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VOL. VIII.

NOTES ON THE REFERENCES FOR
AUTHORSHIP OF SPECIES, AS GIVEN IN JEFFREYS,
BRITISH CONCHOLOGY, VOLUMES II-V.

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

Fellow of King's College, Cambridge, and Head Master of Aldenham School.

I WAS enabled to publish, in Vol. vii of this Journal, pp. 59-64, some Notes on the nomenclature of British Nudibranchiata, with special reference to Jeffreys, *British Conch.*, vol. v. The corrections there found necessary were extensive and, in some cases, of importance. I have been asked to continue the process then initiated, and to apply it to the remainder of "Jeffreys." The present paper is the result.

The notes must be read throughout with close reference to the pages of Jeffreys. It has not been attempted to introduce uniformity into his citations of the same work or volume, but only to correct them when erroneous. For instance, he refers in successive pages (iii, 246) to "Prodr. Zool. Dan.," and (iii, 248, 250) to "Prodr. Z. D.," and (iii, 252) to "Prod. Z. D.," but I have made no correction, though the title of the work is *Zoologiae Danicae Prodomus*. But I have thought it desirable, when Linné has described a species as e.g. *Venus gallina*, not to acquiesce in his being reported as describing it as *Venus gallina*. Quite apart from the question of fact, important results may follow from observing the use of the capital or the small letter, as I have endeavoured to show in this Journal, in a paper

entitled *Phasianella "pullus"* or "*pulla*"? But I have not attempted to decide what the right name of any given species actually is. For instance, it has been no part of my business to substitute *Pecten pectulatus* for *Pecten septemradiatus*, or *Chenopus serresianus* for *Aporrhais marandreae*. The references have been taken as they stand.

One or two alterations, trivial in themselves, may be mentioned here, and thus save space and time. All the references to Pennant are to the 8vo edition of 1777. "Müller" is O. F. Müller throughout. When the reference to Linné is undisturbed, it means that it is (unless otherwise indicated) to the 12th edition of the *Systema* (1766—68). The date of the 10th edition is 1758.

VOLUME II.

P. 14. TEREBRATULA CAPUT SERPENTIS.—For *caput-serpentis* . . . ed. 12, p. 1153 read *Caput serpentis* . . . ed. 10, p. 703, no. 200.

P. 19. ARGIOPE CISTELLULA.—The reference to Searles Wood, *Annals*, vi, p. 253, is useless, no description is there given, only a catalogue. Jeffreys doubtfully referred the species to *Terebratula seminulum*, *Phil., Ann. Mag. Nat. Hist.*, 1847, xix, p. 312. The proper reference for the description is *Argiope cistellula* (S. Wood), Davidson, *Brit. Fossil Brachiop.*, pt. 1, p. 10 (1852), pl. i, f. 13a—d.

P. 21. ARGIOPE CAPSULA.—The right reference is omitted and that given is wrong. Read *Argiope cistellula* var.?, Jeffreys, *Ann. Mag. Nat. Hist.*, ser. 3, 1858, ii, p. 125, pl. v, f. 4: *Terebratula capsula*, Jeffreys, *Ann. Mag. Nat. Hist.*, ser. iii, 1859, iii, p. 43, pl. ii, f. 7a, b.

P. 30. ANOMIA EPHIPIUM.—For p. 1150 read ed. 10, p. 701, no. 185.

I venture to suggest that the accepted derivation of the word *Anomia* (ἀ νόμος, *anōmos* law, hence 'lawlessness', 'irregularity'), with reference to the unsymmetrical growth of the shell, is a mistake. It appears to me more likely to be from ἀνίσχυρος, unequal; the κόγχη ἀνίσχυρος will then be the shell whose two valves are unequal to one another. From this it will follow that we should pronounce *Anomía*, not *Anomíā*.

P. 34. ANOMIA PATELLIFORMIS.—For *Syst. Nat.*, p. 1151 read *Fauna Suec.*, ed. 2 (1761), p. 521, no. 2152. This species, *Aeolis papillosa*, and *Lamettloris bilamellata* are the only three British mollusca, the references to whose description, according to the present rules of nomenclature, are from ed. 2 of the *Fauna Suecica*.

P. 38. OSTREA EDULIS.—For p. 1148 read ed. 10, p. 699, no. 180.

P. 51. PECTEN PUSIO.—For *Ostrea pusio* . . . p. 1146 read *Ostrea Pusio* . . . ed. 10, p. 698, no. 169.

P. 53. PECTEN VARIUS.—For p. 1146 *read* ed. 10, p. 698, no. 168.

P. 59. PECTEN OPERCULARIS.—For p. 1147 *read* ed. 10, p. 698, no. 171.

P. 65. PECTEN TIGRINUS.—Müller's original name *tigerinus* should not be altered. *Tigerina* remains the accepted name of a well-known *Lucina*.

P. 73. PECTEN MAXIMUS.—For p. 1144 *read* ed. 10, p. 696, no. 154.

P. 78. LIMA SARSI.—For Ind. Moll. Scand., p. 32 *read* Oefv. Kon. Vet. Akad. Förh. (1846), iii, p. 186.

P. 81. LIMA ELLIPTICA.—For *subauriculata*, L. and H. *read subauriculata* (Mont.), F. and H.

P. 85. For f. 4 *read* pl. 113, f. 4.

P. 95. AVICULA HIRUNDO.—For *Mytilus hirundo* . . . p. 1159 *read Mytilus Hirundo* . . . ed. 10, p. 706, no. 222.

P. 99. PINNA RUDIS.—For p. 1159 *read* ed. 10, p. 707, no. 223.

P. 104. MYTILUS EDULIS.—For p. 1157 *read* ed. 10, p. 705, no. 215.

P. 111. MYTILUS MODIOLUS.—For *M. modiolus* . . . p. 1158 *read M. Modiolus* . . . ed. 10, p. 706, no. 217.

P. 114. MYTILUS BARRATUS.—For p. 1156 *read* ed. 10, p. 705, no. 214.

P. 125. MODIOLARIA COSTULATA.—For p. 324, f. 165, *read* p. 324, no. 874, pl. xi, f. 165.

P. 143. NUCULA NUCLEUS.—For *Arca nucleus* . . . p. 1143 *read Arca Nucleus* . . . ed. 10, p. 695, no. 153.

P. 149. NUCULA NITIDA.—For p. 5, f. 20 *read* p. 5, pl. 16, f. 20.

P. 154. LEDA PYGMAEA.—For (Münster) Goldfuss, Petref., p. 157 *read* Münster, in Goldfuss Petref., part ii, p. 157.

P. 166. PECTUNCULUS GLYCYMERIS.—For *Arca glycymeris* . . . p. 1143 *read Arca Glycymeris* . . . ed. 10, p. 695, no. 151.

P. 171. ARCA PECTUNCULOIDES.—After p. 82 *add* no. 62, t. I, f. 12 a, b.

P. 175. ARCA OBLIQUA.—Dele Faun.

P. 177. ARCA LACTEA.—For p. 1141 *read* ed. 10, p. 694, no. 147.

P. 180. ARCA TRIKAGONA.—For ii, p. 137 *read* ii, Ord. 2, p. 137.

P. 188. GALEOMMA TURTONI.—It should be explained that Turton in his description "omitted to give a specific appellation to this shell, probably supposing it to be the only species known," not a very convincing reason. The authority "Eds. Zool. Journ." which is generally appended to the name *Turtoni* is awkward and unscientific. Messrs. Bell, Children, and J. and G. B. Sowerby were then acting in that capa-

city, but to attach the names of four authors to one species would perhaps be "too much of a good thing," though dozens of species have two authors and some three.

P. 194. *LEPTON SQUAMOSUM*.—For Test. Brit., i *read* Test. Brit., ii.

P. 198. *LEPTON NITIDUM*.—For Conch. Dith. *read* Conch. Ins. Brit., 1822. The facts are as follows: Turton's original work (published 1822) was called *Conchylia Insularum Britannicarum*. Five Orders were indicated, but only the second (Dithyra or bivalves) was described. The verbatim reprint (1848) was hence termed *Conchylia Dithyra Insularum Britannicarum*. It follows that all references should be to ed. i, on the title-page of which the word Dithyra does not occur.

P. 201. *LEPTON SULCATULUM*.—For 3rd ser. Jan. 1859 *read* ser. 3, iii (1859).

P. 202. *LEPTON CLARKIAE*.—For 2nd ser. March 1852 *read* ser. 2 (1852), ix, p. 191.

P. 210. *MONTACUTA FERRUGINOSA*.—For Test. Brit., p. 44, tab. 26, f. 5 *read* Test. Brit. Suppl., p. 22, tab. 26, f. 2 (the reference to *M. bitentata* is given over again by mistake).

P. 219. *LASAEA RUBRA*.—For p. 83, tab. 27 *read* p. 83; Suppl. tab. 27. The Supplement to the Testacea Britannica was published five years after the second of the two Parts.

P. 225. *KELLIA SUBORBICULARIS*.—For p. 39, tab. 26 *read* p. 39; Suppl. tab. 26.

P. 233. *LORIPES LACTEUS*.—For p. 1119 *read* ed. 10, p. 676, no. 50.

P. 235. *LORIPES DIVARICATUS*.—For p. 1120 *read* ed. 10, p. 677, no. 55.

P. 240. *LUCINA SPINIFERA*.—For p. 577, pl. 17 *read* p. 577; Suppl. pl. 17.

P. 270. *CARDIUM ECHINATUM*.—For p. 1122 *read* ed. 10, p. 679, no. 63.

P. 273. *CARDIUM TUBERCULATUM*.—For p. 1124 *read* ed. 10, p. 679, no. 65.

P. 275. *CARDIUM PAPILLOSUM*.—For ii, p. 56 *read* Vol. i, Ord. 2, p. 56.

P. 281. *CARDIUM FASCIATUM*.—After p. 30 *add* Tab. 27, f. 6.

P. 283. *CARDIUM NODOSUM*.—For Conch. Dith. *read* Conch. Ins. Brit. (See note on P. 198).

P. 286. *CARDIUM EDULE*.—For p. 1124 *read* ed. 10, p. 681, no.

- P. 292. *CARDIUM MINIMUM*.—Dele p. 38.
- P. 298. *ISOCARDIA COR*.—For *Chama Cor* read *Chama cor* (one of Linné's slips in printing).
- P. 304. *CYPRINA ISLANDICA*.—For *Venus Islandica* read *Venus islandica*.
- P. 311. *ASTARTE SULCATA*.—For *Pectunculus costatus* read *Pectunculus sulcatus*.
- P. 327. *VENUS EXOLITA*.—For p. 1134 read ed. 10, p. 688, no. 117.
- P. 330. *VENUS LINCTA*.—For Hutch. Dors., p. 34 read Hutchins' Dorset, ed. i (1799), p. 34. The second edition (1813) exhibits considerable alterations in nomenclature.
- P. 332. *VENUS CHIONE*.—For p. 1131 read ed. 10, p. 686, no. 100.
- P. 337. *VENUS CASINA*.—For p. 1130 read ed. 10, p. 685, no. 95.
- P. 339. *VENUS VERRUCCSA*.—For p. 1130 read ed. 10, p. 685, no. 94.
- P. 344. *VENUS GALLINA*.—For *V. gallina* . . . p. 1130 read *V. Gallina* . . . ed. 10, p. 685, no. 96.
- P. 359. *TAPES DECUSSATUS*.—For p. 1135 read ed. 10, p. 690, no. 126.
- P. 363. *LUCINOPSIS UNDATA*.—For Brit. Zool., p. 95 read Brit. Zool., iv, p. 95.
- P. 367. *GASTRANA FRAGILIS*.—For p. 1117 read ed. 10, p. 674, no. 37.
- P. 371. *TELLINA BALAUSTINA*.—For p. 1119 read ed. 10, p. 676, no. 47.
- P. 375. *TELLINA FALTHICA*.—For p. 1120 read ed. 10, p. 677, no. 52.
- P. 382. *TELLINA FABULA*.—For *T. fabula*, Gron. Zoophyl., iii, p. 268 read *T. fabula*, Gron. Zoophyl. (1781), iii, p. 263.
- P. 384. *TELLINA SQUALIDA*.—For Hutch. Dors., p. 29 read Hutchins' Dorset, ed. i (1799), p. 29.
- P. 386. *TELLINA DONACINA*.—For p. 1118 read ed. 10, p. 676, no. 46.
- P. 392. *PSAMMOBIA TELLINELLA*.—For V. p. 515 read (1818) v, p. 315. It is necessary to indicate the edition.
- P. 394. *PSAMMOBIA COSTULATA*.—For Conch. Dith. read Conch. Ins. Brit. (1822). See note on p. 198.
- P. 402. *DONAX VITTATUS*.—For p. 202 read p. 207.
- P. 407. *DONAX TRUNCULUS*.—For *D. trunculus* . . . p. 1127 read *D. Trunculus* . . . ed. 10, p. 682, no. 85.

P. 408. *DONAX POLITUS*.—For t. p. 44 *read* (1791), Vol. i, Ord. 2, p. 44.

P. 413. *AMPHIDESMA CASTANEUM*.—For Test. Brit. App, p. 573, t. 17, f. 2 *read* Test. Brit. Part ii, p. 573; Suppl. t. 17, f. 2.

