H. COOKE.

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**Limnæa truncatula floating.**—I was much interested in Mr. Nelson’s remarks, respecting the floating habits of the *Limnæidæ*, contained in his paper on ‘A Day’s Collecting near Howden, Yorks.,’ on page 263, ante. Like Mr. Nelson I have never seen *L. auricularia* in the act of floating ; I remember, however, while waiting near Authorpe railway station in Lincolnshire for the arrival of Mr. Roebuck whom I was to meet there, noticing a good number of molluscs floating on the surface of the water in a small pond, and on procuring some of them they proved to be unusually large specimens of *L. truncatula*.—H. WALLIS KEW, 13th February, 1888.

ON THE RE-DISCOVERY OF  
*PLANORBIS MULTIVALVIS*. CASE, AND *PLANORBIS*  
*TRUNCATUS* MILES.

BY BRYANT WALKER, DETROIT, U.S.A.

IN 1847 Case described the *Planorbis multivalvis* from specimens received from 'Captain Stanard who found it in the northern part of Michigan.' A single example received from Mr. Case by Dr. Gould and deposited in the Smithsonian Museum was apparently the only specimen preserved. And for forty years no further trace of the species has been observed. During the summer of 1887, however, it was the good fortune of Dr. M. L. Leach of Travuse City, Michigan, while collecting at Marl Lake Roscommon County, Michigan, to bring to light again the long-lost species. A couple of dozen specimens were found, most of which have come into my possession. Some of them were submitted to the late Geo. W. Tryon, Jun., of the Philadelphia Academy of Sciences, and the identification with Case's species was approved by him. Compared with *P. campanulatus* Say this form is broader and not so high, owing to the rounded shape of the whorls. The hump directly opposite the aperture, and which forms the most striking part of the original figure, only occurs in a small proportion of the specimens, and when present the last half whorl is irregular and distorted almost as though diseased. It would seem as though the animal having completed its shell was, through some unforeseen contingency, compelled to continue it another half whorl and proceeded to do so in a very haphazard sort of way. It is perhaps doubtful whether this species will prove to be more than a strongly-marked local form of *P. campanulatus* Say, but that it is entitled to varietal rank at least seems unquestionable.

*Planorbis truncatus* was described by Dr. Miles, State Geologist, in 1861, from specimens found in Saginaw Bay in the north-eastern part of the state. So far as I know none but

the type specimens have hitherto been found. I have recently received from Prof. W. N. Androus, of Elk Rapids, specimens of this species from the Elk River, Antrim County. These specimens are quite typical and there can be no doubt of the identification. This discovery is interesting, as tending to establish the validity of the species by giving it a range across the whole northern portion of the state, and at the same time showing that it retains through that range its peculiar characteristics.

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**Helix pisana** var. **minor** Bourg.—Some little time ago Mr. C. Jeffrey, of Tenby, kindly sent me a number of small specimens (collected in that neighbourhood) of this species, the bulk of which answered exactly to Bourguignat's description, which fixes the larger diameter as 15 mill. One of the specimens is exceptionally minute and in its greatest width only reaches 10 mill.—JNO. W. TAYLOR, May 20th, 1888.

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**Respiration of Ancyclus fluviatilis.**—According to the text-books there appears to be a difficulty in accounting for the manner in which this species obtains its supply of air, and not having seen an explanation, I wish to offer the following suggestion for the consideration of the readers of this journal. As the minute vegetation on which this mollusk feeds is during the hours of day, constantly giving off small bubbles of nearly pure oxygen, these may easily be received into the air-chamber and retained for the purpose of respiration, this gas being five times as effective as compared with atmospheric air, a very small portion only would be needed for the animal's use.—W. A. GAIN, M.C.S., May 18th, 1888.

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**Unio pictorum** var. **latior** Jeffr. in Lancashire.—Mr. R. Standen has recently given me a specimen of *Unio pictorum* found in the canal at Burnley by Dr. Long which is referable to this variety.—JNO. W. TAYLOR, May 10th, 1888.

NOTES ON MITRA (COSTELLARIA) RUGOSA  
(SWAINSON).

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

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

IN an appendix to the Catalogue of the celebrated collection of shells belonging to the Earl of Tankerville, dispersed in 1825, the elder Mr. Sowerby gave short accounts of a few of the rarer or more curious species there contained. Amongst them is to be found a fair description of the then as now unique mollusc, *Mitra rugosa* (Swainson), which was numbered 2097 in the catalogue. It is worth while transcribing this as follows, pp. xxvii. xxviii. :—

“ *M. testâ, subfusiformi, perforatâ, turritâ, rugosâ, decussatim sulcatâ ; anfractibus angulatis, anfractu basali medio contracto, basi subrecurvâ.*”

“ Shell subfusiform, perforated, turreted, rough with decussated grooves, whorls angulated, basal whorl contracted in the middle, base subrecurved.”

“ OBS. The shape of this curious species comes nearest to that of *M. costellaris*, but the spire is longer in proportion, and the basal part less contracted. The whole shell is rendered very rough by numerous deep grooves, which are decussated at nearly equal distances ; the interstices resemble excavated hollows, and make the elevated parts granulated ; the volutions are obtusely angulated, and the middle of the body whorl contracted. Throat striated ; outer lip crenated, base slightly recurved, pillar five-plaited, colour pale, slightly clouded with brown. Length  $1\frac{4}{10}$  in.”

Thus wrote Mr. Sowerby, and his description is so accurate as hardly to need comment. We should hardly, however, have compared the shell before us to *M. costellaris* (Lam.).

Mr. Lovell Reeve, in September 1844, published Plate xiv. of his Monograph of Mitra in the 'Conch. Iconica,' and gave a figure (No. 101) of the dorsal side only of this species,\* which at that time was in the possession of the late Thomas Norris, Esq., Howick House, Preston. † He re-wrote the description, in Latin and English, giving the name of the describer, however, as Sowerby, not Swainson. A slight error in nomenclature has thus arisen, and as *Mitra rugosa* (Sowb.) is occasionally found in catalogues—as in Paetel's—as a synonym of *M. (Turricula) corrugata* (Lamarck), the confusion is much increased.

According to the inflexible law of priority this well-known species *corrugata* (Lamk.) is the true *rugosa* of Gmelin, Lamarck's name having been thus antedated by some years. That specific title will accordingly have to be restored. To sum up, there is no *M. rugosa* (Sowb.), Gmelin and Swainson being the only authors who selected this term for any member of the genus.

The rule of priority in every other branch of natural science so increasingly and peremptorily recognized, must become equally paramount in conchology: according to its dictates a complete revision of molluscan nomenclature has become compulsory. It will therefore doubtless be necessary to re-christen Swainson's species, and the name of that author being unfortunately preoccupied by a rare species described by Mr. Broderip, from Columbia, I would suggest *Tankervillei*, after the former possessor of this still unique specimen.

Its locality is unknown, but most probably it is a native of Eastern seas. The true affinity of the shell lies with *M. angulosa* (Küster) and *M. mirabilis* (Adams).

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\* Sowerby, 'Thes. Conch. Mitra,' pl. xxiv. fig. 533, also gives a similar figure.

† At the dispersion of that collection in 1873 it was purchased by Dr. Prevost, of Alençon, and, upon his death, I acquired the specimen.

My chief object, however, in calling attention to the subject at the present juncture is to defend its rights as a *species*. The author of the 'Manual of Conchology,' in what he terms a 'Conservative policy,' though it had perhaps better be termed a Radical movement, seeks to prove this a mere variety of *M. Cumingii* (Reeve), a species with which it has hardly any relationship. I quote Mr. Tryon's words, 'Manual of Conchology,' vol. iv. p. 170 : "*Turricula rugosa* (Sowb.) (fig. 439) of which only a single specimen is known, appears to differ [from *M. Cumingii*] only in the somewhat greater prominence of the revolving sculpture on the body whorl. I think it the same species, if it is, then its priority of publication must cause the adoption of its name instead of that of *Cumingii*."

Whether the author expresses a doubt or not upon this subject is not very material, for this luckless shell is favoured with a somewhat roughly executed figure of some totally different species (fig. 439), while what is apparently copied from Reeve's well-known figure of *M. rugosa* is made to do duty for *M. Montrouzierii* (Souverbie) (fig. 440), from New Caledonia.

This is merely one of many instances which I have been sorry to see marring the utility and perfection of so comprehensive a work as the 'Manual of Conchology.' When the author has been able personally to compare and trace the affinities between nearly allied species from long series of specimens in the Museum of the Academy, Philadelphia, his conclusions are mostly weighty and, at all events, worth attention, but there are hundreds of shells which the public and private collections of this country or the continent of Europe alone possess ; relying here on descriptions or plates he has not so often been successful in the interpretation of their characteristics or affinities.

There are hardly two Mitras so different from each other as *M. Cumingii* and *M. rugosa*, and it may not be amiss to demonstrate briefly the more salient points of distinction :—



*M. Cumingii* (Rve.).                      *M. rugosa* (Swains.).

Shape .....	Distinctly ovate-oblong .....	Fusiform attenuated.
Spire .....	Obtusely turreted .....	Sharply acuminate.
Whorls.....	Upper part angulated .....	Upper part depressed.
Ribs .....	Distinct .....	None ; but strongly latticed with transverse longitudinal ridges.
Columella	Four plaited .....	Five plaited.
Lip .....	Outer lip very slightly crenate...	Strongly crenate.
	base somewhat truncate .....	base recurved.
Coloration	White, with orange blotches... and and black interrupted re- markings    volving lines .....	White ; slight speckles and spots of brown ; no orange or black lines.

I have already stated what are probably the nearest allies of *M. rugosa* ; as to *M. Cumingii* I doubt its belonging to the subgenus *Costellaria* at all. It would rather seem akin to *M. patriarchalis* (Lam.), a handsome and well known species of the subgenus *Pusia*. It is gratifying to see my views confirmed by Herr Paetel, who has adopted this course in his 'Conchylien Sammlung,' 1883.

Again, while on this subject, I can hardly agree with Mr. Tryon in also relegating *M. clathrata* (Reeve) to the rank of a mere variety of *M. Cumingii*. This would appear one of the most constant of all the Mitras ; of the many specimens I have seen not one has ever seemed doubtful. The unusually deep cancellations between the thick, obtuse ribs, and the conspicuous brown band round the centre of each whorl, are unlike any Mitra excepting *M. (Costellaria) decora* (Reeve), near which I fancy it should be placed.



**Discovery of *Helix harpa* Say in Switzerland.—**

Mr. A. E. Craven has recently discovered this species in some numbers at the Riffelalp, near Zermatt, at an elevation of 2,100 metres, under dead wood and especially under the bark of fallen trees of *Pinus pinea*, a somewhat scarce tree in Switzerland. In the Palearctic region *H. harpa* has been recorded previously from Lapland, Finland, Norway, Sweden, and the Amour district of Siberia.—J. W. TAYLOR, April 10th, 1888.

## BIBLIOGRAPHY.

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These four parts, which embraces pp. 241—560, completes the Scaliariidæ, Terebridæ, Pyramidellidæ, Eulimidæ, Styliiferidæ, Ceritheopsidæ, Solariidæ, Pleurotomariidæ, Conidæ, Strombidæ, Cypræidæ, Cerithidæ, Melaniidæ, Littorinidæ, Viviparidæ, Rissoidæ, Valvatidæ, Ampullariidæ, Turritellidæ, Cæcidæ, Vermetidæ, Neritidæ, and Trochidæ. With nearly every species mentioned is given indication of the locality or district which it inhabits and a reference to the publication in which the original description or figure may be found.—J. W. T.

**The Shell-Collector's Handbook for the Field**, by J. W. Williams, M.A., D.Sc. London: Roper & Drowley, 29, Ludgate Hill, E.C.