P. 415. *MACTRA SOLIDA*.—For *M. solida* . . . p. 1126 *read Cardium solitum* . . . ed. 10, p. 681, no. 76.

P. 422. *MACTRA STULTORUM*.—For *M. stultorum* . . . p. 1126 *read Cardium stultorum* . . . ed. 10, p. 681, no. 80.

P. 425. *MACTRA GLAUCA*.—For Born, Test. Mus. Caes. Vind., p. 51, t. 3, f. 11, 12 *read* Born, Ind. Mus. Caes. Vind. (1778), p. 40; there are no plates in the Index; the date of the Testacea is 1780.

P. 428. *LUTRARIA ELLIPTICA*.—Add the date (1818) of the edition.

P. 438. *SCROBICULARIA ALBA*.—The author of the species should be distinguished as W. Wood.

P. 442. *SCROBICULARIA TENUIS*.—For Test. Brit. Suppl., p. 572, t. 17, f. 7 *read* Test. Brit. (1803), p. 572; Suppl. (1808), t. 17, f. 7.

P. 444. *SCROBICULARIA PIPERATA*.—Bellonius cannot stand as the author of this species. His "piperata chama" is figured on p. 404 of Liber II of the treatise *de Aquatilibus* (1553). Gmelin is the true author, and Jeffreys gives the reference.

VOLUME III.

P. 6. *SOLECURTUS ANTIQUATUS*.—For Cat. Dors. *read* Hutchins' Dorset, ed. i (1799).

P. 10. *CERATISOLEN LEGUMEN*.—For *legumen* . . . p. 1114 *read Legumen* . . . ed. 10, p. 672, no. 26.

P. 14. *SOLEN PELLUCIDUS*.—For pl. lxi *read* pl. 46.

P. 16. *SOLEN ENSIS*.—For *ensis* . . . p. 1114 *read Ensis* . . . ed. 10, p. 672, no. 25.

P. 18. *SOLEN SILIQUA*.—For *siliqua* . . . p. 1113 *read Siliqua* . . . ed. 10, p. 672, no. 24.

P. 20. *SOLEN VAGINA*.—For *vagina* . . . p. 1113 *read Vagina* . . . ed. 10, p. 672, no. 23.

P. 24. *PANDORA INAEQUALVIS*.—For *Tellina* . . . p. 1118 *read Solen* . . . ed. 10, p. 673, no. 32.

P. 34. *THRACIA PRAETENUIS*.—For Cat. Dors. *read* Hutchins' Dorset, ed. i (1799).

P. 38. *THRACIA PUBESCENS*.—For Cat. Dors. *read* Hutchins' Dorset, ed. i (1799).

- P. 45. POROMYA GRANULATA. — For *Corbula granulata*
d'Anvers read *Corbula ? granulata*, Nyst and West., Nouv. Recherch.
Coq. Foss. d'Anvers (1839).
- P. 49. NEAERA COSTELLATA. — For Exp. Scient. Mor. (Géologie),
p. 86, t. vii read Exp. Scient. Mor. (Zoologie), 1833, Tome iii, pt. 1,
sect. 1, t. xxiv.
- P. 51. NEAERA ROSTRATA. — For iii read 1793, iii, pt. 1.
- P. 64. MYA ARENARIA. — For p. 1112 read ed. 10, p. 670, no. 17.
- P. 66. MYA TRUNCATA. — For p. 1112 read ed. 10, p. 670, no. 16.
- P. 70. MYA BINGHAMI. — For Turt. Dith. read Turt. Conch. Ins.
Brit. (1822).
- P. 86. VENERUPIS IRUS. — For p. 1128 read ed. 10, p. 683, no. 90.
- P. 104. PHOLAS DACTYLUS. — For *dactylus* p. 1110 read *Dac-*
tylus ed. 10, p. 669, no. 10.
- P. 107. PHOLAS CANDIDA. — For p. 1111 read ed. 10, p. 669, no.
13.
- P. 112. PHOLAS CRISPATA. — For *P. crispata* p. 1111 read
Mya crispata ed. 10, p. 670, no. 15.
- P. 116. PHOLADIDEA PAPYRACEA. — For Turt. Dith. read Turt.
Conch. Ins. Brit. (1822).
- P. 168. TEREDO NORVEGICA. — For f. 4—6B, and 7 read f. 4—6
and B. There is no reason why Spengler's spelling *norvagica* should
be altered.
- P. 171. TEREDO NAVALIS. — For p. 1267 read ed. 10, p. 651, no. 2.
- P. 176. TEREDO MEGOTARA. — For xvii read xviii.
- P. 181. TEREDO MALLEOLUS. — The reference, which is omitted,
is Turton, Conch. Ins. Brit. (1822), p. 255, pl. 2, f. 19.
- P. 182. TEREDO BIPENNATA (the alteration to *bipinnata* is need-
less). The reference, which is omitted, is Turton, Conch. Dict. (1819),
p. 184, f. 38—40.
- P. 191. DENTALIUM ENTALIS. — For *D. entalis* p. 1263 read
D. Entalis ed. 10, p. 785, no. 688.
- P. 214. CHITON DISCREPANS. — For Ill. Conch., p. 65, pl. xxi, f. 20
read Ill. Conch., ed. 1 (1827), pl. 35, f. 20; ed. 2 (1844), p. 65, pl. 21,
f. 20. There is no description in ed. 1.
- P. 215. CHITON HANLEYI. — Remove the brackets from (Bean).
- P. 217. CHITON CANCELLATUS. — The full reference is G. B. Sowerby,
Jun., Descriptive Catalogue of British Chitons, p. 4, in Conch. Illust.,
Part 167, f. 104 (twice) 104a, 104b, 105. "Part" apparently = Plate.
It is quite time that Leach's name should cease to be attached to this
species. The following remark seems to have been lost sight of.
"The supposed *Chiton cancellatus* of Leach,—for the species was

never characterised by that naturalist, and Mr. Sowerby doubtfully gives him the reputation of founding it, solely from the traditionary authority of collectors, . . ."—Forbes and Hanley, *Brit. Moll.*, ii, p. 410.

P. 218. *CHITON CINEREUS*.—By a curious slip, Linné treats *Chiton* as feminine in this species only.

P. 224. *CHITON RUBER*.—The Linnean reference is *Syst. Nat.*, ed. 12 (1767), p. 1107, no. 7.

P. 226. *CHITON LAEVIS*.—The reference to Pennant is *Brit. Zool.*, 8vo. ed. (1777), iv, pl. 36, f. 3.

P. 236. *PATELLA VULGATA*.—For p. 1258 *read* ed. 10, p. 782, no. 664.

P. 242. *HELICION PELLUCIDUM*.—For p. 1260 *read* ed. 10, p. 783, no. 673.

P. 254. *PROPHADIUM ANCYLOIDE*.—For *Ancylloides* *read* *ancyloides*.

P. 257. *PUNCTURELLA NOACHINA*. For *Patella Noachina* p. 551 *read* *Patella noachina* (1771), p. 551. The only British species whose prime authority is the *Mantissa*.

P. 259. *EMARGINULA FISSURA*.—For *Patella fissura* p. 1261 *read* *Patella Fissura* ed. 10, p. 784, no. 681.

P. 263. *EMARGINULA CRASSA*.—For p. 73 *read* p. 73 *bis*.

P. 266. *FISSURELLA CRASSA*.—For p. 1262 *read* ed. 10, p. 784, no. 683.

P. 269. *CAPULES HUNGARICUS*.—Linné's spelling *ungarica* (*Patella*) should certainly not be altered.

P. 273. *CALYPTRAEA CHINENSIS*.—For p. 1257 *read* ed. 10, p. 781, no. 656.

P. 279. *HALIOTIS TUBERCELATA*.—For p. 1256 *read* ed. 10, p. 780, no. 648.

P. 287. *CYCLOSTREMA CUTLERIANUM*.—For new ser., vol. iv *read* (1849). Ser. 2, iv.

P. 305. *TROCHUS MAGUS*.—For *T. magnus* p. 1228 *read* *T. Magnus* ed. 10, p. 757, no. 507.

P. 309. *TROCHUS CINERARIUS*. For p. 1229 *read* ed. 10, p. 758, no. 512.

P. 312. *TROCHUS EMBLICATUS*.—For *N. umb.* *read* *T. umb.*

P. 320. *TROCHUS MONTAGUI*.—For *T. Montagu*, Wood, Ind. Test. Suppl., p. 6, f. 43 *read* *T. Montagu*, Gray, MS., Hanley's ed. of W. Wood, Ind. Test. (1856), p. 221, Suppl. pl. 6, *Trochus* f. 43. The true name of the species would thus appear to be *T. Montagu* (Gray), W. Wood.

P. 322. *TROCHUS STRIATUS*.—For p. 1230 ? *read* ed. 10, p. 759, no. 518.

P. 330. *TROCHUS ZIZYPHINUS*.—For *T. zizyphinus* . . . p. 1231 read *T. Zizyphinus* . . . ed. 10, p. 759, no. 520.

P. 338. *PHASIANELLA PULLA*.—Read *pullus* (see A. H. Cooke in Journ. Malac., 1899, vii, p. 31). For *Turbo pullus* . . . p. 1233 read *Turbo Pullus* . . . ed. 10, p. 761, no. 531.

P. 356. *LITTORINA OBTUSATA*.—For p. 1232 read ed. 10, p. 761, no. 526.

P. 361. *LITTORINA NERITOIDES*.—For *Turbo neritoides* . . . p. 1232 read *Turbo Neritoides* . . . ed. 10, p. 761, no. 527.

P. 368. *LITTORINA LITOREA*.—Read *littorea*; it is the height of absurdity to spell the generic name with two t's and the specific with one. For p. 1232 read ed. 10, p. 761, no. 528.

VOLUME IV.

P. 8. *RISSOA CANCELLATA*.—It should be remarked that Da Costa's figures represent the species as sinistral.

P. 22. *RISSOA COSTATA*.—The author should be quoted as J. Adams, and it should be remarked that his figures represent the species as sinistral.

P. 29. *RISSOA ALBELLA*.—For Ind. Moll. Scand., p. 25 read Oefv. Kon. Vetensk. Akad. Förh., 1846, iii, p. 157.

P. 30. *RISSOA MEMBRANACEA*.—The author should be quoted as J. Adams, and for f. 12, 13 read f. 14, 15.

P. 33. *RISSOA VIOLACEA*.—The author's name is not Desmarests but Desmarest, and the reference is Bull. Sci. Soc. Philom. Paris, 1814, p. 8, pl. i, f. 7.

P. 37. *RISSOA STRIATA*.—The author of this species, and of *R. fulgida* p. 43, should be quoted as J. Adams.

P. 39. *RISSOA PROXIMA*.—The reference is omitted, and I do not think that the species was ever properly described by Alder. (See Thompson, Ann. Mag. Nat. Hist., 1847, xx, p. 174). If so, the right reference will probably be *R. proxima* (Alder), Forbes and Hanley, Brit. Moll., 1853, iii, p. 127.

P. 59. *JEFFREYSIA DIAPHANA*.—The references need complete revision; they should read

Rissoa ? glabra, Brown, Alder, Ann. Mag. Nat. Hist., 1844, xiii, p. 325.

Rissoa ? diaphana, Alder, Trans. Tynes. Nat. Field Club, 1850, i, p. 149.

P. 69. *HOMALOGYRA ATOMUS*.—For p. 54 read p. 44.

P. 80. *TURRITELLA TEBEBRA*.—For *Turbo terebra* . . . p. 1239 read *Turbo Terebra* . . . ed. 10, p. 766, no. 562.

P. 86. SCALARIA TURTONÆ. Turton's original name *Turtonis* seems to have been needlessly altered.

P. 93. SCALARIA TREVELYANA.—The reference to Winch's Geology of Lindistarn (1822) is quite beside the point, as he gives no description whatever. The name appears to have remained in MS. quite a remarkable length of time, it was still so in 1840 (Thompson, Ann. Nat. Hist., v, p. 245). The proper reference, hinted at by Jeffreys on p. 95, is Johnston, Proc. Bewicksh. Nat. Club, 1841, i, p. 263. It would thus appear that the species should be quoted as *S. trevellyana* (Leach), Johnston.

P. 96. SCALARIA CLATHRATULA.—The reference Ad. Micr., t. 14, f. 19 is quite inadequate. *Read* G. Adams, Essays on the Microsc., ed. 2, 1798, p. 637, pl. 14, f. 19. The species was not described in ed. 1, 1787.

P. 103. AGLIS SEPRANTIDA.—The reference given "Cat Crag. Moll.," is useless, *read* Ann. Mag. Nat. Hist., 1842, ix, p. 534, pl. v, f. 2.

P. 106. AGLIS GILSONÆ. For 3rd. ser. *read* 2nd. ser.

P. 118. ODOSTOMIA CLAVULA. For Ind. Moll. Scand., p. 18 *read* Oefv. Kon. Vetensk. Akad. Förh., 1846, iii, p. 150.

P. 121. ODOSTOMIA ALBELLA.—For Ind. Moll. Scand., p. 19 *read* Oefv. Kon. Vetensk. Akad. Förh., 1846, iii, p. 151.

P. 124. ODOSTOMIA PALIDA.—For p. 325, t. 21 *read* p. 325, Suppl. t. 21.

P. 127. ODOSTOMIA CONOIDEA.—For p. 659 *read* p. 660.

P. 137. ODOSTOMIA PLICATA.—For p. 325, t. 21, *read* p. 325, Suppl. t. 21.

P. 155. ODOSTOMIA EXIMIA.—For new ser. *read* 2nd. ser.

P. 164. ODOSTOMIA LACTEA.—For p. 1238 *read* ed. 10, p. 765, no. 552.

P. 169. ODOSTOMIA SCHILLÆ.—For the remarkable reference Notizie int. alle Conch. p. 51 *read* Ann. Civ. Regn. due Sicil., 1835, vii, p. 11, Tav. ii, f. 2.