This is a small book intended for the pocket of the active Field-worker, so that he can satisfy himself on the spot of the name of any capture of whose identity he is in doubt. It is prefaced by a general anatomical description of the two types of our Land and Freshwater Shells—a freshwater mussel and a Helix. The third chapter is devoted to instructions in collecting and preserving Land and Freshwater Shells. Chapter four is a conspectus of the classes, orders, genera, &c., of the British species, and the descriptions are drawn up in a terse and condensed style. The remainder of the work is devoted to the enumeration and description of all the species and varieties of our British Land and Freshwater Shells known to the author at the time of publication, with concise notes upon the stations frequented. The descriptive part of the Volume is interleaved so that the collector may make notes of any point of interest at once, without waiting until his arrival home. A good feature of the book is the references given to

detailed and special articles, upon subjects the author has not had space to treat fully upon. An ample glossary concludes the volume, which will (although containing some manifest errors, a result probably of the haste in which the work was evidently compiled), be found useful and handy in many ways by the busy and energetic collector.—J. W. T.

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ON THE SPECIFIC DISTINCTNESS  
AND THE GEOGRAPHICAL DISTRIBUTION OF  
*TESTACELLA SCUTULUM* G. B. SOWERBY.

BY JOHN W. TAYLOR, F.L.S.,  
Membre Honoraire de la Société Malacologique de France.

The investigations instituted by myself and Mr. Roebuck with the valued co-operation of Mr. C. Ashford into the structure and distribution of the British Land and Fresh Water Shells, for the forthcoming Monograph of our native species, has led us, amongst other interesting results, to recognise the specific distinctness of *T. scutulum*, which discovery I think it desirable to place permanently on record without further delay.

### History, &c.

The *Testacella scutulum* was first separated from *T. haliotideae* as a distinct species by Mr. G. B. Sowerby, in his 'Genera of Recent and Fossil Shells', published in 1823, and figured on Pl. 159 of that work. He described the shell as '*Testa ovata, antice paulum acuminata, extus plana, clavacula arcuata, elevata*', and also remarked upon the near resemblance of the animal to that of *T. haliotideae*, and upon the absence of the double row of dorsal tubercles so conspicuous in *T. maugei*. Mr. Sowerby was however very soon afterwards led from the just conclusion he had arrived at by the aid of his own judgment, as Férussac in the same year remarks, 'Mr. Sowerby having discovered this singular mollusk in England, has erroneously considered that those he observed, differed from French specimens. The ex-

amples he had the kindness to send, has convinced us of his error, and he himself agrees with this view, after a fresh examination.' This conclusion of Férussac, yielded to by Mr. Sowerby, was afterwards generally accepted, Dr. Gray, Forbes & Hanley, Dr. Jeffreys and every recent British author, regarding *T. scutulum* as only a slight variety of the better known species *T. haliotideae*.

Afterwards, in 1856, Mr. Tapping in the 'Zoologist,' p. 5105, re-described this species as new, under the name of *Testacella Medii-Templi*, from specimens found in the Middle-Temple gardens, but, as he only compares his new species with *haliotideae* and *maugei*, we are led to infer that he had no practical knowledge of *T. scutulum* and had overlooked Sowerby's figures and description, as we have the high authority of Canon Norman for regarding Tapping's species as identical with *T. scutulum*.

The only other names that appear to have been definitely bestowed on this species, are, that of *Testacella anglica* given by Grateloup in his 'Dist. Geog. Limac.' published in 1856, and that of *Testacellus scutatatus* applied by Lesson in 1838.

### Organisation, etc.

The first discovery of the different organization and conclusive demonstration of the just claim of *T. scutulum* to specific rank, was made by Mr. C. Ashford, early in 1885, and its great divergence in certain respects from *haliotideae* leaves no doubt of its distinctness, in fact, in some points it approaches more closely to *maugei* than to the species with which it has hitherto been confounded. Gassies & Fischer in their 'Monographie du Genre Testacelle' say, 'Animal similar to that of *T. haliotideae*,' and rank this form as a variety of that species. As they do not remark upon the striking differences in the structure, it is reasonable to suppose that no anatomical examination was made, or if made they had not the true *T. scutulum* before them.

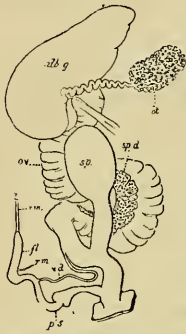
The SHELL is usually smaller in proportion to the size of the animal than in *T. haliotideae*; it is also comparatively longer and more wedge-shaped and has the upper surface much flatter,

sometimes even actually concave towards the outer lip, while in *T. haliotideae* the upper surface is always more or less markedly convex. The nucleus is placed at an angle of about  $60^{\circ}$  or  $70^{\circ}$  to what may be called the vertical line, while in *T. haliotideae* the angle formed is only about  $45^{\circ}$ . The lines of growth are finer and less rugged in *scutulum*, the epidermis is of a brownish color, and the shell generally thinner in substance. The left or columellar side of the shell is more strongly curved—even angular at times—than in *haliotideae*, which is more regularly and gently arched.

On the underside the columella is more strongly arcuate, or almost subangular, and terminates more abruptly, more nearly to the vertical axis of the shell. The projecting apex is seen to be more acute in *scutulum*, and to perceptibly overhang on the right, whereas in *haliotideae* it is more central and does not overhang. The free, thin outer margin is perceptibly darker in color owing to the reddish-brown epidermis being visible through its substance. The muscular scar is crescentic in shape, conforming in shape to the direction of the lines of growth, and shows also the same pale brownish tint which characterizes the free outer margin. The average size of the shells examined is 5 mill. long, by 3 mill. wide, in the broadest part.

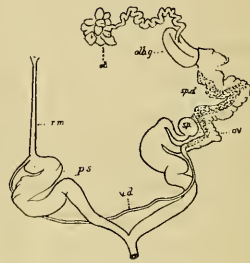
The ANIMAL resembles *haliotideae* in general form, but is perhaps rather less attenuated anteriorly. It is usually of a tawny-yellow color, varying in depth of tint in different specimens, and usually besprinkled with minute brown dots, which are less numerous towards the foot, some specimens are however almost destitute of these markings, while in others, the spots by coalescence, form more or less distinct and regular brown mottlings on the dorsal surface. The sole is usually of a more or less deep uniform yellow. The lateral furrows are closer together on their emergence from beneath the mantle, than in *haliotideae* and when the animal is moderately extended, their junction in one common groove may be distinctly seen. The rows of mid-dorsal tubercles so conspicuous in *T. maugei* and less so in *T.*

*haliotidea*, are in *T. scutulium* scarcely perceptible, and the fine longitudinal striæ which aid to form them become lost as they approach the head in the usual somewhat uniform granulation of the anterior part of the body.



Sexual Organs of *T. haliotidea*,  
from Horsham  $\times 1\frac{1}{2}$   
Sexually mature, hence greater  
development of female organs.

ot. ovotestis; alb. g. albumen gland; ov. oviduct; sp. d. sperin duct; sp. spermatheca;  
v. d. vas deferens; r. m. retractor muscle; fl. flagellum; p. s. penis-sheath.



Sexual Organs of *T. scutulium*, from  
Chiswick,  $\times 2$ .  
Adult, but not quite sexually mature.

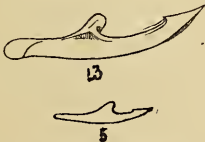
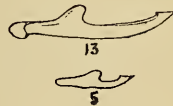
In its REPRODUCTIVE ORGANS, *T. scutulium* differs markedly from *haliotidea* in the totally and strikingly different form and arrangement of the penis-sheath, which approaches much more nearly to that of *T. maugei*\* in its general form and comparative simplicity, being long and simple, and though enlarging upwards and sometimes twisted, is without the long and thick flagellum which is so conspicuous a feature in *T. haliotidea*, the vas deferens thus enters the penis-sheath terminally in *scutulium* and *maugei* and laterally in *haliotidea*. The tongue-like cæcal process which is so distinctive of the lower portion of the penis-sheath in *haliotidea*, is quite absent in *scutulium*, there is

\* The figure of the sexual organs given by Gassies & Fischer, Monogr. genre Testacella, pl. 1, fig. 15, as characteristic of the genus Testacella, and as specially representing those of *T. maugei*, really belong to *T. haliotidea*. It seems advisable to correct this grave error, as Signor C. Pollonera in his recently published elaborate paper on Spanish and Italian Testacellæ, credits *T. maugei* with the possession of a flagellum, apparently on the authority of the above-mentioned distinguished authors.

also, but a single retractor muscle to this organ in *scutulium* and *maugei*, while *haliotideia* has in addition one and sometimes even two slender lateral retractors. The difference in size of the female organs, as represented in the figures, is chiefly due to unequal sexual development in the specimens examined, and is not a matter of importance.

The enormous LINGUAL SHEATH tapers off behind into a very powerful muscle, or combination of two, three, or four partially independent ones, and has in addition its hinder half attached laterally to the skin of left side, near the dorsal line, by a series of ten to twenty conspicuous muscular bands, running parallel to each other and fixed at independent points, *T. scutulium* differs from *haliotideia* in this character, insomuch that these lateral muscles, though variable in number, are constantly less numerous than in *haliotideia*, where they generally exceed twenty. *T. maugei* has terminal muscles only.

The LINGUAL RIBBON of a specimen of *T. scutulium* from Chiswick, collected by Mr. S. C. Cockerell and prepared for me by Mr. Neville, contains 46 rows of teeth, with 34 in each row, totalling 1564 teeth, while a specimen of *T. haliotideia* sent us from Oxford by Mr. E. B. Poulton, has only 38 rows, each containing 36 teeth, or a total of 1368. In all our British species of Testacella there seems to be a tendency to develop along the medial line a central rudimentary tooth. The angle formed by the convergence of the rows of teeth towards the centre of the ribbon is much more acute in *haliotideia* than in *scutulium*.

Teeth of *T. haliotideia*  $\times 40$ .Teeth of *T. scutulium*  $\times 40$ .

The TEETH of *T. scutulium* differ from those of *haliotideia* in being more slender, not so much curved, and with the barbed end not nearly so large and strong, while the prominently de-

veloped protuberance on the concave side of the tooth is much nearer the posterior end. They seem also to be deficient of the blade which I have detected on the convex side of the teeth of *haliotideia* at the apical end. The figures of the dentition of *scutulum* are carefully traced from a photograph taken by Mr. Cooke of a Guernsey specimen and represent the 5th and 13th spinules of one of the middle series. Those of *T. haliotideia* also represent the 5th and 13th teeth of one of the median rows, and are copied from the photo. of a preparation by Mr. Butterell of a Beverley specimen.

There is however some variation, both in the aspect of the teeth of the two species and also in their number—both of which characters are said to be dependent on age—as Gray gives for *T. haliotideia*, twenty longitudinal rows only, while Rimmer states fifty rows of fifty-one teeth each, for the same species.

The STOMACH is whitish and spindle-shaped in *T. haliotideia*, but oval and brown, with longitudinal whitish stripes in *scutulum* and *maugei*, but no stress should be laid on these points, as both the shape and color of this organ are a good deal dependent upon the amount and condition of its contents. The globular enlargement of the canal, at the point where it receives the biliary secretions is much more conspicuous in *scutulum*, than in the other two species, and the liver in *scutulum* and *maugei* is reticulated with white.

### Geographical Distribution.

This species has been recorded under its varietal name from France, Spain, England, Scotland and Ireland. The Irish records are probably erroneous and may refer to *T. haliotideia*, as a spirit specimen in my possession, collected at Youghal by Miss Ball, is without doubt that species. So far as is definitely known at the present time, *T. scutulum* is not found west of a line drawn from the Isle of Wight to Cheshire.

To help us to a better appreciation of what is known on the subject, it will be advisable to give the distribution in detail under each district in which it is stated to have been found.



If, as I suspect *T. bisulcata* and *T. pecchiolii* should eventually prove to be specifically identical with the present species, its area of distribution abroad will be considerably increased, and will extend even into Africa.

## ENGLAND.

**Devon, S.**—Gardens at Plymouth. Alder, Mag. Zool. & Bot., 1838.

**Devon, N.**—Gardens at Bideford. Alder, Mag. Zool. & Bot., 1838.

**Somerset, S.**—The Testacella, figured and described as *T. scutulium*, Nat. viii, p. 179, as found at Taunton, is evidently not that form, but *T. maugei*. Norman, Moll. Som., 1860.

**Somerset, N.**—Leigh woods, rare, T. G. Ponton, 1862. Prof. Leipner's Bristol List, 1875.

**Isle of Wight.**—Numerous in a garden at Newport, it is also found in other gardens there. W. Jeffery, J. of C., iii, p. 313, 1882.

**Sussex, W.**—Mr. Jeffery, about 1880, turned out in his garden at Ratham, Chichester, a half-dozen specimens, sent to him from Newport, I. of W. In Nov. 1883, he kindly sent a living example, presumably a descendant of the imported Isle of Wight specimens.

**Kent, E.**—A specimen from Folkestone, and one from a garden near Faversham were shown by Miss E. B. Fairbrass, at meetings of the Conchological Society in 1884.

**Kent, W.**—A specimen collected by Mr. A. H. Cooke, at Mabledon, Tonbridge, and now in his collection, has been shown to us.

**Surrey.**—The original specimens from which this species was described were obtained by Mr. Sowerby, from a garden, Kennington road, Lambeth. The specimens in British Museum, labelled '*T. haliotidea, Surrey,*' and '*T. haliotidea, Lambeth,*' should now be labelled *T. scutulium*, as I am satisfied from an examination of them, that they belong to this species.

Used to be very common twenty-five years ago, in Mr. Ivery's Nursery gardens at Dorking! R. D. Darbshire, 1885.

Kew Gardens, and in April, 1884, in the garden of 66, Gloucester road, Kew! R. A. Rolfe, 1884.

Wray Park, [published as *T. haliotidea*, but probably *T. scutulium*.]. G. S. & E. Saunders, Reigate list, 1861.

One shell found under beech leaves, Headley lane, near Boxhill, April 1886, by Mr. T. D. A. Cockerell!

The Testacella found by J. T. Horne, in 1868, in Croydon School gardens and recorded in the 'Nat. Hist. Journal' for 1878 without specific name, was probably *T. scutulium*.

**Herts.**—Mr. John Hopkinson, F.L.S., in Feb. 1884, sent us two living specimens, collected by Mr. B. Piffard in his garden at Hemel Hempstead.

**Middlesex.**—All the specimens I have seen from Middlesex, belong to *T. scutulium*, except the specimens of *T. maugei* in British Museum labelled as from a garden at Kensington, and the shells from 'near London' of the

same species in Bean's collection in the Scarborough Museum, but which are labelled as *T. haliotidea*—I will therefore cite all the localities for *Testacella* known to me, recorded or otherwise—in detail.

Stamford Hill, first noticed in 1829. T. Blair, Loudon's Mag., 1833.

Notting Hill Terrace, Kensington; not rare in the forcing and kitchen gardens, attached to Kensington Palace. Mr. J. de C. Sowerby states that it has been found beside Hampstead road. J. Denson, Loudon's Mag., 1833.

In gardens in the neighbourhood of London, and has we believe been found plentifully in gardens at Hammersmith, in the Royal Botanic Gardens, Regent's Park, and in fields and gardens about Hampstead and Hendon. J. Mc.Intosh, Naturalist, 1853.

In one part of the Middle Temple gardens under the protection of a S. W. wall, where it has been known to occur for 10 years [This locality was given for *T. medii-templi*, when described as new.]. T. Tapping, Zool., 1856.

Occasionally in gardens at Stoke Newington, E. R. Allen, 'Field,' 1885, p. 282.

Mr. C. F. Minor's garden at Whetstone, T. D. A. Cockerell, 'Field,' 1885, p. 607.

Occasionally from 1861—1881, in the back-garden of a house at Haverstock Hill, formerly the site of a Nursery garden. W. C. Atkinson, 1885.

In 1875, J. E. Harting in his 'Rambles in search of Shells', repeats several records and adds the Circus road, and Adelaide road, St. John's Wood.

Formerly abundant in the gardens of Burlington Cottage, Turnham Green. Rev. S. Spencer Pearce, 1885.

Winchmore Hill, 1884. Lionel E. Adams.

Common in gardens, Woodstock road, Bedford Park, Chiswick, 1885! T. D. A. & S. C. Cockerell.

In the kitchen-garden of Upper Holloway Railway Station, Islington, N., April 30, 1888! H. Wallis Kew.

The specimens in the British Museum, labelled '*T. haliotidea*, Chiswick', are incorrectly named, they should be referred to the present species.

**Norfolk, E.**—The Rev. Dr. Churchill Babington's collection, contains a specimen received from Mr. J. Reeve in 1880, and stated to be from the Ipswich road, by Mackie's Nursery, Norwich!

The specimens recorded as *T. haliotidea* by W. K. & J. B. Bridgman and others as from Mackie's Nursery grounds, Norwich, are probably this species.

Found somewhat abundantly in October 1884, at Foulsham by Rev. J. W. Horsley, a specimen from which place we have seen through the courtesy of Mr. Sydney C. Cockerell.

**Norfolk, W.**—The Rev. Dr. Churchill Babington has kindly sent us specimens from King's Lynn, received from Miss Peckover.

**Gloucester, W.**—Gardens at Clifton, rare, T. G. Ponton, 1862. Prof. Leipner's Bristol list, 1875.

Catlow's Popular Conchology, 1854, states that a Mrs. Smith of Bristol, first noticed *T. scutulium* as British, finding shells in her garden, and afterwards discovering the animal. It would be interesting to know what foundation exists for the statement.

**Worcester.**—Mr. G. Reece, of the Worcester Museum, kindly sent in Novr., 1883, a specimen found by Mr. W. Wood, in his garden in the city. Mr. Reece adds the information, that he finds it in the gardens of Barbourne Terrace and Britannia Square, both places within Worcester borough.

**Leicester.**—Belvoir Castle gardens, from which place specimens were sent in Jan. 1888, by the head-gardener, Mr. Ingram, to Mr. Quilter, who kindly forwarded them to me for identification.

**Nottingham.**—Common according to Mr. R. A. Rolfe, in the gardens and forcing-houses at Welbeck Abbey, where they were first noticed in 1878, the greatest number of specimens were collected in one of the long Peach-houses. In 1884, we received one of Mr. Rolfe's specimens, through the kindness of Mr. C. T. Musson, who had by error published the discovery in 1879, as *T. maugei*, afterwards altered by him to *haliotideæ*, under which name Mr. Rolfe and others also record the occurrence.

**Cheshire.**—Mr. J. T. Riches finds this species fairly numerous at Hoole, and sent us a small specimen in November 1883.

Mr. T. Ruddy has found it on the rockwork in the Nurseries of Messrs. Dickson & Sons, of Chester.

Mr. G. W. Shrubsole (Proc. Chester Soc. Nat. Sci., 1884.) records it as rare in Upton lanes, Chester, and in some grassy lanes adjoining extensive Nursery grounds, from which locality he sent us a living specimen in 1886.

**Yorkshire.**—The Testacellæ found by Mr. John Emmet at Padman's Nurseries, Boston Spa, and the specimen found at Headingley, near Leeds, by Mr. Edgar R. Waite, judging from the descriptions, probably belong to this species, but accidental circumstances have prevented our seeing and verifying the species.

Specimens labelled '*T. scutulum*, Beverley, Yorkshire,' are, as I am informed by Dr. J. W. Williams, in the Museum of the Middlesex Hospital Medical College, but they are doubtless referable to *T. haliotideæ*, a species known to occur commonly at Beverley.

**Durham.**—Through the kindness of Mr. R. Y. Green, we received two specimens found in November, 1876, in the garden of Mr. Edward Crawshay, Bensham Hall, near Gateshead. Mr. Howse, Curator of the Newcastle Museum, informs us that it is also found further up the Tyne at Axwell Park, &c.

#### SCOTLAND.

**Fife and Kinross.**—Only one locality is as yet known in Scotland, viz. : The St. Brycedale Nurseries of Messrs. E. Sang & Sons, of Kirkcaldy, where it has been known to exist for twenty-five years or more, and from which locality we received a living specimen through the influence of the Rev. J. McMurtrie, M.A.

#### IRELAND.

**Cork, N.**—Discovered many years ago by Mr. R. Ball in the town gardens at Youghal. In a garden at Bandon a Testacellus has been procured by G. J. Allman. The Irish specimens agree with English examples of *v. scutulum* with which I have been favoured by Mr. G. B. Sowerby.—Thompson, Annals and Mag. Nat. Hist., Sept., 1840.

## CHANNEL ISLES.

**Guernsey.** — In Guernsey, the late Dr. Lukis was acquainted with *Testacella* as early as 1801, as it inhabited his garden at that time, and was afterwards discovered at the end of the valley in which his garden was situated. It is also recorded by Cooke & Gwatkin, under the name of *T. haliotideae*, as abundant in Guernsey. Specimens supplied for examination by Mr. Tomlin and Mr. Cooke from market-gardens, near St. Peter's Port, proved the species to be *T. scutulum*.

**Sark.** — Messrs. Cooke & Gwatkin also record *T. haliotideae* as abundant at Sark, but the specimens are probably really referable to *T. scutulum*. The precise locality according to Mr. Cooke is the Seigneurie grounds.

## FRANCE.

Has been collected in many localities in France, Paul Massot, 1876; by De Cessac, in the department of the Creuze, Gassies and Fischer, 1856; and in the department of the Gironde, where it is common at La Teich, La Teste, Facture, Sallas, &c. — Gassies Mal. Aquitaine, 1876.

## SPAIN.

A specimen collected by Mr. R. D. Darbishire, B.A., at Granada, in Andalusia, which he kindly presented to me, was examined internally by Mr. Ashford and shown to be—as far as could be ascertained from a spirit specimen—in general accord with the organization of *T. scutulum*, but with fewer lateral muscles to lingual sheath than is usual in that species, and having a short accessory almost filiform muscle near base of penis retractor, not hitherto observed in *T. scutulum*. The shell and outer appearance are in accord with *T. scutulum* with which we may in the present paper regard it to belong.

The specimens collected by the Rev. J. W. Horsley at Gibraltar and recorded by myself and others as *T. haliotideae* var. *scutulum* do not belong to that form, but probably are true *T. haliotideae*.

## Affinities.

It is far from improbable that at least two Continental forms will upon critical examination be found to be identical with the present species, these are the *T. bisulcata* of Risso and *T. pechiolii* of Bourguignat.

*T. BISULCATA* is stated by Dupuy to differ from *T. haliotideae* in the warmer colors and the less-distinctly apparent ramified grooves or furrows of the animal. The shell is also stated to be more elongated, narrower anteriorly, very markedly flattened, and the columella truncated anteriorly, but narrower behind, which gives the opening an oboval shape, the epidermis is ferruginous and the surface is finely and rather regularly striate, while the

aperture of *T. haliotidea* is oval, the epidermis is greyish or blackish, the surface always marked with coarse and irregular lines of growth, and the shell more or less strikingly convex. In addition to the above points of difference between *T. bisulcata* and *T. haliotidea*, and which apply equally well to *T. scutulium*, I would in further confirmation point out that the figure of the teeth of *T. bisulcata* given by Gassies and Fischer is practically identical with those of *T. scutulium*, especially in the comparative slenderness of their form and the reduced dimensions of the barbed end. Lovell Reeve, 'Brit. Land and Freshwater Mollusks,' seems to quite misapprehend the characters of *T. bisulcata*, evidently regarding the sulci from which this form received its name, as a peculiarity of the shell.