P. 186. IANTHINA ROTUNDATA.—The reference to "(Leach MS.), Dillwyn, Contributions towards a History of Swansea (1840), p. 59" cannot possibly stand. I quote the passage:—"1824, July.—Many thousand shells of *Janthina*, of which some retained the animal alive . . . were thrown on the shores of Oxwich Bay . . . A few of these *Janthina*, which had before at different times been washed up in the same bay, received from Dr. Leach his MS. name of *J. rotundata*." The species is generally known as *communis*, Lam.

P. 195. STILIFER TURTONI.—It may be worth while noting that

the Zoological Society's first publication was entitled "Proceedings of the Committee of the Science and Correspondence of the Zoological Society of London; Part i (1830—1831), Part ii (1832)." Then began "Proceedings of the Zoological Society of London, Part i (1833)," and so continued until Part xxviii (1860). In 1861 and afterwards the number of the Part has not appeared on the title-page.

Strictly speaking the name of this species is *Stilifer stylifer*, Turton.

P. 201. EULIMA POLITA.—For p. 1241 *read* ed. 10, p. 767, no. 570.

P. 203. EULIMA INTERMEDIA.—I am quite unable to understand what is meant by the reference to "Cantr. Mal. Méd. (Suppl.), p. 14." *Read* Bull. Acad. Roy. Sci. Bruxelles (1835), ii, p. 390, the original description. In Jeffreys' list of works referred to (Brit. Conch., v, p. 236), he refers, under Cantraine, F., to a "Malacologie méditerranéenne et littorale" as published in Nouv. Mém. Acad. Bruxelles, 1841, and to a supplement to the same, as published in Bull. Acad. Sci. Bruxelles, 1842. No such works occur in either of the volumes referred to.

P. 210. EULIMA BILINEATA.—For p. 47 *read* i, p. 141.

P. 214. NATICA ISLANDICA.—For *Nerita Islandica* *read* *Nerita islandica*.

P. 227. NATICA MONTACUTI.—*Montagui* should be restored, and for f. 3, 4 *read* f. 3, 4, 5.

P. 235. LAMELLARIA PERSPICUA.—For p. 1250 *read* ed. 10, p. 775, no. 621.

P. 245. TRICHOTROPIS BOREALIS.—For p. 395 *read* p. 375.

P. 250. APORRHAI PES PELECANI.—For *Strombus pes pelecani* . . . p. 1207 *read* *Strombus Pes pelecani* . . . ed. 10, p. 742, no. 422.

P. 256. CERITHIUM METULA.—For Ind. Moll. Scand., p. 23 *read* Oefv. Kon. Vetensk. Akad. Förh., 1846, iii, p. 155.

P. 261. CERITHIUM PERVERSUM.—For p. 1231 *read* ed. 10, p. 760, no. 523.

P. 271. CERITHIOPSIS METAXA.—For Mem. iii *read* Mem. stor. notom. Napoli, iii.

P. 276. PURPURA LAPILLUS.—For *Buccinum lapillus* . . . p. 1202 *read* *Buccinum Lapillus* . . . ed. 10, p. 739, no. 403.

P. 285. BUCCINUM UNDATUM.—For p. 1204 *read* ed. 10, p. 740, no. 410.

P. 293. BUCCINUM HUMPHREYSIANUM.—For Zool. Journ., i, p. 298, pl. xxx (upper figures) *read* Zool. Journ., 1825, i, p. 398, pl. xxii (two upper figures).

P. 298. BUCCINOPSIS DALEI.—For Min. Conch., p. 139 *read* Min. Conch., 1825, v, p. 139.

P. 306. MUREX ERINACEUS.—For *Murex erinaceus* . . . p. 1216 read *Murex Erinaceus* . . . ed. 10, p. 748, no. 451.

P. 319. TROPHON TRUNCATUS.—For (*truncatum*) read (*Truncatum*).

P. 323. FUSUS ANTIQVUS.—For p. 1222 read ed. 10, p. 754, no. 486.

P. 329. FUSUS NORVEGICUS.—For *Strombus Norvegicus* . . . Conch. Cab., xi read *Strombus Norvegicus* . . . Conch. Cab., 1788, x. In the Verzeichniss p. 204 the name is printed *Norragicus*, but as it is *Norvegicus* in the description it must so remain.

P. 331. FUSUS TURTONE.—For Mag. N. H., viii read Mag. Nat. Hist., 1834, vii.

P. 338. FUSUS PROPINQVUS.—For Club), p. 63 read Club, i, (1847), p. 157.

P. 346. NASSA RETICULATA.—For p. 1204 read ed. 10, p. 740, no. 411.

P. 359. COLUMBELLA NANA.—For Ind. Moll. Scand., p. 12 read Oefv. Kon. Vetensk. Akad. Förh., 1846, iii, p. 144.

P. 362. DEFRANCA TERES. No proper definition is given by Forbes in the passage quoted from the Annals. Read (Forbes) Reeve, Conch. Icon., 1844, i, *Pleurotoma*, pl. xix, f. 161, to which Forbes refers in the Annals passage.

P. 388. PLEUROTOMA NIVATUS.—For Ind. Moll. Scand., p. 14 read Oefv. Kon. Vetensk. Akad. Förh., 1846, iii, p. 146.

P. 390. PLEUROTOMA SEPTANGULARIS.—For p. 260 read p. 268.

P. 403.—CYPRAEA EUROPEA.—For (ii), p. 88 read Suppl. 2, 188.

P. 411. CYLICHNA ACUMINATA.—For Enc. Méth. (Vers.), t. vi read Enc. Méth. Vers., 1792, i.

P. 412. CYLICHNA NITIDULA.—For Ind. Moll. Scand., p. 10 read Oefv. Kon. Vetensk. Akad. Förh., 1846, iii, p. 142.

P. 417. CYLICHNA ALBA.—For Ill. Conch. G. B. & I., p. 3, pl. xix, f. 43.44 read Ill. Conch., ed. 1, 1827, pl. 38, f. 43.44; ed. 2, 1844, p. 3, pl. 19, f. 43.44.

P. 421. UTRICULUS TRUNCATULUS.—For (Vers.), t. vi read Vers., 1792, i.

P. 425. UTRICULUS VENTROSUS.—The species was not described, but only figured, in the reference from Ann. Mag. It was first described in the present passage.

P. 433. ACTAEON TORNATHIS.—For p. 1187 read ed. 10, p. 728, no. 342.

P. 437. BULLA HYDATIS.—For p. 1183 read ed. 10, p. 726, no. 333.

P. 443. SCAPHANDER LIGNARIUS.—For p. 1184 read ed. 10, p. 727, no. 335.

P. 447. PHILINE SCABRA.—For Zool. Dan., ii, p. 41, t. lxxi, f. 10—12 read Zool. Dan., 1784, ii, p. 90; Atlas, pl. 71, f. 10—12. There are two editions of the Zoologia Danica, differing widely from one another; the date of the later, which contains the Atlas, is 1788—1806.

P. 453. PHILINE PUNCTATA.—This species should not be assigned to Clark but to J. Adams, who described it thirty years before, as *Bulla punctata*, in Linn. Trans., 1798, v, p. 2, pl. 1, f. 6—8.

VOLUME V.

P. 5. APLYSIA PUNCTATA.—For *A. punctata* Cuv., Annals du Muséum, 1803, ii, p. 295, pl. i, f. 2—5 read *Laplysia punctata*, Cuvier, Ann. Mus. Hist. Nat. Paris, 1803, ii, p. 295, pl. 51 (*Laplysia* pl. 1), f. 2—5.

P. 7. APLYSIA DEPILANS.—The *Laplysia depilans* of the Systema ed. 12, is now, I believe, regarded as identical with *Tethys limacina* of ed. 10, p. 653.

P. 10. PLEUROBRANCHUS MEMBRANACEUS.—For *Lamellaria membranacea*, Mont. read *Lamellaria* or *Bulla membranacea*, Mont.

P. 17. PLEUROPHYLIDIA LOVENI.—For *P. Loveni*, Bergh in Foren. vidensk. Meddel. for 1860 read *P. Loveni*, Bergh, Vid. Medd., 1860.

P. 95. ONCHIDIUM CELTICUM.—For *Onchidium Celticum*, Cuv., Règne An., iii read *Onchidium celticum*, Cuv., Règne Anim. nouv. éd., 1830, iii. As Jeffreys truly says, the species is "indicated but not described" in the above passage. It would be interesting to find out who first attached a description to the species.

P. 101. ASSIMINFA LITTORINA.—For p. 215 read p. 225.

P. 115. SPIRALIS RETROVERSUS.—For p. 498 read p. 499.

P. 119. CLIO PYRAMIDATA.—Browne was not a binomial author so that in any case his description "*Clio* 1. *Vaginâ triquetra pyramidatâ, ore oblique truncatâ*" cannot stand. The first edition of the Civ. Nat. Hist. Jamaica was in 1756, the second in 1789. Linné in his ed. 10 of the Systema, published in 1758 (between Browne's two editions) took up the name *pyramidata*. It thus becomes *C. pyramidata*, Linné.

P. 128. OMMASTROPHES TODARUS.—Jeffreys seems to have "Frenchified" the title of the work, and his reference is not correct. Read *Delle Chiaje*, Memor. stor. notom. Napoli, Atlas (1822), Pl. 61, f. i. The species is mentioned, but not described, in the text, vol. iv, p. 161.

P. 139. *OMMATHEPHES SAGITTATUS*.—For *Mém. Soc. H. N.*, p. 13 *read* *Mém. Soc. Hist. Nat. Paris*, 1799, p. 13. The volume (the first) does not appear to have been numbered. Repeat the correction on pp. 130, 144, 146.

P. 132. *LOLIGO MEDIA*.—For p. 1095 *read* ed. 10, p. 659, no. 3.

P. 133. *ROSSIA MACROSOMA*.—The completely correct reference to Delle Chiaje must be deferred for a while. That author appears to make no reference to *Sepiola macrosoma* in the *test* of the *Memorie*. But in the *Descrizione e Notomia* (1841, twelve years later), he refers (i, p. 10, note) to the *Memorie Atlas*, Pl. lxxi, 11, and again (v, p. 68) to Pl. lxx, 1—11, of the same. (These references are evidently to the same figure, and the error is that of the typographer.) But in the *Memorie Atlas*, as at first published, there are only 69 plates in all; Delle Chiaje, however, intended to publish more (*Descriz. e Notom.*, p. xiii), but whether he ever did so or not I have not at present been able to discover.

P. 136. *SEPIOLA RONDELETHI*.—By strict rules the species should be known as *Sepiola sepiola*, Linné. See, on the whole question, Hoyle, 'Challenger,' vol. xvi, p. iii.

P. 138. *SEPIA OFFICINALIS*.—For p. 1095 *read* ed. 10, p. 658, no. 2.

P. 140. *SEPIA ELEGANS*.—For t. lxviii, p. 44 *read* t. xlviii, p. 284.

P. 141. *SEPIA BISERIALIS*.—For p. 75, pl. 26 *read* p. 73, pl. 26, f.—k.

DESCRIPTION OF TWO NEW SPECIES OF HELICOID LAND SHELLS.

By G. K. GUDE, F.Z.S.

Epiphragmophora dormeri, n. sp. Figs. 1—3.

SHELL, covered-umbilicate, solid, pale straw-yellow, with a dark brown sutural band ascending the last two whorls, and a faint peripheral band which becomes evanescent towards the mouth. Spire conoid, slightly elevated; suture impressed, apex obtuse. Whorls 5, tumid, increasing rapidly, the last twice as wide as the penultimate, laterally compressed, and deeply descending in front. The apical whorl smooth, the next three finely and regularly ribbed; the ribs almost obliterated by fine wrinkled malleations on the last whorl. Aperture very oblique, ovate; margins convergent, connected by a thin callus. Peristome

white, polished, thickened and strongly reflected; the columellar margin triangularly dilated and covering the narrow umbilicus.

Diam. maj. 23.5, minor 20.5; alt. 17 mm.

Hab.—Mont Ascuncion, Paraguay. *Type* in my collection.

The nearest ally of this shell is *E. estella*, d'Orb., the type of the latter is in the British Museum, where, through the courtesy of Mr. Edgar A. Smith, I have been able to inspect it. The shell is much more depressed than that of the present species, especially in the

1.

2.

3.



body whorl; and there are only four whorls, which are strongly mal-leated. *E. dormeri* is further distinguished from *E. estella* by its less dilated aperture, the presence of the dark subsutural band, and the deep deflection of the last whorl.

The species is named in honour of the late Lord Dormer who collected the shells.

Sesara mouleyitensis, n. sp. Figs. 4—7, enlarged.