*T. PECCHIOLII* is only known to us by the figure of the sexual organs given by Pollonera in the 'Boll. Mus. Zool. Anat. Compar.' vol. iii., pl. ii., fig. 18, and by his remarks thereon, all of which agree completely with *T. scutulium*. If the arrangement and number of the muscles of the lingual sheath also coincide there can then be no reason for maintaining *T. pecchiolii* as a species distinct from *T. scutulium*. It may further be remarked in corroboration of the views here expressed that Tryon ('Man. Conch. Pulm. i., 11, 1884) is of opinion that the form called by the name *pecchiolii* is very closely allied to *bisulcata*.

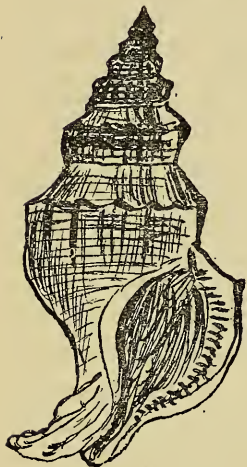
I hope that with the kind and generous help of fellow-conchologists the full distribution of *T. scutulium* may be worked out, and the identity or otherwise of *T. pecchiolii*, *T. bisulcata*, and other forms definitely determined by the new material which I trust our co-workers will exert themselves to procure.

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**Helix revelata and Pupa umbilicata var. alba at Newquay.**—To the list of shells found by Mr. J. H. James at Newquay, Cornwall, I can add *Helix revelata* and *Pupa umbilicata* var. *alba*, of each of which I found two examples only. The *Helix revelata* was among weeds and grass on the cliff, the *Pupa* among moss in a damp lane.—S. J. DA COSTA, May, 1888.

## TWO NEW SIPHONALIÆ FROM JAPAN.

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

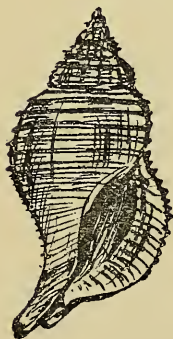
**Siphonalia mikado** sp. nov.

*S. testâ subfusiformi, turrîtâ, acuminatâ, brunneâ, basi obliquè recurvirostri, anfractibus angulatis, transversim elevatostriatis, ad angulum costatis, costis prominentibus, supernè reticulatis, fauce ad aperturam ipsam liratâ, intus lævi.*

*Long. 5.5 mill., Lat. 2.9 mill.*

Habitat Japoniam.

Shell somewhat fusiform, turreted, acuminate, brown, base obliquely recurved, beaked, whorls angulated, transversely ridged, ribbed at the angle with prominent noduled ribs, which are reticulate on the upper whorls, interior lirated at the aperture, but smooth within.

**Siphonalia pseudo-buccinum** sp. nov.

*S. testâ ovato-fusiformi, basi subrecurvâ, transversim liratâ, liris elevatis, ochraceis, superne longitudinaliter crenulatâ ut in Buccino undato, anfractu ultimo ferè planato, aperturâ subangustâ, intus crebriliratâ.*

*Long. 4.7 mill., Lat. 2.4 mill.*

Habitat Japoniam.

Shell ovate-fusiform, base somewhat recurved, transversely lirated, striæ elevated, ochraceous, round the upper whorls longitudinally wavy crenate,

as in *Buccinum undatum* (L.), the body whorl is, however, nearly smooth (except for the transverse liræ), aperture rather narrow, much striate within.

Last year these two interesting species came into my possession, both, so far as is known, unique at the present time. They have not been noticed by either Dunker or Lischke, and are an important addition to a genus only comparatively recently separated from *Fusus* by Mr. Arthur Adams, and which has its headquarters in Japanese waters. Paetel's new catalogue (1887) embraces about forty species of this genus, of which more than half occur in Japan, the remainder being about equally distributed in California, Tasmania, and New Zealand. *S. mikado* is one of the handsomest and most distinct of all the species, it may not, therefore, be considered amiss to give it a regal attribute in honour of the monarch of its native country. *S. pseudo-buccinum* is nearest allied to *S. fusoïdes* (Reeve), figured in the 'Conchologia Iconica' as a *Buccinum*, in company with *S. signum*, *S. trochulus*, *S. varicosa*, *S. cassidariæformis*, all of Reeve, being the first described species of what bids fair to become a genus as extensive as it is well defined.

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PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY.

**NOTICE.**—ALL Communications for the Conchological Society of Great Britain and Ireland should be addressed to the Secretary, THOS. W. BELL, 2, Carr Lane, Leeds.

## Meeting

HELD AT THE MUSEUM, APRIL 4TH, 1888.

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

### DONATIONS.

"Proceedings of the Royal Physical Society," 1886-87.—Presented by the Society.

### NEW MEMBERS.

The undernamed were duly elected members of the Society: (Mrs.) Mary Heitland; Rev. Geo. Bailey, F.R.M.S.; Messrs.

F. Stanley, Jno. Clegg, E. Deschamps, D. Robertson, F.L.S., F.G.S., J. T. T. Reed, L.R.C.P. & S. Edin., Mark Stirrup, F.G.S., and W. J. Jones, jun.

Mr. G. G. C. Storrs, of Sandown Vicarage, Isle of Wight, was nominated for membership by Mr. J. W. Taylor, F.L.S., and Mr. W. Denison Roebuck, F.L.S.

SPECIMENS EXHIBITED.

The Chairman showed a number of specimens, on behalf of Mr. Barrett Hamilton, from Kilmanock, New Ross, Wexford Co., including examples of *Helix concinna*, *H. rufescens*, *H. rotundata*, *Arion bourguignati*, *A. hortensis*, and *Limax flavus*; also on behalf of Mrs. Heitland, the following from Shrewsbury: *Zonites cellarius*, *Z. nitidulus*, *Pupa umbilicata*, *P. marginata*, *Limnæa peregra*, *Sphærium rivicola*, &c.

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## Meeting

HELD AT THE MUSEUM, MAY 2ND, 1888.

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

The correspondence for the month was laid on the table.

The Secretary announced that the following donations had been made to the "Cabinet" Fund:—Mr. S. J. Da Costa, 10s.; Mr. Wm. Whitwell, 10s.; Mr. G. B. Sowerby, F.L.S., F.Z.S., 10s.; and Mr. H. F. Dale, F.R.G.S., F.L.S., F.Z.S., 10s.

DONATIONS.

The following donations were laid on the table:—

Twenty species of Marine Shells from the West of Scotland.—Presented by Mr. A. Somerville, B.Sc., F.L.S.

*Iberus meridionalis* and *Cyclostoma ligatum* from Cape of Good Hope.—Presented by Mrs. A. Evans.

"Transactions of the Leicester Literary and Philosophical Society," part vii., April, 1888, containing a list of Land and Freshwater Shells of Leicestershire, by Mr. H. E. Quilter.—Presented by Mr. H. E. Quilter.

"Hogg's List of the Mollusca of the Neighbourhood of Stockton-on-Tees, with Annotations," by Mr. Baker Hudson (re-print).—Presented by Mr. J. W. Taylor, F.L.S.



*Dreissena polymorpha* and *Limnæa peregra* from Stourport and *Limnæa stagnalis* from Hampstead Heath.—Presented by Dr. Williams, M.A.

NEW MEMBERS.

Mr. George Godwyn Coopland Storrs was duly elected a member of the Society.

The following nominations for membership were made:—

Rev. Edward S. Dewick, M.A., F.G.S., London, by A. Somerville, B.Sc., F.L.S., and D. Robertson, F.L.S.

Alfred Bell, Lambeth, by A. Somerville, B.Sc., F.L.S., and Thos. Scott.

H. Hulme Brindley, Uttoxeter, by A. Somerville, B.Sc., F.L.S., and E. A. Smith, F.Z.S.

Henry F. Dale, F.R.G.S., F.R.M.S., F.L.S., &c., Cirencester, by Thos. W. Bell and J. W. Taylor, F.L.S.

Violet Dale, Cirencester, by T. W. Bell and J. W. Taylor, F.L.S.

Mary L. Dale, Torquay, by T. W. Bell and J. W. Taylor, F.L.S.

Ellen E. Dale, Torquay, by T. W. Bell and J. W. Taylor, F.L.S.

Alice M. Dale, Torquay, by T. W. Bell and J. W. Taylor, F.L.S.

Chas. A. Whatmore, Wolverhampton, by A. Somerville, B.Sc., F.L.S., and Rev. W. Turner.

Wm. Dean, Burnley, by A. Somerville, B.Sc., F.L.S., and John Ramage.

PAPERS READ.

“Notes on Marine Shells of South Africa, collected at Port Elizabeth, with descriptions of some new species,” by G. B. Sowerby, F.L.S., F.Z.S.

“Description of two New Siphonalia from Japan,” by J. Cosmo Melvill, M.A., F.L.S.

“On the meaning of Glycogaine Function in the Mollusca,” by Dr. Williams, M.A.

“On the Circumstances Attending Death by Drowning of Helix,” by Dr. Williams, M.A.

“On the Phenomena of Muscle Contraction in the Mollusca,” by Dr. Williams, M.A.

SPECIMENS EXHIBITED.

The Chairman exhibited type specimens of several species of Zonites, Limnæa, and Helix; also a number of Land and

Freshwater Shells collected in the Isle of Wight, sent by Mr. J. W. Wood, including the var. *nana* of *H. hispida* and var. *radiata* of *H. virgata*; and from Mr. W. Whitwell several species of *Helix* and *Limax*, collected by Miss Ffoulkes Jones, at Aberayron, Cardiganshire.

## Meeting

HELD AT THE MUSEUM, JUNE 6TH, 1888.

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

### DONATIONS.

The following donations were announced :—

Reprints of Papers by Prof. Ralph Tate, F.G.S., F.L.S., &c. :

“Description of some New Species of South Australian Marine and Freshwater Mollusca.

“A Revision of the recent Lamellibranch and Palliobranch Mollusca of South Australia.

—Presented by the Author.

The Secretary also announced a donation of 10s. to the Cabinet Fund from Mr. H. Coates. Since the date of this meeting the Secretary has received a further donation of £1 from Lieut.-Col. G. S. Parry.

### NEW MEMBERS.

The undernamed were duly elected members of the Society: Rev. E. S. Dewick, M.A., F.G.S., Alfred Bell, H. H. Brindley, B.A., H. F. Dale, (Mrs.) Violet Dale, (Miss) M. L. Dale, (Miss) E. E. Dale, (Miss) A. M. Dale, William Dean, and Charles A. Whatmore.

Walter Crouch, F.Z.S., of Wanstead, was nominated for membership by G. B. Sowerby, F.L.S., F.G.S., and E. A. Smith, F.Z.S.

Nominations for the different offices of the Society for 1889 are now desired, and should be sent to the Secretary before September 15th, 1888.

### SPECIMENS EXHIBITED.

Mr. Thos. Hey, of Derby, sent for exhibition a series of shells collected in Monk's Dale, in the Peak district of Derby-

shire, together with some interesting comments on the specimens shown. The Chairman brought forward the following exhibits from members—From Mr. Collier a series of shells collected by himself at Aberystwith during the month of May, included were specimens of *Ancylus fluviatilis*, *Helix virgata*, *H. caperata*, and others; from Mr. Heathcote, of Preston, specimens of *Limnæa truncatula* from various localities; from Mr. Whitwell a collection of slugs and land shells collected by Miss Maddy, at Aberayron, Cardiganshire; from Mr. S. J. Da Costa an example of *Helix obvoluta* from Norbury Park, Surrey.

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LAND AND FRESHWATER MOLLUSCA OF  
CARDIGANSHIRE.

BY EDWARD COLLIER.

(Read before the Conchological Society, Aug. 1st, 1888, and approved by the referees).