Shell imperforate, semiglobular, corneous brown, finely and regularly ribbed, paler and nearly smooth below; embryonal whorl smooth. Spire convex; suture shallow; apex rather prominent, obtuse. Whorls nearly 7, increasing slowly, the last gradually receding below the

4.

5.

6.

7.



penultimate, rounded, not deflexed in front; deeply impressed at the umbilical region. Aperture subtrapezoid, nearly vertical. Peristome white, strongly thickened and slightly reflected; looked at from below it has the shape of a note of interrogation. Inside the aperture on the palatal wall is a strong, stout, horseshoe-shaped fold, extending over nearly the whole of the basal margin and having the concave side outward. On the columellar margin occurs a narrow entering fold.

Diam. for alt. 5.75 mm.

Hab. Mount Mouleyit, Tenasserim, Burma. *Type* in my collection.

This is an interesting form of *Sesara*, allied to *S. attaranensis*, Theob., which, however, is a much smaller shell. The new species is further distinguished from *S. attaranensis*, by its semiglobular shape, rounded whorls, deeply impressed umbilical region, and receding last whorl. In the shape of the aperture, the form of the peristome, the horseshoe-shaped fold on the basal margin, and the entering collumellar fold, the two species are remarkably alike. Figure 7 (enlarged) shows the aperture with its two folds.

For both the shells here described, I am indebted to the kindness of Colonel Beddome, whose MS. name of the latter species I have had much pleasure in adopting.

DESCRIPTION OF TWO NEW SPECIES OF MICROPARMARION FROM THE ANDAMAN ISLANDS.

BY WALTER E. COLLINGE,

The University, Birmingham.

(Plate i.)

HITHERTO the only reference to any *Parmarion*-like molluscs in the Andaman Islands, is a brief note by Lieut.-Col. Godwin-Austen¹ in a paper on the Land molluscan fauna of these and neighbouring islands. He there states that his brother and Col. Hobday found, when making the ascent of Saddle Peak on North Andaman, a large slug-like form resembling *Girasia*. The specimen, unfortunately, was accidentally lost before they returned into camp.

In the early part of last year Dr. O. F. von Möllendorff sent me two molluscs from the Andaman Islands, both of which belong to the genus *Microparmarion*.

I take this opportunity of expressing to him my best thanks, for so kindly placing these very interesting molluscs in my hands. To the Council of the Birmingham Natural History and Philosophical Society, I also desire to express my best thanks for their kindness in defraying the artist's charges in connection with the accompanying plate.

Microparmarion mollendorffii, n. sp. Pl. 1, figs. 1—6.

Animal a dark blue, excepting laterally just behind the head, and on the dorsum beneath the anterior portion of the mantle, where the ground colour is a dirty yellow. Mantle dark blue, covering the visceral mass from all sides, portion bordering the shell thin. Visceral mass overlapping the posterior portion of the dorsum, which is flattened. Caudal mucous pore a vertical slit not extending to the foot-sole. Keel short and prominent. Rugæ small. Peripodial groove distinct. Foot-fringe dark blue with yellow lineoles. Foot-sole yellowish, divided into median and lateral planes.

Length (in alcohol) 31 millim.

Shell (Pl. 1, fig. 3) oval in form, with a slight indication of the apical whorl, borders thin and membranaceous.

Major diam. 11.5, min. diam. 8 millim.

Type in my collection.

ANATOMY OF THE GENERATIVE ORGANS.

The penis is a thick muscular walled tube, terminating in a beak-like head. In section (Pl. 1, fig. 5), the lumen is seen to pass to almost the distal end and to widen into two sac-like portions, the upper of which is connected with the vas deferens. Viewed externally the vas deferens is connected with the penis on its ventral side, whilst the retractor muscle is inserted a little nearer the distal end on the dorsal side. The receptaculum seminis has a short duct which enters the vagina on its inner side (Pl. 1, fig. 4). Above this is the free oviduct, just before it enters the common duct, it becomes more globose and then narrowing suddenly, becomes the oviducal portion of the common duct. The dart-sac (Pl. 1, fig. 4, *d. s.*) is a large thick muscular organ sharply bent upon itself. The fundus of the dart is situated at the first bend. The dart (Pl. 1, fig. 6) is a long calcareous rod which becomes gradually finer at the free end.

The prostatic and oviducal canals, forming the common duct, are richly folded and partly cover the albumen gland.

Microparmarion andamanica, n. sp. Pl. 1, figs. 7—10.

Animal yellowish with dark mottling laterally, anteriorly the dorsum is light yellow with a dark blue lateral band extending from the head to the visceral mass. Mantle same colour as the body, with well developed keel encircling the visceral mass, mantle covers the visceral mass from all sides, portion bordering the shell thin. Visceral mass overlaps the posterior portion of the dorsum which is flattened.

Caudal mucous pore small. Keel longer than in preceding species. Peripodial groove prominent. Foot-fringe yellowish-brown with yellow lineoles. Foot-sole yellowish-brown, divided into median and lateral planes.

Length (in alcohol) 24 millim.

Shell (Pl. 1, figs. 9 and 10) elongate oval in form, with a slight indication of apical whorl, membranaceous, and slightly wraps over the visceral mass.

Hab.—North Andaman. *Type* in my collection.

The generative organs were not mature in this species.

Having only a single specimen of each of these new species, I am unable to give a more detailed description, but I am hoping to obtain more, when further particulars will be given.

EXPLANATION OF PLATE I.

Microparmarion möllendorffi, n. sp.

Fig. 1. View of the animal from the right side. $\times 2$.

Fig. 2. Dorsal view. $\times 2$.

Fig. 3. Shell. $\times 2$.

Fig. 4. Generative organs. $\times 24$.

REFERENCE LETTERS.

alb. gl. Albumen gland.
d. s. Dart-sac.
f. ov. Free-oviduct.
h. d. Hermaphrodite duct.
h. gl. Hermaphrodite gland.
ov. Oviduct.
p. Penis.

pr. Prostate.
r. m. Retractor muscle.
r. d. Receptacular duct.
r. s. Receptaculum seminis.
v. Vestibule.
v. d. Vas deferens.
vg. Vagina.

Fig. 5. Horizontal section through the penis.

Fig. 6. Dart-sac and dart *in situ*. $\times 10$.

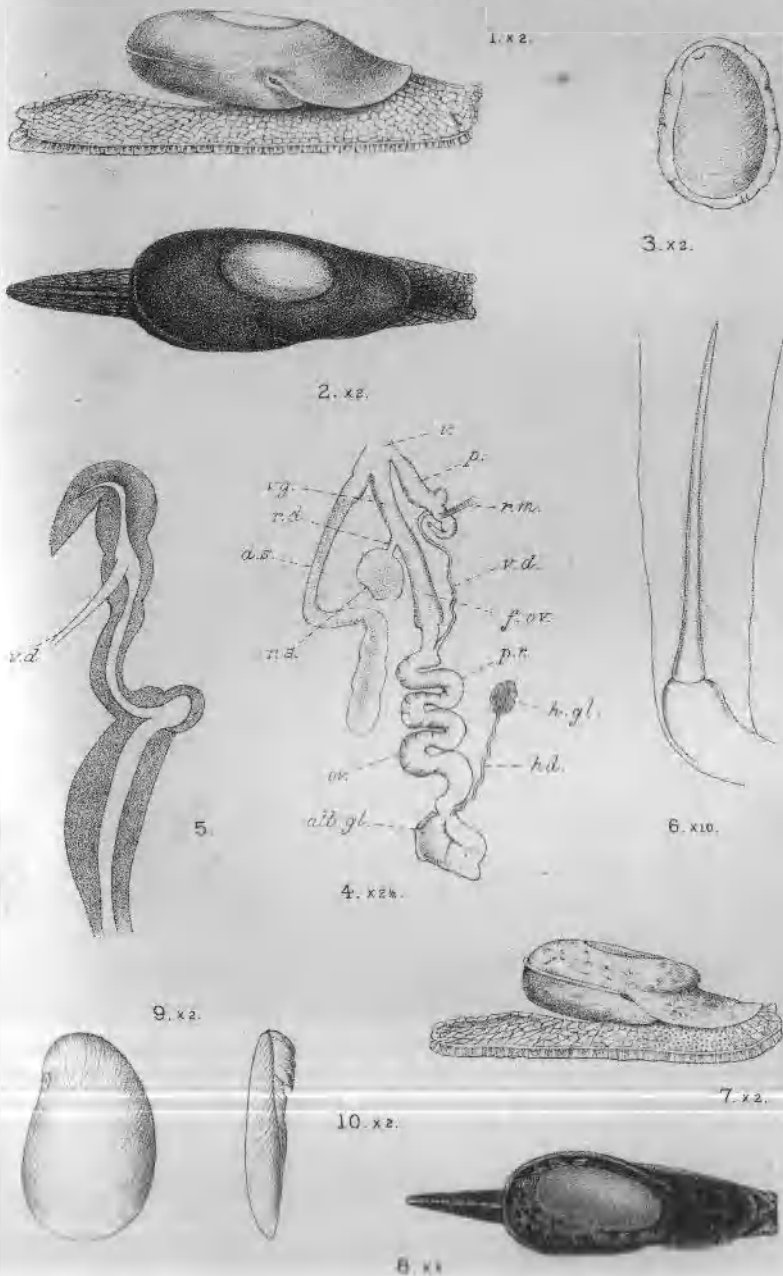
Microparmarion andamanica, n. sp.

Fig. 7. View of the animal from the right side. $\times 2$.

Fig. 8. Dorsal view. $\times 2$.

Fig. 9. Dorsal view of the shell. $\times 2$.

Fig. 10. Lateral view of the same. $\times 2$.



Fig^s 1-3 A 7-10. P.W.C. det. ad nat.

Fig^s 4-6, P.W.C. det. ad nat.

A. H. S. G. 1. 10th London.

NOTE ON MYRINA SIMPSONI, MARSH.

By J. T. MARSHALL.

WITH reference to my paper describing this species¹, I am indebted to Mr. Edgar A. Smith for pointing out to me that he "understands the name *Myrina*, H. and A. Adams, was preoccupied many years ago, but does not see how it is conchologically separable from *Adula* of the same authors." I do not know the genus *Adula*, but my faith in Mr. Smith's conchological instinct is so strong that I have no hesitation in substituting *Adula*, H. and A. Ad., for *Myrina*.

Mr. Smith also writes me that *Adula* (*Myrina*) *pelagica*, the type of the genus, was found "off the Cape of Good Hope, attached to floating masses of blubber."

Since my paper on the subject appeared in this journal, a piece of pitch pine, bored by *Xylophaga* and *Teredo*, was landed on the fish-quay of Aberdeen by a trawler, who said it came from the "Shetland fishing-grounds," and in the deserted tubes were *Adula simpsoni* attached by a byssus. This is especially interesting, as the habitat is in complete harmony with that of *A. argenteus*, Jeffr., from frigid water in the Shetland-Faroe Channel. It is probably owing to this concealed habitat that the present specimens are much paler than those originally described. About two dozen specimens were obtained on this occasion, several of which were still alive, and were placed under examination. "They were quite at home in a watch-glass, and travelled by first protruding the foot, and then by contracting it drew the shell along," while under the microscope "the action of the current through the tubes could be seen through the valves of the shell." (Mr. J. Simpson *in litt.*)

A specimen sent me in spirit yielded the following results, which demonstrates that the animal is not far removed from *Modiolaria*:—Body dirty white, viscera light brown; mantle free, plain; incurrent tube formed by the two flaps of the mantle; excurrent tube short, thick, and conical; foot large, white, and tongue-shaped, with a conspicuous groove down the centre for the byssus.

At the time of writing another whale's skull has been landed at Aberdeen by a local trawler, which was brought up "20 miles N.W. of Fair Isle" (between the Orkneys and Shetlands), to which two or three dozen *A. simpsoni* were attached.

MALACOLOGICAL NOTES.*

By E. R. SYKES, B.A., F.L.S.

5. The genus *Rhodea*.

THE genus *Rhodea* has been reviewed three times, namely by Crosse (1), Da Costa (2), and Jousseume (4), and though the last two have added but little to our knowledge save in the description of new forms, it may be convenient to briefly list the species now known. Dr. Jousseume appears to have worked in ignorance of Mr. Da Costa's paper.

The genus was founded by H. and A. Adams in February, 1855, (*Genera Rec. Moll.*, vol. ii, p. 135), as a section of *Columna*, to contain the single known species *R. pfeifferi*, Crosse, under its then name of *Achatina californica*, Pfr. It was raised to the rank of a genus by Monsson (5) in 1873, when describing a second species, *R. gigantea*. A third species was added by Dohrn (3) in 1875; two by Mr. Da Costa (2) in 1899, and three by Dr. Jousseume (4) in 1900.

Nothing seems to have been stated as to the life-history or anatomy, save the note by Dohrn that *R. wallisiana* is ovoviviparous, and the record by Mr. Da Costa of the finding of ten embryonic shells in *R. gigantea*. The fossil history equally appears to need study. I have not repeated all the references given by Crosse (1), but have only referred to the original diagnosis, and to that paper. We may note the description by de Morgan of a genus *Rhodina* from Perak, said to be allied to *Rhodea*.

LIST OF SPECIES.

RHODEA AEQUATORICA, Da Costa.

R. aequatorica, Da Costa (2), p. 305, fig.

Hab.—Ecuador.