HAVING noticed for the last two years that, from the reports of the Conchological Society, Cardiganshire was the only county in England and Wales without any records, I resolved to have a few days at Aberystwyth, as soon as an opportunity occurred, to try and make as complete a list of its Land and Freshwater Mollusca as I could in the time I had at liberty. I was there for a week, from May 19th to 26th, but did not find anything like the number of species I expected to do, although I looked well for them; it was, perhaps, too early in the year, and, also, the weather was almost too fine, as there was not a drop of rain all the time I was there, and so may have missed some species that I might have taken, and others I should have taken much more plentifully.

I worked Aberystwyth and district, Borth and Aberayron on the coast, and found *Helix aspersa* and *H. caperata* the commonest species all along the coast-line. Of *H. virgata* I only got one specimen, and that was in the castle grounds at Aberyst-

wyth, but I think if there had only been a few showers I should have taken more of this species, as I have always found it abundant when it occurs.

The inland district I found very unproductive with the exception of the ruins of Strata Florida Abbey, where I got a few species that I had not taken elsewhere.

What surprised me most was that I only got two species of Freshwater Shells, *Limnæa peregra* and *Ancylus fluviatilis*, and these only in the smaller streams. The rivers yielded nothing, seemingly being poisoned with the water from the lead mines, of which there are large numbers both up the Ystwyth and Rheidol. There seems to be neither canals nor ponds in the district. I collected a few of the slugs at Aberystwyth, and Mr. W. Denison Roebuck, F.L.S., of Leeds, kindly determined them for me.

I hope that this will only be a commencement, and that other conchologists who visit Cardiganshire may be able to add considerably to the list. I append list of species, with localities.

*Limnæa peregra* Müll.—Small stream running into the sea at the north end of the Terrace, Aberystwyth.

*L. peregra* var. *ovata* Drap.—Borth; Clarach Valley, near Aberystwyth; and small streams at Pontrhydfendiged, near the ruins of Strata Florida Abbey.

*Ancylus fluviatilis* Müll.—Borth, common; very plentiful in stream at north end of Terrace, Aberystwyth; Clarach Valley, near Bow St. Station, a few.

*Arion ater* var. *albolateralis* Roebuck.—Aberystwyth.

*Arion hortensis* var. *rufescens*.—Aberystwyth.

*Amalia marginata* Müll.—Aberystwyth.

*Limax maximus* var. *fasciata*.—Aberystwyth.

*L. agrestis* var. *reticulata* Müll.—Aberystwyth.

*Vitrina pellucida* Müll.—Ruins of Strata Florida Abbey, scarce.

*Zonites cellarius* Müll.—Aberystwyth, fine specimens.

*Z. alliarius* Miller.—Aberayron, a few; ruins of Strata Florida Abbey, plentiful.

- Z. nitidulus** Drap.—Aberystwyth ; ruins of Strata Florida Abbey.
- Z. purus** Alder.—Ruins of Strata Florida Abbey, one only, immature.
- Helix aspersa** Müll.—Borth, Aberystwyth, Aberayron, and ruins of Strata Florida Abbey. Most of these shells were very much eroded, some, though alive, having hardly any epidermis left. Might not this be caused by last year's dry, sunny weather, as all the mature shells would be last year's growth?
- H. aspersa** var. **minor** Moq.—Aberystwyth, a few, but not very good specimens.
- H. aspersa** var. **conoidea** Picard.—Aberystwyth.
- H. aspersa** var. **undulata** Moq.—Aberystwyth.
- H. aspersa** var. **nigrescens** Moq.—Aberayron, one only.
- H. nemoralis** L.—Aberystwyth, a few only.
- H. nemoralis** var. **olivacea** Gassies.—Aberystwyth, most of *nemoralis* were of this variety.
- H. concinna** Jeff.—Ruins of Strata Florida Abbey.
- H. virgata** DaCosta—Castle Grounds, Aberystwyth, one only.
- H. caperata** Mont.—All along the coast wherever I looked ; Borth, Aberystwyth, Aberayron.
- H. caperata** var. **ornata** Picard.—Aberayron, a few.
- H. caperata** var. **fulva** Moq.—Aberayron, plentiful, but not very large.
- H. rotundata** Müll.—Aberystwith, ruins of Strata Florida Abbey, Devil's Bridge ; a few.
- H. rotundata** var. **alba** Moq.—Devil's Bridge, one only.<sup>1</sup>
- Pupa umbilicata** Drap. — Aberystwyth, ruins of Strata Florida Abbey.
- Clausilia rugosa** Drap.—Ruins of Strata Florida Abbey.
- Cochlicopa lubrica** Müll. — Aberystwyth, ruins of Strata Florida Abbey.
- C. lubrica** var. **lubricoides** Fer.—Ruins of Strata Florida Abbey.

## CONCHOLOGICAL NOTES FROM PICARDY.

HAVING recently visited Abbeville and Amiens I append lists of the Land and Freshwater shells which I observed during a search of not more than half an hour near each place.

There is no more delightful district for a quiet holiday than the valley of the Somme, and I hope that the publication of these imperfect records will show how well a careful investigation would be repaid, and induce other conchologists to complete them.

## NEAR ABBEVILLE :—

*Anodonta anatina* (L.).  
*Paludina vivipara* (L.).  
*Bythinia tentaculata* (L.).  
*B. leachii* (Shepp.).  
*Valvata piscinalis* (Mull.).  
*V. cristata* Mull.  
*Planorbis lineatus* Walker.  
*P. spirorbis* Mull.  
*P. vortex* (L.).  
*P. complanatus* (L.).  
*P. corneus* (L.).  
*P. contortus* (L.).  
*Physa fontinalis* (L.).  
*Limnæa peregra* (Mull.).  
*L. stagnalis* (L.).  
*L. palustris* (Mull.).  
*Arion ater* (L.).  
*Limax maximus* L.  
*L. agrestis* L.  
*Succinea elegans* Risso.  
*Zonites nitidus* (Mull.).  
*Helix pomatia* L.  
*H. aspersa* Mull.  
*H. nemoralis* L.  
*H. ericetorum* Mull.

## NEAR AMIENS :—

*Sphærium corneum* (L.).  
*Pisidium amnicum* (Mull.).  
*Unio pictorum* (L.).  
*Anodonta anatina* (L.).  
*Dreissena polymorpha* (Pall.).  
*Neritina fluviatilis* (L.).  
*Bythinia tentaculata* (L.).  
*Planorbis vortex* (L.).  
*P. carinatus* Mull.  
*P. corneus* (L.).  
*Limnæa peregra* (Mull.).  
*L. peregra* var. *ovata* Drap.  
*L. auricularia* (L.).  
*L. palustris* (Mull.).  
*Arion ater* (L.).  
*Limax agrestis* L.  
*L. lævis* Mull.  
*Succinea elegans* Risso.  
*Helix aspersa* Mull.  
*H. nemoralis* L.  
*H. hispida* L.  
*H. rotundata* Mull.  
*Cochlicopa lubrica* (Mull.).

I may also mention that I met with *Balea perversa* (L.) and *Carychium minimum* Mull. high up under the clerestory windows of Beauvais Cathedral. Perhaps they originally came on the twigs brought there by the pigeons for building their nests.

SYDNEY C. COCKERELL.

July 25th, 1888.

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**Helix nemoralis** monst. **sinistrorsum**.—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.

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**Vertigo minutissima** (Hartm) in Gloucestershire.—Mr. C. H. Falloon has recently sent me eight specimens of this species from Clifton, Bristol. I believe this species is new to Gloucestershire, as the only record I know of it from the South of England is the Isle of Wight.—J. W. WILLIAMS, D.Sc.

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**Note on Vertigo tumida** West.—In 1867 Prof. Westerlund in the "Mal. Blatt.," p. 203, described as new a *Vertigo* which he stated had been confused with *V. pusilla* up to that time. He described it as closely allied to *V. pusilla*, but distinguished from it by its smaller size, more ventricose shape, and thus having a comparatively broader mouth. The darker color of the shell and nearly imperceptible umbilical fissure were also points of difference. Dr. Jeffreys, in "Annals and Mag. Nat. Hist.," p. 381, 1878, accepted Dr. Westerlund's view of the distinctness of the new species, but expressed a doubt whether it was more than a dwarf form of *V. pusilla*, as which he had regarded it until that time. From a type specimen which Dr. Westerlund has kindly sent me it would seem that a more extended examination has led him to regard *V. tumida* as merely a variety of *V. pusilla*. My specimen is labelled in Dr. Westerlund's own hand *Vertigo pusilla* Mull. var. *tumida* West.—J. W. TAYLOR, JUNE 1ST, 1888.

## ON AGRIOLIMAX MONTANUS IN COLORADO.

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 BY T. D. A. COCKERELL.
 

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THE group of *Agriolimax*, which is represented in Europe by *A. lævis* and its allies, and in America by *A. campestris* and its allies, is essentially *the* boreal group of slugs descended from a type which occupied the far north when the continents were united. The European and American groups are much alike in general appearance, and even in their anatomy they do not present any important differences, so that Jhering ("Jahrbuch," 1885) has proposed to unite them under the one name of *lævis* Müll. I think, however, that there is sufficient difference between them to warrant their separation, though it may be conceded that the three races of the United States, namely, *campestris* of the eastern, *montanus* of the central, and *occidentalis* of the Pacific region, are geographical forms of one species—the *campestris* of Binney.

Ingersoll (Report U.S. Geol. Surv., 1875) described two species of slugs from Colorado, and remarked that they were the only ones he met with in the state.

**Limax montanus** Ing.—Bluish-gray, form stout, with blunt posterior extremity, length exceeding one inch. (Grand county).

**Limax castaneus** Ing.—Small and slender, length less than one inch, colour lively brown, with a darker spot on mantle; head and tentacles black; sole white. (Blue River Valley).

These appear sufficiently distinct from the descriptions, but I regard them as synonymous. The mountain form of *campestris*, referred by authors to *montanus*, is abundant in most parts of Colorado, including the Blue River Valley, and could not have been missed by Ingersoll, and must therefore be one of his species. Yet it is not bluish-gray (*montanus*), nor has it a white sole and black head and tentacles (*castaneus*), except in



spirit specimens. It appears, therefore, that Ingersoll's slugs were both described from specimens preserved in alcohol; *castaneus* being a young example and *montanus* an older one, the bluish-grey color being due for the most part to an exudation of slime, such as is often witnessed in specimens which have been put into alcohol.

The tentacles of *castaneus* were doubtless very dark brown (as I have myself observed in examples collected in the Blue River Valley), and the very pale sole of some examples would probably appear white in an alcoholic specimen.

There is, then, but one species of slug at present known in Colorado, and this is *Agriolimax campestris montanus* Ing. It varies, however, in colour, and I have separated three forms:—

- A. *typicus*.—Rather pale brown, foot-sole pale.
- B. *intermedius*.—Dark brown, foot-sole grey.
- C. *tristis*.—Very dark brown or brown-black.

I have endeavoured to trace this variation to some definite cause, but although it can be said that *tristis* and *intermedius* belong to high, and *typicus* to middle elevations, this does not always hold good. Like *lævis* this species is nearly always found in damp places.

My experience with the various forms of this slug has been as follows, from which it will be seen that I obtained it in thirteen localities:—

- (1). Atlantic slope.
  - (A). Swift Creek, Custer Co., Aug., 1887, under *Populus tremuloïdes*, on logs, &c.; altitude about 8,200 ft.—*typicus*.
  - (B). Nathrop, Chaffee Co., August, on under side of log; altitude about 7,680 feet—*typicus*.
  - (C). E. Fork of Arkansas, R., Lake Co., August, near willows; altitude about 10,200 feet—*tristis*.
  - (D). Saguache Creek, above Rock Cliff, Saguache Co., October, found together under an old tree—*typicus* and *intermedius*.