RHODEA COUSINI, Jousseume.

R. cousini, Jousseume (4), p. 36, pl. i, fig. 15.

Hab.—Ecuador.

RHODEA CROSSEANA, Da Costa.

R. crosseana, Da Costa (2), p. 305, fig.

Hab.—U. S. of Colombia.

RHODEA EQUATORENSIS, Jousseume.

R. equatorensis, Jousseume (4), p. 37, pl. i, fig. 17.

* See ante, vol. vii, p. 164.

Hab.—Ecuador.

Probably this species will need re-naming on account of the prior

R. aequatorica.

RHODEA GERETI, Jousseaume.

R. gereti, Jousseaume (4), p. 38, pl. i, fig. 16 (not fig. 17 as given in text).

Hab.—U. S. of Colombia.

RHODEA GIGANTEA, Mousson.

R. gigantea, Mousson (5), p. 15; Crosse (1), p. 18, pl. i, fig. 2; Da Costa (2), p. 304, fig.

Hab.—U. S. of Colombia.

RHODEA PFEIFFERI, Crosse.

R. pfeifferi, Crosse (1), p. 14, pl. i, fig. 1.

Achatina californica, Pfeiffer (6), p. 89.

Hab.—U. S. of Colombia.

RHODEA WALLISIANA, Dohrn.

R. wallisiana, Dohrn (3), p. 57; Crosse (1), p. 21, pl. i, fig. 3.

Hab.—U. S. of Colombia.

REFERENCES.

1. CROSSE.—J. Conchyl., 1876, vol. xxiv, pp. 1—24, pl. iv.
2. DA COSTA.—P. Malac. Soc. London, 1899, vol. iii, pp. 304—306, figs.
3. DOHRN.—Nachrbl. Deutsch. Malak. Ges., 1875, p. 57.
4. JOUSSEAUME.—Bull. Soc. Philom., 1900, vol. ii, pp. 35—39, pl. i.
5. MOUSSON.—Malak. Blätt., 1873, vol. xxi, pp. 15—17.
6. PFEIFFER.—Symb. Hist. Hel., 1846, part iii, p. 89.

NOTES.

Helix lapicida m. sinistrorsum.—This form was named by C. A. Westerlund in 1871, so Mr. Partridge's find (p. 180) is not an absolute novelty, though it is very interesting.—T. D. A. COCKERELL.

Trichomya, von Ihering (see p. 186).—This may I suppose remain, on account of its different derivation, but it is uncomfortably similar to *Trichomyia*, Haliday, a genus of Diptera.—T. D. A. COCKERELL.

Dates of publication of Forbes and Hanley's History of British Mollusca.—This was issued in monthly parts each with four (dated) plates.

Vol. I.—	pp. i—lxxx, 478—486 and all title pages.	1853.
	pp. 1—477 (= Pt. 1—12).	1848.
Vol. II.—	pp. 1—480 (= Pt. 13—24).	1849.
	pp. 481—557 (= Pt. 25 and 26)	
Vol. III.—	pp. 1—320 (= Pt. 27—34).	1850.
	pp. 321—616 (= Pt. 35—42).	1851.
Vol. IV.—	pp. 1—302 (= Pt. 43 in end).	1852.

For evidence see Wiegmann's Archiv. f. Naturg., 1849, ii, pp. 77 and 106; 1850, ii, p. 103; 1851, ii, p. 104; 1852, ii, p. 263; 1853, ii, p. 94.—B. B. WOODWARD.

INVESTIGATIONS ON THE VARIATION AND LIFE-HISTORY OF BRITISH LAND AND FRESHWATER MOLLUSCS.

A Committee, consisting of Messrs. J. R. B. Masefield, F. Taylor, R. J. Welch, and A. E. Boycott, has been appointed by the Council of the Conchological Society of Great Britain and Ireland for the purpose of conducting a collective investigation of phenomena connected with the variation and life-history of British Land and Freshwater Mollusca. The object of the investigation is to inquire into points liable to general uncertainty and to local or other variation, and into the diffusion and dispersal of species, by collecting the results of the individual experience of many naturalists. A certain small number of subjects for investigation will be published each year, and it is hoped that an abundance of replies will be received, so that the results may be thoroughly representative. The following five subjects have been selected for 1901:

(1) How far is the smell of "garlic" constantly associated with *Hyalinia alliaria*? under what circumstances and at what seasons of the year is it most noticeable? does *H. alliaria* seem to escape destruction by other organisms more than the rest of the genus? is the smell of "garlic" found in other species and under what circumstances?

(2) Have you in any case found any species or variety of land snail constantly associated with any particular plant?

(3) Is any preference shown by (1) *H. aspersa*, (2) *F. rufescens* for the neighbourhood of human habitations and buildings? if so, what explanation do you consider the most probable?

(4) What localities produce the largest specimens of *Anodonta*? Describe the nature of the water, soil, geological formation, etc., and give the dimensions and, if possible, the weight.

(5) In the genus *Helix*, where not indigenous, when and how were any of the species introduced? It is desired to put on record as far as possible the date of introduction of any species into any given locality, both from abroad into the British Isles and from one part of the country to another.

The locality for which each answer is recorded should be carefully given, with any details of geological formation, altitude, vegetation, etc., etc. which may seem desirable. All returns should reach the Secretary (A. E. Boycott, The Grange, Hereford), by September 1st, 1901.

PROCEEDINGS OF THE MIDLAND
MALACOLOGICAL SOCIETY.

24TH (ANNUAL) MEETING, DECEMBER 7TH, 1900.

The President in the chair.

Professor Ludwig Plate of Berlin was unanimously elected one of the six honorary members on the recommendation of the Council.

The Annual Report of the Council and the Treasurer's Statement were read and adopted.

The Secretary reported that as no amendments had been received to the Council's nominations, the following would constitute the Council and Officers for 1901:—

President—Walter E. Collinge.

Treasurer—H. H. Bloomer.

Hon. Secretary—H. Overton.

Librarian and Curator—Guy Breeden.

Other members of the Council—Messrs. Breeden. H. Willoughby Ellis, F. J. Partridge, and Bromley Peebles.

The President's Address was postponed until the February meeting.

EXHIBITS.

By Mr. Overton: A very fine collection of shells of *Helix hortensis*, also *H. obsoleta* from Ditcham, Hampshire.

By Mr. Breeden: Shells of *H. hortensis* from various localities.

By Mr. Partridge: Varieties of *H. hortensis*.

By the President: Specimens of *Veronicella gilsoni*, Cllge., from the Fiji Islands.

ANNUAL REPORT, 1900.

In presenting their Third Annual Report your Council have to record another year's work of an extremely satisfactory character.

During 1900 only one new member has been elected, and death has removed from our Society the veteran student of the Mollusca—Mr. G. Sheriff Tye.

Eight meetings have been held, at which five papers have been read. The exhibits have been plentiful, and often of great interest.

The financial condition of the Society stands as follows: there is a balance due to the Treasurer of £2. os. 3d., and the outstanding subscriptions amount to £2.

Numerous additions to the Library have been made, the number of works and pamphlets now numbering 85. A commencement has been made with the Collection of British Molluscs, and donations have been received from the President, and Messrs. Bloomer and Overton.

Your thanks are due to the Council of the University of Birmingham, and Prof. Bridge, for the facilities they have so kindly given in permitting our meetings to be held in the Zoological Department.

CURRENT LITERATURE.

Pilsbry, Henry A.—Tryon's Manual of Conchology, ser. ii, vol. xiii (pt. 52), pp. 177—253, pls 49—72. Philadelphia: Academy of Natural Sciences.

Dr. Pilsbry continues and completes his account of the genus *Amphidromus*, Alb.

An Appendix to the volume contains the following important corrections, etc. *Bothriembryon physodes* (Menke), 1848, replaces Reeve's name *physoides*. *Placostylus shongii* (Less.). According to Mr. Suter this name is incorrect, and should stand *hongii*. *P. fibratus* (Martyn). Mr. Charles Hedley points out that the locality of the original is Ile Amère or Botany Island.

Simpson, C. T.—Synopsis of the Naiades, or pearly freshwater mussels. Proc. U.S. Nat. Mus., 1900, vol. xxii, pp. 501—1044, pl. xviii.

The appearance of Mr. Simpson's valuable synopsis marks a distinct advance in the history of the study of this large and difficult group of Pelecypoda. Coming, as it does, from so distinguished an authority, who has had unrivalled facilities for dealing with this interesting group, it claims more than passing attention.

The Introduction first gives a brief sketch of the different classifications from that of Lea (1836) to the author's own in 1896. Apart from the work of Lea, Troschel, and Pelsener, very little attention has been paid to the anatomy of the group. The author in his earlier paper (Proc. U.S. Nat. Mus., 1896. xviii), placed a great variety of forms under the generic name *Unio*, but since then from a study of the soft parts, he has come to the conclusion that it would be best to split up this genus, somewhat after the manner in which Pilsbry has treated the old group *Helix*. This dismemberment is warranted by the following facts. Under ordinary conditions there is but little differentiation in the soft parts, but at the period when the ova pass into the gills a remarkable change is brought about in these organs. "In the *Anodontia edentula* of Say, short, horizontal ovisacs are developed, which run directly across the animal, and which at maturity break through the outer walls of the outer gills and pass with their young entire into the water. In the forms typified by *Unio anodontoides* the young are contained only in very distinct vertical or oblique ovisacs in the hinder part of the outer gills; in *U. crassidens pictorum*, and the like, the embryos fill the entire outer gills, forming thick, smooth pads; in *U. metaneorus trigonus*, *multiplicatus*, and allied forms, they occupy all four of the branchiae throughout. In *U. phascolus* the smooth outer gills begin to be crimped as they are being filled with embryos, until when full, they become a series of marvelous folds. In *U. irroratus* several ovisacs in the center of the outer gills grow out to a great length, and become filled with young, and are closely coiled. In *U. cornutus* a few central ovisacs develop so as to project below, in a long, straight flap. In all the South American and Australian *Unios*, so far as is known, the inner gills alone, as a rule, are filled with young, and this is probably the case with the species of the Ethiopian region and most of those of south-eastern Asia. After the young have passed out into the water the gills of all the species change back into their ordinary condition, and when not gravid there is great similarity in those of most of the species formerly classed as *Unios*."

It would seem that these peculiar evanescent characters, assumed when the gills act as marsupia, are quite constant, and further, are concomitant with certain minor shell characters, consequently the author thinks they may be used as a basis for the foundation of genera.

Von Ihering's discovery in 1893, showing that certain species on hatching from the egg commence life as a *glochidium*, with a bivalve shell capable of containing the animal, and others as a *lasidium*, with three segments, the middle one only having a single shell, the former being regarded as members of the *Unionidae*, and the latter as of the *Mutellidae*, is rightly regarded as the most important discovery that has yet been made in the study of the Naiades. Mr. Simpson's researches upon the gills and ovisacs must rank as the second most important, and we trust that at no distant date he will describe these changes in greater detail and illustrate the same.

In the past it has been claimed by certain malacologists that the Naiades were hermaphrodite, and by others that the sexes were separate, but from the recent careful researches of Sterki, Taylor, Kelly, and others, it would seem that in the more specialised *Unionidae*, viz. those having two forms of shell and the ovisacs situated in the hinder portion of the outer gills, the sexes are always separate; whilst in the more generalised, viz. those with one form of shell and the embryos occupying the entire gill, the sexes may or may not be separate.

The author recognises about 1000 species and 82 varieties of *Unionidae*, comprised in 61 genera, of these 553 species and 55 varieties belong to Nth. America and 101 to Sth. America. Of the *Mutellidae*, 117 species and 11 varieties are listed comprised in 11 genera.

With von Ihering's view that the primitive beak sculpture of the *Unionidae* was radial, Mr. Simpson is inclined to agree, further he believes "that the earlier *Unios* had the young contained in the inner branchial alone, and that there has been a gradual development from these primitive forms with simple, dull-colored, smooth

shells, those of the male and female being alike, with radially sculptured beaks, the *Endobranchs*, up to the highest forms of to-day, with concentric, doubly looped beak sculpture, with highly painted shells, in which those of the male and female are very different, with the young contained in distinctly marked ovisacs in the hinder part of the outer gills alone, the *Exobranchs*."

The past history of the Naiades is then treated of, and very interesting and valuable are the views set forth. The work of Rafinesque, Lamarck, and the so-called new school of France, is next reviewed, and a synopsis of the genera, etc., given in tabular form.

A running comment in the form of foot-notes is made upon the genera, species, etc., in the systematic portion. Many new names are introduced and radical changes made. Finally a bibliography containing nearly 2000 titles, and an index extending over 46 pp. concludes this valuable work.

Mr. Simpson has had no light task before him, for such a work as the present one must have entailed many years hard work, often of a very trying nature. It has been well done and handled in a masterly manner, and must for many years rank as the standard work, for it cannot fail, with its wealth of criticism, to prove indispensable to all who study the group. On all concerned in its production (excepting the binders, the stitching being abominable) it reflects the greatest credit.—W. E. C.

Baker, F. C.—The Gross Anatomy of *Limnaea emarginata*, Say, variety *mighelsi*, Binney. Bull. Chicago Ac. Sci., 1900, vol. ii, pp. 191—211, pls. i—vi.

The author has given an interesting account of the gross anatomy of this form, together with other useful notes. Respecting the wide range of variation in this species, a large number of figures of the variety *mighelsi* are given, out of which any one fond of making species could form a large number and several genera, but the animals show no such variation, indeed they are anatomically wonderfully uniform. The digestive system, generative organs, nervous, circulatory, respiratory, renal and muscular systems are described and figured.

Collett, O.—Pearl Oysters and Pearl Fisheries. Reprint from "Ceylon Observer," 1900, pp. 1—12.

This is an abstract of an interesting paper read by the author on October 27th, at a meeting of the Ceylon Branch of the Royal Asiatic Society. In addition to Mr. Collett's paper it contains remarks made by Capt. Donnan, Mr. R. H. Ferguson, Dr. Vander and others.

Melvill, J. Cosmo.—Descriptions of Two Species of *Cypraea*, both of the Sub-genus *Trivia*, Gray. Ann. and Mag. N. H., 1900 (s. 7), vol. vi, pp. 207—210, 4 figs.

C. (T.) galapagensis, n. sp., is characterised by a shining, enamelled callosity over the whole centre of the dorsal region, completely obliterating the sulcus (if such exists), a feature unknown in any other species of *Trivia*. Affinity exists between this species and *pulla*, Gask., and also *subrostrata*, Gray. Hab. Albemarle Is., Galapagos.

C. (T.) buttoni, n. sp. (Hab.—?) is a small, globular, straw-coloured species, with few ribs and no sulcus.

Wlogmann, Fritz.—Binnen-Mollusken aus Westchina und Centralasien. Zootomische Untersuchungen. I. Die Heliciden. L'Ann. du Mus. Zool. d. l'Acad. Imp. Sci. St. Petersb., 1900, T. v, pp. 1—186, pls. i—iv.

The author here gives a careful, and fully illustrated, anatomical account of the *Helix* group, described in a previous volume by Dr. O. F. von Möllendorff. In all 36 species or subspecies are dealt with, comprised in 11 genera and 3 families. The greater portion of the work is devoted to the *Eulotidae*, and forms a valuable contribution to the anatomy of this family.

Monti, Rina.—Le Ghiandole Salivari dei Gasteropodi Terrestri nei diversi periodi funzionali. Mem. R. Ist. Lomb. di sci. e lett., 1899, vol. xviii (x, d. ser. iii), pp. 115—133, tav. ix.

Miss Monti describes in some detail the structure of the salivary glands in *Helix pomatia* and *Agriolimax agrestis*. They consist of a fibrillar connective tissue stroma, and a parenchyma composed of large mucous, transparent, and granular cells. The resting and active stages are carefully compared with one another, emphasis being laid upon the fact that there are no signs of mitotic division.

Monti, Rina.—Sur la fine structure de l'estomac des gastéropodes terrestres. Archiv. Ital. Biol., 1899, T. xxxii, pp. 1—15.

The epithelium lining of the stomach consists of a series of mucous laden caliciform cells, and ciliated cylindrical cells. These are supported by fibrillar connective tissue, large connective tissue cells, pigment cells, muscle fibres, and bloodvessels lined with endothelium. Covering these come the layers of longitudinal and circular muscle fibres, the whole being enveloped in a connective tissue sheath, in which are a large number of cells analogous to those of the sub-mucosa.

Dall, W. H.—Synopsis of the Family *Tellinidae* and of the North American species. Proc. U.S. Nat. Mus., 1900, vol. xxiii, pp. 285—326, pls. ii—iv.

This valuable synopsis in addition to revising the North American species, includes descriptions of figures of species which have hitherto not been reported from the coast of the United States, or have not previously been figured. There are also descriptions and figures of the following new species: *T. georgiana*, *iheringi*, *americana*, *promera*, *flagellum*, *colorata*, *texana*, *reclusa*, *pacifica*, *pristiphora*, *leucogonia*, *meropsis*, *amianta*, *paxiana*, *macneili*, *suffusa*, *cerrosiana*, *panamensis*, *recurva*, *santalosae*, *phenax*, *Macoma phenax*, *extenuata*, *tagetiformis*, *kruussei*, *sitkana*, *alaskana*, and *panamensis*. *T. (Angulus) carpenteri* is a new name for *A. variegatus*, Carp., and *T. (Oudardia) buttoni* for *A. molossus*? var. *obtus*, Carp.

Dall, W. H.—Synopsis of the Family *Cardiidae* and of the North American species. Proc. U.S. Nat. Mus., 1900, vol. xxiii, pp. 381—392.

Simroth, H.—Über Selbstbefruchtung bei Lungenschnecken. Verhandl. d. Deutsch. Zool. Gesell., 1900, pp. 143—147, 5 figs. in text.

This is an interesting paper upon the morphology of certain parts of the generative organs of some molluscs, in which self-fertilization is known to occur. Two new genera are mentioned, viz. *Phriolestes* and *Hyrcanolestes*, but no species.

Pilsbry, Henry A.—Lower Californian species of *Coclocentrum* and *Berendtia*. Proc. Acad. Nat. Sci. Phila., 1900, pp. 550—555, figs. 1—4.

The new forms are *C. minorinum* v. *gabbi*, n. var., *C. cisenianum*, n. sp. Comparing the genus *Berendtia* of Mabilie with *Coclocentrum*, Dr. Pilsbry concludes that the former is evidently a tangent from the latter genus, "and distinguished from certain Lower Californian species of that genus solely by the reduction of the columella from a tube to a solid style, as in the genus *Eucalodium*."

Pilsbry, Henry A.—*Sonorella*, a new genus of Helices. Proc. Acad. Nat. Sci. Phila., 1900, pp. 556—560, pl. xxi.

This new genus is established for the reception of the "*Epiphragmophora*" *huchitina* of Dall, and is allied to *Ashmunella*. It agrees with this last genus in the absence of any trace of dart-sac or mucous glands, and generally in the form of the reproductive organs, free muscles and pallial organs. This forms the third American genus of *Balogona* established since 1895, the others being *Ashmunella*, Pils. and Skll., and *Metostrecon*, Pils.

Pilsbry, Henry A.—On the Zoological position of *Partula* and *Achatinella*. Proc. Acad. Nat. Sci. Phila., 1900, pp. 561—567, pl. xvii.

Dr. Pilsbry proposes to divide the Vasopulmonata into two groups, the *Orthurethra* and *Sigmurethra*. In the former series the ureter passes directly forward from the kidney, toward the anterior margin of the lung, a condition common to the Basommatophora, which have been generally considered ancestral to the Stylommatophora, in *Partula*, *Achatinella*, etc., this same condition obtains, and in the author's opinion indicates that such genera are members of an ancient and ancestral group lying at the base of the vasopulmonate phylum. In the latter series the ureter is abruptly reflexed from the apex of the kidney, passing to the posterior end of the pulmonary cavity. Thence an open groove or closed tube (secondary ureter or Darmharnleiter) continues across to the last fold of the gut, which it follows forward to the mantle-edge.

A rough tabulation of the various families belonging to these two groups is then given, and the anatomy of *Partula rosea*, Brod., and *Achatinella dolei*, Baldwin, described and figured. Dr. Pilsbry concludes that the *Achatinellidae* are apparently a group of great antiquity, the archaic pallial organs and male generative organs being associated with peculiarly specialised female organs.

Pilsbry, Henry A.—The Genesis of Mid-Pacific Faunas. Proc. Acad. Nat. Sci. Phila., 1900, pp. 568—581.

The author summarises this very interesting paper as follows: "The hypothesis of a late palaeozoic or early mesozoic mid-Pacific continent (upon the sunken heights of which the present island-masses, volcanic or coral, have been superposed) is advanced to account for the constitution of Polynesian land-snail faunas, which are shown to be (1) nearly homogeneous over vast areas, (2) composed of ancient types, with no admixture of the great series of modern families, and (3) not derivable from any tertiary or modern continental fauna or faunas in the sense Atlantic island faunas have been derived. The mollusca, land and marine, supply no evidence that this Pacific continent was ever connected with or faunally affected by the Americas, but emphatically deny any such connection."

Dupuis, P. et Putzeys.—Diagnosis de quelques coquilles nouvelles provenant de l'état indépendant du Congo. Ann. Soc. roy. Malac. Belgique, 1900, T. xxxv, pp. xii—xix, 17 figs.

The new species are *Ganomides fraterculus*, *Perideriopsis fallensis*, *P. moulensis*, *Melania ponthiervilleensis* and var. *spoliata*, *M. nyangweensis*, *M. depravata*, *M. nsendweensis*, *M. soror*, *M. consobrina*, and *M. kinshassaensis*.

Collinge, Walter E.—On the Anatomy of certain Agnathous Pulmonate Mollusks. Ann. and Mag. N. H., 1901 (s. 7), vol. vii, pp. 65—73. pls. i—ii.

The species described are *Rhytida greenwoodi*, Gray, *Paryphanta hochstetteri*, Flr., *P. edwardi*, Suter, and *Schizoglossa nunseelandica* (Flr.), em. Hedley.

Andreae, A.—Landschnecken aus Central-und Ostasien. Mitth. a. d. Reem.-Mus., Hildesheim, 1900, nr. 12, pp. 1—14, 1 Taf. u. 2 figs.

Prof. Andrae's paper contains four very interesting articles upon various species of molluscs from Central and East Asia. He first treats of the genus *Cathaica*, Mildd., which is divided into the following subgenera: *Eucathaica*, nov. (type *C. fasciola*, Drap., = *pyrrhazona*, Phil.), *Phocathaica*, nov. (type *C. pulveratula*, v. Mart.), *Xerocathaica*, nov. (type *C. kreutneri*, Hilb.), *Pseudiberus*, Ancey (type *P. lectumsinense*, v. Mart.), and *Campylocathaica*, nov. (type *C. przewalskii*, v. Mart.)

In the second article comparisons are instituted between various Asiatic and European genera.

The variation of *Campylocathaica przewalskii*, v. Mart., is dealt with in the third article, followed by a note on the variation of *Campylaea frigida*, Jan.

A short comparison of certain Chinese and European land molluscan forms from alluvial deposits, concludes the series.

Sykes, E. R.—*Digesta Malacologica*. No. I. A Summary of the American Journal of Conchology, 1865—1872. pp. vii + 46. London: 1901. William Wesley and Son.

We heartily congratulate Mr. Sykes on the appearance of the first number of his "Digesta Malacologica," which deals with the 7 volumes of the 'American Journal of Conchology' (1865—1872).

The general arrangement is that adopted in the 'Zoological Record.' The date of publication of each of the 29 parts is given, together with the pagination and number of plates; 232 titles are quoted, followed by the two sections 'Biology' and 'Systematic.'

If sufficient support be forthcoming, Mr. Sykes hopes to deal with other periodicals such as the 'Zeitschrift für Malakozoologie,' 'Annals and Magazine of Natural History,' etc.

The value of such digests is obvious, and we trust malacologists will at least show their appreciation of the care and patience the author has expended, by quickly exhausting part i. It is a publication of great value and usefulness, and we wish its author every success with this and future issues.

Dall, W. H.—On a genus (*Phyllaplysia*) new to the Pacific Coast. Naut., 1900, vol. xiv, pp. 91—92.

P. taylori, n. sp. found on floating sea-grass near Nanaimo, Vancouver Island.

Dall, W. H.—A new species of *Pleurobranchus* from California. Naut., 1900, vol. xiv, pp. 92—93.

P. californicus, n. sp. from San Pedro.

Dautzenberg, Ph.—Description d'une espèce nouvelle du genre *Cyrena* provenant des Nouvelles-Hébrides. Journ. de Conchyl., 1900, vol. xlviii, pp. 105—108, pl. v.

Cyrena ingens is the new species, characterised by its large size and solid shell.

Dautzenberg, Ph.—Description d'une espèce nouvelle appartenant au genre *Hemicardium*. Journ. de Conchyl., 1900, vol. xlviii, pp. 5—8, pl. I, fig. 3—6.

Hemicardium tegulatum, n. sp. is evidently nearly related to the *H. unedo* of Linné; the author has, however, carefully compared it with young and adult forms of the latter species, and finds certain well marked differences.

Baker, F. C.—A Revision of the Linnæas of Northern Illinois. Trans. Acad. Sci. St. Louis, 1901, vol. xi, pp. 1—24, pl. i, and 13 figs. in text.

The author recognises nine species in Northern Illinois viz., *L. stagnalis*, L., *reflexa*, Say, *palustris*, O. F. Mull., *caperata*, Say, *cubensis*, Pfr., *columella*, Say, *humilis*, Say, *desidiosa*, Say, and *catascopium*, Say. He is of opinion that a new classification is required, based upon anatomical characters; the present grouping by shell characters being totally unsatisfactory on account of the extreme variability of the individuals. In support of this statement, he points out that different forms of *L. emarginata*, Say, var. *mighelsi*, Binn., which he has recently examined, can be placed in all of the usually recognised subgenera, so-called (*Radix*, *Bulimnea*, *Limnophysa*, etc.). The typical *emarginata* is typical of *Limnophysa*, the var. *mighelsi* of *Radix*, whilst all the intermediate forms occur connecting the extremes.

Of the above mentioned nine species, descriptions are given in nearly all cases of the shell and animal, jaws, radula, distribution, and habitat, followed by critical remarks upon the synonymy, variation, etc.