- (2). Pacific slope.
- (E). West 10-mile Creek, Wheeler, Summit Co., August, amongst willows—*tristis* abundant, *intermedius* also found.
- (F). Near Dillon, Summit Co., August, with *Conulus fulvus*; altitude 8,850 feet—*tristis* and *typicus*.
- (G). Naomi, Summit Co., August; altitude about 8,200 feet—*typicus*.
- (H). Black Lake Creek, Summit Co., August; probably over 9,000 feet—*intermedius*.  
(The three last localities are in the Blue River Valley).
- (I). Two Elk Creek, Eagle Co., September; altitude 7,856 feet—*typicus*.
- (K). Buzzard Creek, Mesa Co., Sept., at roots of *Equisetum*, with *Cochlicopa lubrica*, *Hyalina radiatula*, and var. *viridescenti-alba*, &c.—*typicus*.
- (L). East fork of Clearwater Creek, Grand Mesa, Mesa Co., September; altitude about 9,800 feet—*intermedius*.
- (M). Surface Creek, Delta Co., September, under logs; altitude about 8,500 feet—*intermedius* common, *tristis* also found.
- (N). Little Blue Creek, Gunnison Co., October—*typicus*.  
West Cliff, Colorado, April 21st, 1888.



*P. marginata* var. *albina* Menke.—Mr. J. W. Wood during his researches in the Isle of Wight, in 1886, was so fortunate as to find several specimens of this uncommon variety in the vicinity of Ventnor.—J. W. TAYLOR, May 1st, 1888.

*Amalia gagates* in Cardiganshire.—Through the kindness of Mr. Whitwell I have received a specimen of this interesting species of a pale lavender color, collected with other species of Mollusks by Miss Maddy during the present month in her garden at Aberayron.—J. W. TAYLOR, May 25th, 1888.

## ARGIOPE DECOLLATA AT SCILLY.

BY J. T. MARSHALL.

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(Read before the Conchological Society, Sept. 5th 1888, and approved by the Referees)

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THE finding of this species at Scilly by my friend Mr. Clifford Burkill amounts practically to a re-discovery. The late Dr. Gwyn Jeffreys dredged two or three dead specimens off Guernsey nearly 30 years ago, but though the same ground has been since dredged over and over again for the same species by the late Dr. Lukis, myself, and others, no further traces of it have appeared. Moreover, there was a possible likelihood of those specimens being sub-fossil, as I believe several other species occurred to Dr. Jeffreys in the same cruise which were certainly so.

*Argiope decollata* is pretty widely distributed in Europe, and is not uncommon in the Mediterranean. Its distribution embraces the south-west of France, the Atlantic coasts of Spain, the Mediterranean, Adriatic, and Ægean, also Madeira and the Canary Isles, at depths ranging from 18 to 130 fathoms. The Scilly Isles is therefore the furthest point north for this species, and I have no doubt it will again be found in some parts of the Channel Islands. Nor has the species deteriorated in its north-ward march, the Scillonian specimens being as large as any from the Mediterranean.

Unfortunately no living specimens were found, but three or four perfect examples and a couple of dozen valves—ample to identify it as an established denizen of the Scillonian seas. Some were dredged in 35-40 fathoms outside Menavawr Rock (about one-and-a-half miles N.E.) and a few valves in 35 fathoms in St. Mary's Sound, about two miles south of St. Mary's. Both localities have been dredged by the Rev. W. J. Smart, and the results appeared in the Journal of Conchology for January, 1885. In fact, it was through Mr. Smart's kindness in lending his charts and giving information that Mr. Burkill was induced to dredge

these grounds, and it is certainly curious that the former gentleman should have missed such a species, some of which exceed a quarter of an inch in diameter.

Not many dredgings were taken off Menavawr Rock, either by the Rev. W. J. Smart or Mr. Clifford Burkill, as it is on the Atlantic slope, and can rarely be dredged with comfort or success in a small craft. Mr. Burkill spent three months in the islands this summer, and could not get one day's favourable dredging near the spot. I hope, however some future collector may attempt the task and meet with more success, for I believe the locality to be a most promising one.

In connection with the foregoing, it may be added that several valves of *A. cistellula* likewise occurred on the Menavawr ground—also a new addition to the Cornish fauna.

Since the above was in type, a thorough investigation of the Scilly dredgings has been made, and the results examined by me. This has revealed nearly thirty species new to the Scilly Islands, a list of which will appear in the next number of this Journal.

Sevenoaks, Torquay, September, 1888.



**Bulimus decollatus in captivity.**—In my snailery I have about one thousand or more *Bulimus decollatus*. A year ago about six or eight large *B. decollatus* from the south of France were sent me alive, and they have increased to this extraordinary number. I find as soon as they attain to one inch in length they decollate. I have some now which are nearly two inches long; others are so small they can scarcely be held in the fingers. They are voracious feeders, cabbage leaves, lettuce, dock leaves, coltsfoot leaves, &c., are all greedily devoured. I can keep no small *Helix* or *Bulimus* with them, for they at once kill them and eat them. They will also eat raw meat. I have a colony of other European land shells, but not one species flourishes like these curious and interesting *Bulimus decollatus*.

—FANNY M. HELE.

**Sphærium corneum upon the tarsus of *Dytiscus marginalis*.**—On 27th August last, while searching for shells in a pond at West Barkwith, in Lincolnshire, I procured a female *Dytiscus marginalis* with a *Sphærium corneum* attached to its right front tarsus. The shell, which enclosed one joint only of the tarsus, was of fair size, measuring 10 mill. in width. On placing the beetle in water it was ascertained that when motionless it frequently supported the shell with its middle and left front legs, thus relieving the stress upon the leg to which the shell was attached. Occurrences similar to the above, records of which have appeared from time to time, are doubtless of significance when viewed in connection with the distribution of the freshwater shells.—H. WALLIS KEW, London, 3rd September.

**The Red Fluid emitted by *Planorbis corneus*.**—It is well known that this species emits a red-colored fluid from its pulmonary aperture on being killed either in hot water or spirit. Professor Ray Lankester some years ago made the interesting discovery that hæmoglobin is present in the plasma of the hæmolymph in this species, and the consideration struck me as worth investigating whether the emitted red fluid was hæmolymph or not. If it is such it will give the tests for hæmoglobin; and I have found this to be the case. A spectroscopic examination gave the two absorption hands between *D* and *E* of Fraunhöfer's lines of the spectrum; and on testing with ozonic ether and tincture of guaiacum it gave the usual blue color. How this hæmolymph gets into the pulmonary sac is indeed a questionable point, and a somewhat difficult one to settle by any experimental method. I would make the suggestion—which seems the most probable one to me—that it is extruded into the lung sac by reason that the walls of the circulus venosus pulmonis or of the vessels constituting the pulmonary plexus are ruptured as the result of a last and forcible expiratory movement of the muscular floor of the mantle-cavity.—J. W. WILLIAMS, D.Sc.

ON THE MORPHOLOGY OF THE GONADS IN  
LIMNÆA STAGNALIS (L.) AND L. PEREGRA (Müll.)

By J. W. WILLIAMS, M.A., D.Sc.

(Read before the Conchological Society, July 4th, 1888, and approved by the referees).

THE reproductive organs (gonads) of the Pulmonata resolve themselves into three groups—a male group, a female group, and a group common to both the male and female portions. From this arrangement the genus *Limnæa* forms no exception. In *L. stagnalis* the male group consists of a penis sac, a vas deferens, and a well-defined prostata; the female group is made up of a vagina, oviduct, receptaculum seminis or spermatheca, albuminiparous gland and two, rarely three, accessory albuminiparous glands developed along the course of the oviduct; the common group contains the ovotestis (hermaphrodite gland) and its duct (hermaphrodite duct). The male and female portions open to the exterior at different points on the right side of the prostoma; the former just below and slightly to the right of the tentacle (penial aperture), the latter some distance posterior to this (ostium vaginæ). Self-fecundation, reasoning on anatomical considerations, is possible; and, according to Macalister, in *L. auricularia* (where the same condition of the position of the genital apertures obtains) this has been actually observed; but it is a matter of very great doubt whether such self-fecundated ova would be fertile. The *penis* is a botuliform sac, circularly striated on its exterior, smooth on its interior, bent upon itself at a right angle, and lying in the cœlom of the prostoma to the right of the buccal mass and the commencement of the œsophagus. It is grooved on its upper surface for the prostata, and the proximal end of the spermatheca, the former being the more anterior of the two. The vas deferens proprium commences in a well-defined depression on the anterior surface

of the prostata by a dilated pelvis, runs forward, and makes a U-shaped bend posterior to the penis sac, and in a triangular space that has its base formed by the posterior end of the penis, its right side by the proximal position of the receptaculum seminis and oviduct, and its left side by the prostata and buccal mass ; then it passes over the retractor muscle of the penis, and running in front of the proximal portion of the spermatheca, it becomes thinner and enters the muscular tissue forming the right side of the body-wall in which it runs a sinuous course for some distance to emerge at the right side of the penial aperture ; it then runs towards the dorsum, along the right side of the penis, makes several convolutions immediately under the skin of the dorsal surface of the prostoma, and passes back to enter the apex of the penis sac by a short, but distinctly marked, terminal portion. The *prostata* is an irregular spheroidal dilatation of the commencement of the vas deferens which is set apart for the fulfilment of a special function. It is situated posterior to the penis sac, and lies in a groove (vide, ante) on the posterior third of that organ ; it is hæmal to the œsophagus and salivary glands, and anterior to the first accessory albuminiparous gland ; the oviduct and the proximal portion of the spermatheca pass over its posterior portion. Its wall is greyish and very rugose externally, divided into incomplete loculi internally ; the male portion of the hermaphrodite duct opens into it on its posterior aspect, and the vas deferens proprium commences in a depression on its anterior surface. The *oviduct* commences from the hermaphrodite duct directly posterior to the prostata and receptaculum seminis and directly underneath the anterior end of the first accessory albuminiparous gland ; it then runs alongside of, but posterior to, the proximal portion of the spermatheca for some distance, and, at last, joins with it about two millimetres from the ostium vaginæ to form a canal common to both (vagina). The *receptaculum seminis* (*spermatheca*) consists of a long duct-like proximal portion, and of a bulbous saccate distal extremity which has been called, after its

discoverer, the *Swammerdamian vesicle*. This vesicle is a yellowish spherical sac lying transversely in the cœlom, and situated to the left of the prostata and on a plane slightly inferior to the one occupied by that organ. The proximal portion runs from the pole of the right hemisphere of the sac, crosses over the posterior and upper portion of the base of the prostata, and then running in the groove previously described on the postero-dorsal surface of the penis, it descends by the right side of that organ to unite with the oviduct, and thus form the vagina. (The spermatheca is in reality, a cœcal diverticulum of the vagina). The albuminiparous gland is a linguiform body flexed transversely across the convex upper surface of the middle third of the second accessory gland, and firmly bound down to it by peritoneal connective tissue, so that its base looks towards the left, and its apex towards the right. The *accessory albuminiparous glands* are generally two in number—named first and second according to their position from before backwards,—the first being much larger than the second. They are yellow pulviniform bosses situated along the course of the oviduct, and directly beneath the muscular floor of the pallial cavity, separated from the prostata by a well defined diaphragm consisting of connective tissue, containing muscle cells, and placed hæmally to the receptaculum seminis, œsophagus, stomach, and common generative duct. The posterior third of the second one lies imbedded in the substance of the “Mitteldarmdrüse of Frenzel.” Both the albuminiparous gland, and its accessory glands swell up so much on the addition of water, that dissection under water is carried on with difficulty, a condition of things that can be remedied by replacing the water with spirit. The *hermaphrodite gland (ovotestis)* consists of an agglomeration of follicles situated in the “Mitteldarmdrüse.” In it the spermatozoa and ova are produced from exactly the same kind of germinal epithelium;\* these are carried down by the hermaphrodite