Hedley, C.—Studies on Australian Molluscs. Pt. II. Proc. Linn. Soc. N.S.W., 1900, pp. 495—513, pls. xxv—xxvi.

The author continues his interesting studies on the lines laid down in part i. A large number of additions to the Australian fauna are recorded, in addition to the following new species: *Puncturella kesteveni*, *Liotia rostrata*, *L. phillata*, *Scalenostoma striatum*, *Leucotina helva*, *Diplommata oreadis*. *Salinator*, nom. nov. is suggested for the group typified by *Ampullaria fragilis*, Lam., which will replace the *Ampullarina* of authors, not Sowerby. The *Mytilus inaequalis* of Dall, is probably the *M. gemmata* of Tate. It seems now definitely settled that the name *Merita melanotrachus*, E. A. Sm., has priority over *N. saturata*, Hutt. The genus *Menon* proposed in the first part of these Studies (p. 90) would seem to be synonymous with *Chileutomia*, Tate and Cossmann, the former name is therefore withdrawn, but Mr. Hedley maintains that the genus must be included in the *Eulimidae* (where he placed *Menon*) and not in the *Rissoidae*.

Melville, J. Cosmo.—Description of *Bulimulus dukinfieldi*, n. sp., from Paraná, Brazil. Proc. Malac. Soc. Lond., 1900, vol. iv, p. 116, fig.

Woodward, M. F.—Note on the Anatomy of *Voluta ancilla* (Sol.), *Neptuneopsis gilchristi*, Sby., and *Volutilithes abyssicola*, (Ad. and Rve.). Proc. Malac. Soc. Lond., 1900, vol. iv, pp. 117—125, pl. x.

Sowerby, G. B.—Descriptions of new species of Marine Mollusca collected by the late Otto Koch at the Island of Cebu, Philippines. Proc. Malac. Soc. Lond., 1900, vol. iv, pp. 126—129, pl. xi.

Wiegmann, Fritz.—Anatomische Untersuchungen von *Solaropsis*. Nachr. Deutsch. Malak. Gesell., 1900, pp. 178—184.

Wiegmann, Fritz.—Beiträge zur Anatomie. 1. Anatomische Untersuchungen einiger mittel-italienischer Arten. Nachr. Deutsch. Malak. Gesell., 1901, pp. 8—16.

Möllendorff, O. von.—Ueber einige Nomenclaturfragen. Nachr. Deutsch. Malak. Gesell., 1900, pp. 161—178.

Nagele, G.—Einige Neuheiten aus Vorderasien. Nachr. Deutsch. Malak. Gesell., 1901, pp. 16—31.

Sterkl, V.—New Pisidia. Naut., 1901, vol. xiv, pp. 99—101.

Bavay, A. et Dautzenberg, Ph.—Diagnoses de Coquilles nouvelles de l'Indo Chine. Journ. de Conchyl., 1900, vol. xlviii, pp. 108—122.

Descriptions of the following species are given: *Helix* (*Camaena*) *lavazzariti*, *H.* (*C?*) *vorvonga*, *H.* (*Euhadra*) *fauvei*, *H.* (*Eulota*) *vignali*, *H.* (*Chloritis*) *marimborti*, *H.* (*C.*) *durandi*, *H.* (*C.*) *gereti*, *H.* (*Ganesella*) *saurivonga*, *H.* (*G.*) *coudetini*, *Macrochlamys* *albuaudi*, *Buliminus* *messageri*, *Clausilia* *callistomella*, *G. gereti*, *Stenothyra* *messageri*, *Cremnoconchus* *messageri*, *Lithoglyphus* *tonkeinianus*, *Melania* *reducta*, *Alycaeus* (*Dioryx*) *najor*, *A.* (*D.*) *messageri*, *A.* (*D.*) *compactus*, *A.* (*D.*) *vanbuensis*, *A.* (*Charax*) *fraterculus*, *A.* (*C.*) *heudei*.

Pilsbry, Henry A.—Notes on certain mollusca of South-western Arkansas. Proc. Ac. Nat. Sc. Phil., 1900, pp. 449—459, figs.

Babor, J. F.—Bericht über die wissenschaftlichen Leistungen im Gebiete der Malakozöologie im Jahre 1892. Arch. f. Naturgesch., Jhg. 60, Bd. 2, pp. 514—545.

Ahting, K.—Über die Entwicklung des Bojanus'schen Organs und des Herzens von *Mytilus edulis*. Zool. Anz., 1900, Bd. 23, pp. 529—533.

Ihering, H. von.—The Musculus cruciformis of the Order Tellinaceæ. Proc. Ac. Nat. Sc. Phil., 1900, pp. 480—481, 2 figs.

Gulart, J.—Nouvelle classification des Opisthobranches. Compt. Rendus, 1900, T. 52, pp. 425—426.

Willcox, M. A.—Hermaphroditism among the Docoglossa. Science, 1900, N.S. vol. xii, pp. 230—231.

Chiamenti, A.—Contribuzione allo studio della Malacofauna adriatica: Nota sulla famiglia delle *Veneridae* e delle *Petricolidae*. Riv. Ital. Sc. Nat., 1900, pp. 2—15.

Dautzenberg, Ph. et Durouchoux, P.—Faunule Malacologique des environs de Saint-Malo. La Feuille J. Nat., 1900, pp. 1—24.

Enumerates 183 species and a number of new varieties.

Meek, A.—On Mussel Cultivation on the Coast of Northumberland. Rpt. Northumberland Sea Fish. Comm., 1900, pp. 62—63.

Bulman, G. P.—The Marine Mollusca of Northumberland. Ibid., pp. 78—82.

GENERAL REVIEWS.

Lehrbuch der vergleichenden Anatomie der Wirbellosen Thiere. 2 umgearb. Aufl. 1 Lief. Mollusca. Von Prof. Arnold Lang. Bearbeitet von Dr. Karl Hescheler. pp. viii+509, Mit 410 Abbildungen. Jena: 1900. Gustave Fischer.

We welcome a second edition of Prof. Lang's valuable text-book on the comparative anatomy of the Mollusca. Although there are grave faults, which have received their full share of adverse criticism, the work remains the most complete and up-to-date epitome of Molluscan morphology yet published. In the edition before us Dr. Hescheler has generally revised the text, and incorporated the results,

put forward by different workers, since the previous edition. The wealth of illustrations, the many diagrammatic figures, the useful Bibliography, and the index to the species of molluscs treated of, in addition to the general index, all tend to make this work a valuable aid in the laboratory.

The forcible objection, raised by Prof. E. Ray Lankester, against this work in 1895 (cf. *Nature*, 1895, p. 289) still holds good. It is unfair, in our opinion, to use the observations of other workers without acknowledgment. The size of the work need not be necessarily enlarged to admit of this, for a very little extra space only would be necessary, and this might very easily have been obtained by omitting such figures as 89 and 90 (p. 82, shell of *Triton*, from Parker and Haswell), and the, often needless, repetition of other figures.

This work has enjoyed a good reputation in the past, and the present edition can only enhance the same.—W. E. C.

Text-book of the Embryology of Invertebrates. By Dr. E. Korschelt and Dr. K. Heider. Translated by Matilda Barnard. Revised and edited by Marlin F. Woodward. Vol. iv, pp. xi+594. London: 1900. Swan Sonnenschein and Co., Ltd.

The volume before us forms the final part of Prof. Korschelt and Heider's well known and valuable "Lehrbuch." It is now over seven years since the original work appeared and much has been added to our knowledge of the development of the Mollusca, Tunicata, and Cephalocorda, of which phyla the present volume treats. The task of revising and re-editing such a work is no easy one, and we think Mr. Woodward would have been well advised if he had attempted to re-write it. Almost all that could be done to amplify and bring up to date the section on the Mollusca, by foot-notes, fresh paragraphs, and certain alterations in the text, has been done; and although these are very often far too brief, and sometimes lack clearness, they certainly tend to make the work a valuable resumé of our knowledge upon the embryology of the Mollusca, and one which every student will find of great assistance.

The Tunicata and Cephalocorda have not been so carefully revised as the Mollusca.

The work will prove of great service to senior students, and those who desire a concise and systematic account of molluscan embryology.—W. E. C.

Text Book of Vertebrate Zoology. By J. S. Kingsley. pp. viii+439. London: 1900. George Bell and Sons.

Professor Kingsley's work is intended to supplement lectures and laboratory work, and to place in concise form the more important facts and generalisations concerning vertebrate animals.

The work is divided into two parts, the first treating of the morphology of vertebrates, based upon embryology, whilst the second presents an outline classification, a subject which, the author thinks, "has been too much ignored in College work." Part one is carefully written and should prove very useful to certain classes of students, although there are some points which require re-writing, e.g. no useful purpose can be served by referring to the remains of the pronephric duct in the male Ichthyopsidian, as the "hydatid of Morgagni," or by using the term "Welfian (Leydig's) duct" for the mesonephric duct. Throughout the terminology requires revision.

The illustrations, of which many are new, are all excellent.—W. E. C.

EDITOR'S NOTES.

The Manchester Museum has recently received by presentation from Surgeon Colonel S. Archer, a beautiful specimen of *Pleurotomaria adansoniana*, Cr. and Fisch., obtained in Barbados. This is the fifth known specimen of this fine species.

At the December meeting of the Midland Malacological Society, Professor Ludwig Plate, of Berlin, was elected an Honorary Member.

From Mr. T. Van Hyning of Des Moines, Iowa, U. S. A., we have recently received an interesting Catalogue of recent and fossil Mollusca for sale or exchange.

The Council of the Zoological Society has given instructions for the publication of an Index-Volume to the new generic names mentioned in the 'Zoological Record,' Vols. xvii—xxxvii (1880—1900).

The Volumes previous to Vol. xvii. have been indexed in the 'Nomenclator Zoologicus' of Scudder, published by the Smithsonian Institution in 1882. The contemplated Index-Volume of the 'Zoological Record,' in order to increase its usefulness, will include names omitted from Scudder's list and from the volumes of the 'Zoological Record.' Thus zoologists may have at their disposal (in the 'Nomenclator Zoologicus' and the new Index together) a complete list of all the names of the genera and subgenera used in zoology up to the end of 1900.

It is earnestly requested that anyone who knows of names omitted from Scudder's 'Nomenclator,' or from the volumes of the 'Zoological Record,' will forward a note of them, together, if possible, with a reference as to where they have been noticed or proposed, so that the new list may be made practically complete. Such information should be addressed to the Editor of the 'Zoological Record,' 3, Hanover Square, London, W.; or to C. O. Waterhouse, Esq., British Museum, Natural History, S. Kensington, London, who is engaged in compiling the list.

A Conchological Exchange Club, with head-quarters at Birmingham, has recently been founded.

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VOL. VIII.

CLAUSILIA MIMICKED BY A MICROLEPIDOPTERON.

By DR. H. SIMROTH,

Leipzig.

THE examples of mimetic mollusca are constantly being augmented. Some imitate stones, leaves, and seaweed, others snakes or parts of Ascidians, *Gorgoniidae*, *Acteniidae*, etc. But the cases in which animals of other classes imitate molluscs are comparatively rare. The best known are those of *Psyche helix*, a Lepidopteron, and of *Helicopsyche*, a *Phryganida* whose larval cases have the form of a *Helix* shell. I have added a further case,¹ another Lepidopteron, a *Coleophorida*, imitating a *Clausilia*. The larval case had the form of the Gastropod shell, the spire being represented by transverse lines. The larvae and the *Clausiliae* were feeding upon the lichens of the same rock, so that a bird's eye would confound them and spare both.

In the present note I wish to record a further very interesting example of this kind.

When visiting with Dr. Heymons of Berlin the "doline"* of St. Canzian in the Karst mountains north of Triest, I found a small object adhering to the limestone wall, which for the moment I took for a *Clausilia*, Dr. Heymons did also. The mimetic impression was perfect in the dorsal view (Figs. A and B), a little, dark greyish-brown shell,

¹ *SB. Nat. Gesell. Leipzig*, Bd. viii-xiv, p. 45.

* "Dolines" are the characteristic funnel shaped hollows of the Karsts.

with six curved transverse lines, as if there were seven whorls without the little ones of the straight upper end. The mouth was narrowed as in *Clausilia*. Every stripe was composed of two lines, a darker and a clearer whitish one, giving one the impression of a *Clausilia*, whose sutures were filled up with powdery limestone as is usual in these localities.

The latero-ventral view (Fig. C) is entirely different, the transverse lines being restricted to the dorsal side. The tail-end is compressed and curved downwards; being narrow when looked at dorsally but considerably larger when seen laterally; for there are two flaps with a slit between them for the exit of the perfect insect after metamorphosis.

I think it is clear that the whole arrangement is very effective and likely to deceive small birds frequenting the rocks for feeding upon insects. Larger birds, such as pigeons for instance, would take shells such as *Clausilia*, but not so the *Sylviae*, *Turdidae* and others, preferring the objects in question.



A Coleophoridae Lepidopteron imitating *Clausilia*. A. Natural size. B. Dorsal view enlarged. C. Lateral view.

Although it is clear that this mimetic character is of protective value to the larvae, it is very difficult to account for its origin. When the larva enlarges its case, does its build circle after circle by its salivary glands, in the manner the silkworm forms its cocoon? If so, we could understand the darker rings as being added at varying intervals. The explanation of the interruption of the rings on the ventral side is more difficult. I think before we attempt to explain the growth, etc., of this interesting structure, we must first investigate the manner in which the larva produces it. Probably it is not in the same manner as that which takes place in the formation of the cocoon in the silkworm.