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\* Reproduction consists essentially in the metazoa of the fusion of a flagellate cell (spermatozoon) with an amœboid cell (ovum). Both these



duct to either the vas deferens (if spermatozoa) or to the oviduct (if ova). This hermaphrodite duct is a dead white, highly convoluted tube, which passes from the ovotestis to the base of the albuminiparous gland; then becoming thinner it courses through that gland and receives its duct; then, at last, leaving the gland it runs as a liguliform duct—the common generative duct—on the neural aspect of the accessory albuminiparous glands to the extreme anterior extremity of the first one, when it suddenly divides into two portions;—one which suddenly enlarges to form the prostata and which is continued as the vas deferens, the other which is known as the oviduct. These two portions have already been described. In *L. peregra* the penis is very long and narrowly cylindrical, and situated neurally to the accessory albuminiparous gland and prostata; the vas deferens proprium is much shorter in comparison and less convoluted; the prostata lies directly under the accessory albuminiparous gland and between the œsophagus and posterior end of the penis, the vas deferens commences in a depression on its inferior surface, and the male portion of the common generative canal opens into it on its posterior aspect; the albuminiparous gland, a curved, somewhat quadrangular mass, irregularly laciniate on its inferior surface, lies transversely over the stomach and intestine; there is only one accessory albuminiparous gland, it is situated hæmally to the prostata; the Swammerdamian vesicle is a thin walled sac lying immediately under the dorsal integument of the body at the junction of the prostoma and metastoma, anterior to the accessory albuminiparous gland and dorsal to the prostata, and the proximal portion of the spermatheca runs in company with the oviduct over the antero-dorsal surface of the prostata; the ovotestis is situated in the “Mitteldarmdrüse” near the apex of the spire, and the

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cells are developed from primitive germ-cells, which at some time in the life of the animal, or during the whole life of the animal, are exactly similar, and which correspond to the protozoon ancestors of the metazoa. It is very suggestive that in sagitta both the ovaries and the testes are developed from a single primitive germ-cell.

hermaphrodite duct runs a sinuous course through the substance of that digestive gland to get into relation with the albuminiparous gland when it becomes very convoluted so as to simulate a gland-like mass between that organ and its accessory gland. The common generative canal is ribbon-shaped.

From the consideration of the discrete positions of the male and female genital apertures in both these species it will thus be seen how that two cannot engage in coitus in such a complete manner as occurs in the *Helices* ; how it is that fecundation of all the animals engaged in coition at any one time cannot take place at one and the same time ; how it is, in fact, that we find *L. peregra*—as was first observed by Prevost—banded together in threes, or sometimes in greater numbers, the one fecundating the other. In *L. stagnalis*, as two are the number generally seen together in coitus at the same time, impregnation of only one of them, at one time, can occur, unless the animals are placed in opposite directions one to the other. In *L. peregra*, taking the three engaged from above downwards, it will be noticed that the general condition of affairs is that the penis of the first is exerted into the vagina of the second, and that it is not fecundated at all itself but is fecundating, that the second is being fecundated by the first and is fecundating the third, and that the third is being fecundated but is not fecundating. So that of three *peregras* banded together for fecundating purposes, two only of them are fecundated, the second and the third, and two only are fecundating, the first and the second. The exerted penis in both the species is flattened and triangular in shape. In *L. stagnalis* during coition—this being the only species I was fortunate enough to kill with the penis exerted—I find the relative positions of the organs inside the animal changed to but some slight extent. The penis, of course, is absent, and its place is occupied by convolutions of the vas deferens, the terminal portion of which runs through the centre of the exerted penis and opens by a foramen or meatus at its extremity in order for the ready conveyance of the spermatozoa into the vagina of the one being fecundated.

On making a comparison with the gonads of the Helices and those of the Limnææ, it will be found that the greatest dissimilarity of the latter from the former occurs in the great separation of the male and female portions from one another, this being a decided advance on to the monœcious condition; the presence of the large and well-defined prostata, the existence of the so-called accessory albuminiparous glands, and the absence of muciparous glands, dart-sac and flagellum. The absence of the dart in other species than those of the Helicidæ suggests not the idea (I may incidentally mention) that my friend Prof. J. Bland Sutton has recently proposed to me as an organ of cuticular irritation, an idea which I find is held by Simroth in a paper entitled "Ueber eine Nacktschnecke von Samarkand die *Amalia maculata*, Heynemann, besser *Agriolimax maculatus*," which he communicated to SB. Ges. Leipzig, xii., pp. 11 and 12; but rather inclines to the theory proposed by Mr. W. E. Collinge, in a paper on "The Darts of the Helicidæ," read before the Leeds Naturalists' Club and Scientific Association, on October 29th, 1887, viz., that it must be considered as a degenerate weapon of defence. But I would point out that the only basis on which we must build the most probable function of the dart must be one founded on inferences derived from embryological considerations which are not, as yet, forthcoming.



**Limnæa auricularia floating.**—It will doubtless interest Mr. Nelson and others (vide 'A Day's Collecting near Howden, Yorks.,' pp. 262—267 ante) to know that I observed this afternoon (May 7th) a distinctly marked *auricularia* floating on the surface of the water in a large pan wherein I am keeping a quantity of specimens alive for anatomical work. These specimens were taken yesterday afternoon by Mr. Wallis Kew and myself from the Lea Marshes, Tottenham, and were only placed in the water in the early morning of to-day.—J. W. WILLIAMS.

## PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY

NOTICE.—*All Communications for the Conchological Society should be addressed to the Secretary, Mr. Thos. W. Bell, 2, Carr Lane, Leeds.*

## Meeting

HELD JULY 4TH, 1888, AT THE MUSEUM, LEEDS.

Mr. W. E. Collinge presided.

## DONATIONS.

The following Donations were announced :—

- “Proceedings of the Linnean Society of New South Wales,” vol. ii., part 4, 1887.  
 “Transactions of the Yorkshire Naturalists’ Union,” part 10, 1885.  
 “North Yorkshire” :—Presidential Address, by John G. Baker, F.R.S., F.L.S., President of the Yorks. Naturalists’ Union.  
 “Transactions of the Leeds Geological Association,” 1886-7.

The thanks of the Society were accorded the donors for their valuable donations.

## NEW MEMBER.

Mr. Walter Crouch, F.Z.S., of Wanstead, was elected a member of the Society.

## PAPERS READ.

- “On the Morphology of Gonads in *Limnæa stagnalis* (L.) and *Limnæa peregra* (Mull.), by Dr. J. W. Williams, M.A.”

## Meeting

HELD AUGUST 1ST, 1888, AT THE MUSEUM, LEEDS.

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

## DONATIONS.

The following donations were laid on the table :—

- “Report of the Smithsonian Institution,” part 2, 1885.  
 “Journal of the Royal Society of New South Wales,” vol. xxi., 1887.  
 The Secretary also announced a donation of 10/- from the Rev. Edward S. Dewick, M.A., to the Cabinet Fund.

The thanks of the Meeting were accorded the donors for their donations.

## PAPERS READ.

The Chairman read a paper from Mr. E. Collier, of Manchester, "On the Land and Freshwater Mollusca of Cardiganshire."

Mr. R. D. Darbishire read a paper entitled "Notes on Shells of Argonauta Argo."

## SPECIMENS EXHIBITED.

Mr. J. W. Taylor showed a choice collection of named varieties of *Limnæa peregra*, and also the following sent to him by the gentlemen named:—

From Mr. W. H. Heathcote a large collection of Shells from South and West Lancashire, some of which he kindly allowed to be retained for the Society's Collection.

From Dr. Scharff, of Dublin, *Helix aspersa*, *H. nemoralis*, *H. hispida*, *H. rotundata*, *H. rufescens*, and *Clausilia rugosa* from Navan, county Meath.

From Dr. Williams, M.A. specimens of *Paludina vivipara* from Leicester and the river Lea.

From Mr. A. Somerville, B.Sc., F.L.S. examples of *Limnæa peregra*, *Zonites cellarius*, *Clausilia rugosa*, *Helix caperata*, and *H. hortensis* from the Island of Barra and South Uist. Hebrides.

From Mr. Charles Ashford examples of *Helix aspersa*, *H. rufescens*, *H. hortensis*, *H. lapicida*, *H. virgata*, and *H. hispida*, and *Zonites cellarius*, and *nitidulus* from Spettisbury, Dorset.

From Mr. Byne specimens of *Vitrina pellucida* from Teignmouth, South Devon.

## NOTE ON SHELLS OF ARGONAUTA ARGO.

Mr. Darbishire exhibited and described some shells of Argonauta. Specimen No. 1 is a well-grown perfect 'live' shell, not of the largest size, but measuring as noted in the table below. Its texture is that of an old shell with the tops of the ridges polished, its colour a greyish white with the usual brown touches on and near the keel at the back. The lines of growth are well seen in looking from the inside towards a light, and are very regular,

ending in the marginal line of the lip. The outline of the keel curves forward from the back with a uniform expansion somewhat in advance of a circular line. The whole lateral surface is crowded with the characteristic undulated ridges with many interpolations of one or two of half length or less, every ridge ending in a spinous tubercle on the keel.

Specimen No. 2 was exhibited to illustrate the great regularity of the characters of the shell. This is a 'dead' shell, a shade less than No. 1, but otherwise repeating its features.

These two are said to have come from the Cape of Good Hope.

Specimen No. 3 (Pl. iii Frontispiece) from an unknown locality is remarkable for an unusual development of the aperture. From a width of one centimetre at the lateral point to that of three centimetres at the keel, the edge of the shell is marked with three strong and many fine lines of growth, the whole forming a sort of final lip upon which the radiating ridges, and particularly the deflected ends of such ridges near the keel, are partially evanescent. These final lines of growth follow quite normally the long series seen from within.

The front edge of the aperture is marked by a distinct prolongation forwards, deflecting the keel outwards like the lip of a jug, with a regular curve affecting the position of three tubercles. Instead of the expanding curve of the general outline of the keel seen in No. 1 and No. 2 and all ordinary specimens, this line in this shell is somewhat restricted, so that it appears to be more nearly parallel to the curve of the thickened lip from the axis to the point. This, with the extension of the aperture, gives a somewhat trumpet-shaped figure to the lateral aspect.

This shell is (except for the pouting lip in front) very much more regular than No. 1 and No. 2 in the curvature and succession and in the alternations of long and single short ribs, not one of which is wanting or out of place, while all are somewhat more developed and slightly more distant from each other than in No. 1. The whole lateral surface is polished in all the speci-

mens, but in this one especially so with a glassy glaze on and between the ribs. The shell looks especially well developed and perfect. The colour is a delicate creamy or warm ivory white. The brown marking at the ends of the ridges and on the tubercles of the keel is more delicately applied and outlined than in No. 1, and at the back for about two centimetres from the keel is faintly expanded on the shell so as to look like a film of epidermis.

It would not be fair to occupy so much space with the description of only a peculiar specimen of so common a shell, unless in the hope that so far from being an abnormal or deformed individual this may really be an exceptionally adult and well developed shell such as may have sheltered the ova of an especially lovely lady mother of Argonauts who passed a long life, well nourished and undisturbed, in some protected lagoon where the sea was always smiling. Still, it is only fair to add, that amongst very many specimens in many collections the writer has never seen a shell like this one; or—one in itself so perfectly beautiful.

MEASUREMENTS IN CENTIMETRES.			
	No. 1.	No. 2.	No. 3.
From keel at the back to the front of the aperture ... ..	24.0	24.5	22.0
From the keel below to the lateral point ... ..	16.0	14.0	15.5
From the front of the aperture to the point along the edge of the shell	17.0	18.0	16.0
From point to point across the aperture	8.2	8.2	8.5
From the front of the aperture over round the keel ... ..	50.0	47.0	47.0

[Dr. Gould, quoted in "Tryon's Manual," I., page 136, gives measurements of the largest known shell as equal to 30 centimetres long by 19 centimetres high].

Mr. Darbshire also exhibited specimens of *Unio tumidus* from a pond near Birmingham, measuring severally 10.6 centimetres in length, 5.5 centimetres in height, and about 4.0 centimetres in thickness, all of unusual thickness in the valve and weight; colour black in all; umbonal abrasion of the epidermis, but without erosion.

Also specimens of the same species *Unio tumidus* from another pond near Birmingham of the following dimensions in centimetres:—

	Lgth.	Hght.	Thcknss.		Lgth.	Hght.	Thcknss.
1	13.0	7.0	5.4	4	12.5	6.2	5.0
2	13.0	6.3	3.75	5	12.4	6.0	4.2
3	12.5	6.5	5.2	6	11.9	6.4	4.5

Colour, black or dark brown; 2, 5, and 6 with a slight lateral depression and corresponding concavity in the ventral curve. These shells were all notably heavy.

Also, from the same pond as the last lot, specimens of *Unio pictorum* of the following dimensions:—

	Lgth.	Hght.	Thcknss.		Lgth.	Hght.	Thcknss.
1	14.5	6.2	4.4	4	13.8	6.0	4.7
2	14.2	6.0	4.5	5	13.2	5.8	4.5
3	14.0	6.0	4.2	6	13.2	5.8	4.0

These shells are blackish brown and lighter brown; all the shells were in the best health, very heavy, with thick epidermis, and more or less umbonal erosion. Some showed a slight incurvation on the ventral margin, and all well developed massive posterior rostration. The pool from which these two series were taken is a large pond with a slight current through it, about 8ft. to 10ft. deep, where the shells were, with a gravelly bottom and a certain amount of dead leaves. The water was not tested for lime. By a fortunate hap the two largest *U. t.* and *U. p.* came up in the same haul, otherwise these great shells were scattered, and somehow the abode of younger ones was not found.

Mr. Darbshire owed the capture to a friend at Birmingham, who gave kind personal help and a pleasant walk.

Mr. W. E. Collinge gave notice of his intention to move the following Alterations of Rules at the Annual Meeting:—



- 1st.—That the following be substituted for Rule No. 4 :—Candidates for Membership, after being proposed by two Members of not less than twelve months' standing, from a personal knowledge, at one meeting, shall be balloted for at the next. They shall pay in advance on the 1st of January an Annual Subscription of not less than 5/-. Foreign Members shall pay an Annual Subscription of not less than 7/6.
- 2nd.—That Rule No. 6 be omitted from the Constitution.
- 3rd.—That the Curator and Recorder and Librarian be ex-officio Members of the General Council.

## Meeting

HELD SEPTEMBER 5TH, 1888, AT THE MUSEUM, LEEDS.

Mr. W. E. Collinge, presided.

### DONATION.

The following donation was announced :—

“Proceedings of the Linnean Society of New South Wales,” vol. iii., part 1.

Correspondence from Members was laid on the table :—  
Under date August 10th the Rev. Churchill Babington, D.D., F.R.S., wrote that on the previous day he had found *Hydrocharis morsus-ranae* in flower in the river Stour, near Sudbury. Some of these plants were taken home and placed in water. When examined subsequently Dr. Babington observed “that several shells had detached themselves from the leaves, and among them was a specimen of *Chiton cinereus* (L.), the only species of this genus which has as yet been found in Suffolk.” The Rev. Carleton Greene, who saw the shell while the animal was yet fresh, suggests that it may be worth considering whether this shell can have been introduced by a barge from the sea, as in his boyhood barges came up as far as Sudbury from the sea. Dr. Babington suggests “some of your correspondents may be able to throw some light upon this subject.”

### PAPERS READ.

“*Argiope decollata*, at Scilly,” by Mr. J. T. Marshall.

“On the position of dart sac in *Helix rufescens*,” by Mr. W. E. Collinge.

## SPECIMENS EXHIBITED.

Mr. Collinge showed examples of *Arion ater* and the variety *brunnea*, *Limax maximus*, *L. flavus*, and *L. agrestis*, *Zonites cellarius* and *Helix aspersa* from the Corporation Gardens, Well Road, Nottingham. Also *Arion ater* and *Limax agrestis* from Barnby-in-the-Willow, near Newark,—all sent by Mr. G. W. Mellors.

NOTICE.—The Annual Meeting of the Conchological Society will be held on Saturday, the 15th of December, at 5-30 p.m., at the Museum, Park Row, Leeds. Members intending to communicate papers or exhibit specimens are requested to furnish particulars to the Secretary as early as possible.

## BIBLIOGRAPHY.

**Museum Normanianum**, or a Catalogue of the Invertebrata of Europe, and the Arctic and N. Atlantic Oceans, which are contained in the collection of the Rev. Canon A. M. Norman, M.A., D.C.L., F.L.S., iv., Mollusca Marina; v., Brachiopoda.

These lists are prepared by their learned author (for private distribution) to show the species contained in his vast collection and to indicate clearly the deficiencies which exist and which he will be glad to have supplied by any person, and for which he offers either Mollusca or other classes of Marine Invertebrates in exchange, or cash if preferred. The chief deficiencies in the Marine Mollusca are those of coasts of Eastern N. America, Asiatic, Arctic and Alaskan, Abyssal Atlantic and Mediterranean forms, Cephalopoda and Nudibranchiata. The Land species specially desired are those of Cape Verd, Azores, Canary Islands, those parts of Africa and Arabia N. of the tropics, Asia Minor, Persia, Afghanistan, and the Russian Empire. In all 1910 forms of Marine Mollusca and Brachiopoda are enumerated as in this collection which sufficiently attests its great importance and value.—J. W. T.

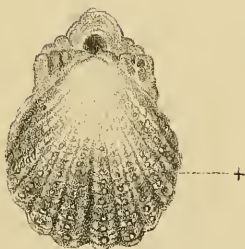
***Helix virgata* var. *radiata*** Hidalgo in the Isle of Wight.—Last year, Mr. J. W. Wood, while staying at Freshwater, found several specimens of *H. virgata* which seem to accord fairly well with Hidalgo's variety *radiata*, originally recorded from the Balearic Isles. The upper surface, instead of the usual spiral banding, is radiately and regularly striped with black and white, in a similar way to *B. acutus* var. *articulata*. The under surface has the usual spiral banding.—J. W. TAYLOR.



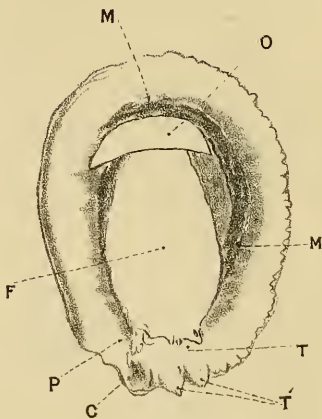
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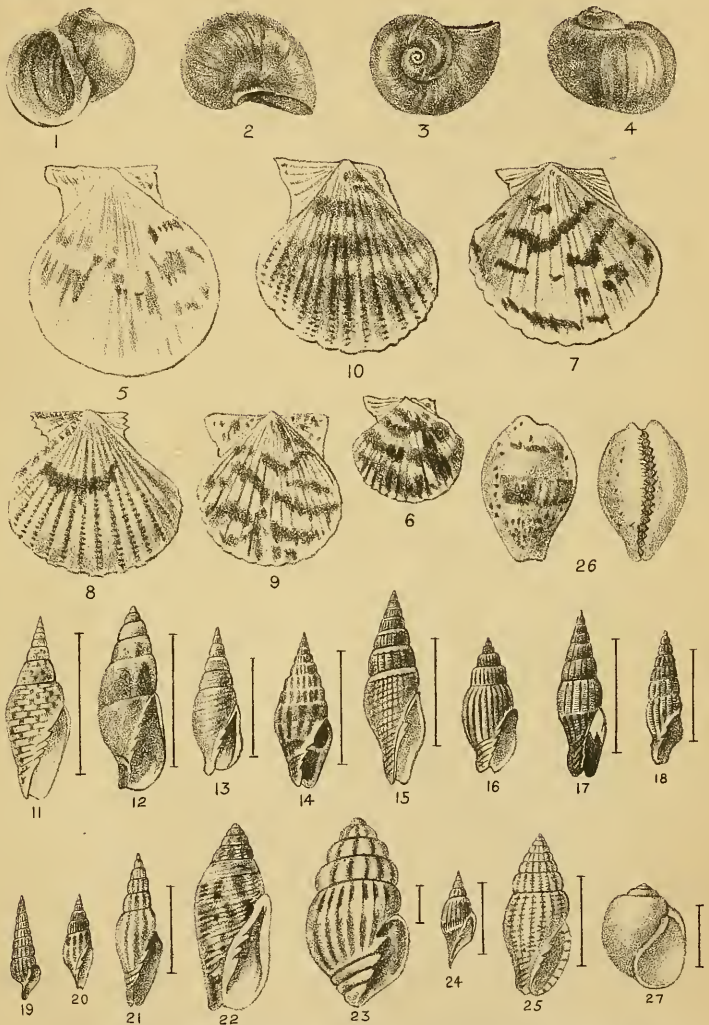
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4

*Terebratula papillosa*.  $\times 18$ , Fig. 1 front view, Fig. 2 side view, Fig. 3 Dorsal view. Fig. 4 *Scalaria pseudoscalaris* Brocchi. Fig. 5 *Concholepas Peruvianus* showing position of operculum, MM mantle, F foot, p proboscis, running into C canal, T tentacles, T' the two labial teeth, O operculum.





Figs. 1-4, *Limnæa physopsis*, Cooke; 5, *Pecten Gladysæ*; 6, *P. Guendolæ*; 7, *P. Hastingsii*; 8, *P. hyssginodes*; 9, *P. psarus*; 10, *P. valdecostatus*; Melvill. Fig. 11, *Mitra Marionæ*; 12, *M. ærumnosa*; 13, *M. astyridiformis*; 14, *M. caloxesta*; 15, *M. chariessa*; 16, *M. transenna*; 17, *M. Sybillæ*; 18, *M. percnodictya*; 19, *M. cerithina*; 20, *M. bela*; 21, *M. tensa*; 22, *M. abacophora*; 23, *M. rhodinosphæra*; 24, *M. zythochroa*; 25, *M. fulvosulcata*; Melvill. Fig. 26, *Cypræa Rashleighana*, Melvill. Fig. 27, *Bith. tentaculata*, abnormal.



# Conchological Society of Great Britain and Ireland.

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The Council will be pleased to receive subscriptions from the members towards the purchase of Cabinets and the necessary tubes and glass-capped boxes for the display of the Society's collections, which have increased largely during the past few years. Until now, however, the Society has not had the opportunity of rendering them available for consultation by the members. This difficulty has now been removed, thanks to the kindness of the Council of the Leeds Philosophical and Literary Society, who have liberally consented to the Society's collections being deposited in one of the rooms of the Leeds Museum, so that it will in future be possible to examine the collections at any time when the Museum is open.

Before this can be done, however, it will be necessary to provide Cabinets in which to place the specimens, and it will be obvious that a special subscription is necessary, in view of the fact that for the very small subscription of 5/- the "Journal of Conchology" is supplied to each member.

It is intended to house the collections in a series of small Cabinets, at an estimated cost of £2 10s. each, so as ultimately to facilitate the classification of the collections. Of these it is wished to order at least half-a-dozen. A list of subscriptions already promised is subjoined.

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PROCEEDINGS OF THE CONCHOLOGICAL SOCIETY  
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*PUBLISHED UNDER THE DIRECTION OF THE COUNCIL.*

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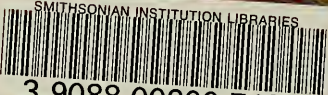
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