NOTE SUR UNE LIMNÉE DE LA FAUNE PROFONDE DU LAC LÉMAN.

PAR LE DR. EMILE ANDRÉ.

Université-Genève.

LES naturalistes qui ont étudié la faune profonde du lac Léman, y signalent trois espèces de Limnées, qui toutes trois dérivent d'espèces littorales ou d'espèces vivant dans les eaux des environs du lac. A ces trois espèces, nous devons en ajouter une quatrième, qui a été draguée par M. le Dr. Penard dans le Petit-Lac, au large de Bellerive, à une profondeur de 40 mètres environ. Cette espèce est la *Limnaea* (*Gulnaria*) *auricularia*, L., var. *contracta*, Kobelt.

Elle diffère des individus de la faune littorale par ses dimensions plus faibles (hauteur 19 mm., largeur 16 mm.) et par la plus grande fragilité de sa coquille. Deux faits nous font considérer cette Limnée, non pas comme un individu amené accidentellement dans les grands fonds du lac, mais comme une espèce appartenant normalement à la faune profonde : 1. lorsqu'elle a été ramenée à la surface, son poumon était plein d'eau (il l'était encore lorsque le Dr. Penard m'apporta l'animal); 2. les excréments qu'elle a rendus étaient composés de ce limon impalpable, caractéristique pour les grandes profondeurs des lacs.

Cette Limnée présentait en outre d'autres particularités curieuses qu'on observe pas chez les *L. auricularia* du littoral. Ses téguments étaient teintés en rose-saumon, toutes les parties du moins qui ne sont pas recouvertes par la coquille. Elle sécrétait constamment un mucus très abondant, coloré également en rose-saumon. L'abondance de ce mucus était telle qu'il formait sur toute la paroi du cristalliseur dans lequel vivait la Limnée, une couche de plusieurs millimètres d'épaisseur. Examiné au microscope ce mucus se montre parfaitement homogène. Il est coagulable par l'alcool et ce dernier liquide en dissout la matière colorante. L'alcool, ainsi teinté en rose-saumon, se décolore au bout de quelques jours, sous l'action de la lumière probablement.

Nous avons débité en coupes cette Limnée et nous avons constaté que, dans les téguments, les glandes mucipares et les glandes calcaires étaient très développées, en nombre et en dimensions. En outre, sur les côtés du pied et sur toute sa longueur, au dessous de la couche glandulaire tégumentaire, on remarque un dépôt très important de corpuscules calcaires. Ceux-ci sont incolores, translucides, sphériques ou irréguliers; les plus grands atteignent 0,12 mm. de diamètre. Ils sont contenus, non pas dans des cellules, mais dans la masse musculo-conjonctive du pied.

THE ANATOMY OF THE BRITISH SPECIES OF THE GENUS SOLEN. Pt. i.

By H. H. BLOOMER.

(Plates ii—iii.)

IN working at the anatomy of the various British species of the genus *Solen*, I was somewhat surprised to find that, while *S. ensis* and *S. siliqua* are in their structure very similar to each other, they differ very materially from *S. marginatus*, the latter exhibiting many points of interest. Apart from this, *Solen* also presents many interesting features when compared with other types of the Pelecypoda. Further, on looking through the literature, I have failed to find any work dealing fully with the anatomy of the genus. Menegaux¹ has described at length the circulatory system, and Pelseneer,² Barrois,³ Lang,⁴ Faussek⁵ and others, have made reference to other portions of the anatomy, but have not dealt systematically with it.

There are four species of *Solen* recognised as British, viz., *S. ensis*, L., *S. siliqua*, L., (*S. marginatus*, Pult. and Don. or *S. vagina*, L.), and *S. pellucidus*, Penn. In the latest classification, *ensis* and *siliqua* are placed in the genus *Ensis*, Schum., *pellucidus* in the genus *Cultellus*, Schum., leaving only one species, *marginatus* or *vagina*, in Linné's genus *Solen*. I purpose dealing with this question in a later paper.

It is my intention in the present paper to deal with the external characters, the musculature, and the alimentary canal of the first three species, and in a future contribution to complete the anatomy of the same, and the whole of the anatomy of *S. pellucidus*.

I desire to express my thanks to the Council of the Birmingham Natural History and Philosophical Society for the grant they have made me towards defraying the expenses in connection with this work; also to Mr. Walter E. Collinge for the kindly advice he has extended to me.

EXTERNAL CHARACTERS.

Solen ensis, L. (Pl. ii, fig. 2).

S. ensis is an elongated animal, measuring in length from six to seven times the measurement from the dorsal to the ventral surface at

¹ Recherches sur la circulation des Lamellibranches Marins, pp. 170. Desargen, 1890.

² Introduction à l'étude des Mollusques, 1894.

³ Revue hist. du Nord de la France, 1890, T. ii, pp. 209—220, 295—311, 337, 356.

⁴ Text book of Comparative Anatomy, 1896, pt. ii.

⁵ Trudui St Feterb. Obshch., xxviii, pp. 213—270, 2 pls.

its widest part. It curves a little dorsally, is bilaterally symmetrical, and is enclosed ventrally by the concrescence of the edges of the mantle lobes, with the exception of the apertures at the anterior and posterior ends, and a fourth aperture situated nearly at the centre of the ventral surface.

The periostracum passes from the outside of the shell to the edges of the mantle lobes, to which it adheres.

The pallial muscles form a deep band along the margin of the mantle lobes, and at the anterior end, surround the pedal aperture, through which the foot is protruded. At the posterior end the muscles assume a more circular condition, and give rise to the siphon containing the afferent and efferent chambers.

On separating and turning back the left mantle lobe, it is seen that the foot projects from nearly the centre of the ventral surface of the animal and proceeds in an anterior direction. A little anterior to the foot is the mouth, and in the front of the mouth the broad anterior adductor muscle (Pl. ii, fig. 2, A.A.). On each side of the visceropedal mass are the labial palps, and commencing between and passing posterior to them, are the two pairs of gills which extend to the siphon. The anus opens into the cloacal chamber from a free portion of the rectum, behind the posterior adductor muscle.

The siphon consists of two separate chambers, the upper one the exhalent, the lower one the inhalent. The free portions of the siphonal chambers are short, and separate from each other, both are encircled with a fringe of pale tentacles, and at the distal end of each chamber are two flaps forming the valve.

The fourth aperture is an elliptical opening which narrows very much at the inside edge of the mantle lobes; around the inside of it, but near the outer edge, is a row of tentacles, those on the one side alternating with those on the opposite side. The tentacles and surface of the lobes bordering the opening are of a lighter or paler colour. On the inside of each mantle lobe is a groove passing dorsally from this aperture towards the foot, and in it lie the distal portions of the labial palps.

Solen siliqua, L. (Pl. ii, fig. 3).

This species very closely resembles *S. ensis* in its external characters, only it is larger, and quite straight along its dorsal surface.

Solen marginatus, Pult. and Don. (Pl. ii, fig. 4).

Externally this species exhibits many points of difference when compared with *S. ensis*. It is shorter, and, like *S. siliqua*, straight along its dorsal surface. The pallial muscles are more strongly developed, while at its anterior end in the muscular part of the mantle

lobes which encircle the pedal aperture, is a groove, in which the constricted part of the shell lies, from which character arises the name of the species. The most important feature, however, appears to be the non-existence of the fourth aperture, and of the labial grooves on the inside of the mantle lobes. The diminution in the length of the animal, when compared with *S. ensis* and *S. siliqua*, is seen to be in the portion anterior to the foot. Just in front of the mouth, the muscular portion of the ventral integument terminates abruptly, and with the lips formed by the fusion of the labial palps, projects anteriorly. The anterior adductor is not so broad as in the two preceding species. It is also observable through the transparent ventral integument, that the liver does not project anterior to the mouth. The foot is larger, and has a more massive appearance.

The siphon is much longer than in *S. ensis*, and in one piece, though it shows clearly that at one time it was two distinct siphons. Both internally and externally, the chambers exhibit a transverse and longitudinal ribbing, and the free end of each is encircled with a row of tentacles.

The periostracum passes from the outside of the shell to the mantle lobe, to which it firmly adheres, and then forms a free border, particularly so at the anterior and posterior ends.

The bases of the two inner gills are joined and enclose the cloacal chamber for the greater portion of its length, whereas in *S. ensis* and *S. siliqua*, I have found in the course of examination of a large number of specimens, they are not so connected.

MUSCULATURE.

Solen ensis, L. (Pl. ii, fig. 1 and Pl. iii, fig. 5).

i. *The Pallial Muscles*.—The muscles along the edge of the mantle lobe, or the muscles of the pallial edge (Pl. ii, fig. 1, *Pal. M'*.), form a deep and thick band. They are composed of closely arranged bundles, running in a ventral direction, at right angles to the mantle edge, and become closer as they approach the line of concrescence of the two lobes, where the thickness is further increased by another band of muscles traversing each lobe parallel to the pallial edge. The mantle lobe attains its maximum thickness just ventral to the line of its adherence to the shell. At the anterior end, the pallial muscles form a circular growth enclosing the pedal aperture (Pl. ii, fig. 1, *Pal. M.*), and have two lateral portions, which are free and to a considerable extent close the aperture on the withdrawal of the foot. The circular muscular arrangement is the same at the posterior end, where, how-

ever, its continuity is more complete, and it is also more developed, forming the proximal end of the siphon.

Along the whole dorsal surface of the animal is a muscular integument (Pl. ii, fig. 1, *Int. D.*), consisting of transversely crossed muscles; these are further crossed and intertwined with longitudinal muscles of the raised and fluted portion along the median line. The integument is joined to the pallial muscles of the anterior and posterior ends, and is also connected with the posterior adductor and retractor muscles, the dorsal portion of the foot, and the teeth of the hinge of the shell valves. Behind the posterior adductor muscle it is much more developed and is attached laterally to the valves, in consequence of which it appears as a continuation of the posterior adductor muscle.

The anterior adductor muscle (Pl. ii, fig. 1, *A.A.*), is an extremely broad plate of muscles, extending from a position a little anterior to the mouth to the pallial muscles, bordering the pedal aperture, to which it is united.

The posterior adductor muscle (Pl. ii, fig. 1, *P.A.*), is also plate-shaped, but is not nearly so wide as the anterior adductor. It is connected on its anterior side with the retractor pedis posterior (Pl. ii, fig. 1, *P.R.P.*), while on the opposite side it joins the circular muscular growth supporting the siphon. Over and connected with it, runs the dorsal muscular integument.

ii. *The Pedal Muscles.*—The foot is a narrow and elongated body, somewhat flattened laterally with a tendency to be keeled ventrally and grooved dorsally. In it are three kinds of muscles. The first consisting of longitudinal, the second of circular and semicircular, and the third of transverse and oblique muscles, the whole being enclosed in a muscular integument. When examined in detail, there are seen on each lateral side two groups of longitudinal muscles (Pl. ii, fig. 1, and Pl. iii, fig. 5, *Lo.M.*) which traverse the whole length of foot, and between each of these groups is a semicircular band, passing from the dorsal to the ventral surface (Pl. ii, fig. 5, *Sem.M.*). Bordering the dorsal and ventral surfaces of the pedal cavity, are two rows of bundles of transverse muscles (Pl. ii, fig. 1, and Pl. iii, fig. 5). The ends of these bundles spread out and their fibres pass between the inner longitudinal muscles, to the inner sides of the bands of semicircular muscles, while from the outer sides of these bands, muscular fibres or oblique muscles (Pl. iii, fig. 5, *Ob.M.*) pass in greater numbers, between the outer longitudinal muscles to the muscular integument. Towards the distal end of the foot these semicircular muscles gradually come together, first ventrally, then dorsally, and eventually form

a continuous circular band. Afterwards they and the transverse muscles, which become irregular in their distribution, fray out, and the whole form a network of muscular fibres.

At the proximal and posterior end of the foot is the retractor pedis posterior muscle (Pl. ii, fig. 1, *P.R.P.*), which, prior to its attachment to the valves of the shell, bifurcates and forms the right and left muscles.

At the anterior end of the proximal portion of the foot are the retractor pedis anterior muscles (Pl. iii, fig. 1, *P.R.A.*, *P.R.A'*). Each of these is a long rounded muscle passing from the foot along the ventral integument, and on leaving this, the muscle bifurcates, the two portions then passing through the liver and dorsal integument to the shell. The posterior bifurcation is the shorter one and it passes directly to the valve. The anterior one is much longer, and passes in an oblique direction over part of the anterior adductor muscle to the valve. At its junction with the foot, the fibres spread out and pass directly on the inside of the longitudinal muscles to the ventral and ventrolateral surfaces.

On each side of the foot a muscular band (Pl. ii, fig. 1, *P.P.*) runs along the anterior ventral integument, in close proximity to the anterior retractor pedis, to the anterior adductor muscle to which it is attached, but has no connection with the shell. Possibly this represents the protractor pedis anterior, as I have been unable to trace any other muscle likely to correspond to it.

The dorsal part of the foot has also on each side, a slight muscular connection (Pl. ii, fig. 1, *P.El.*) with the muscular dorsal integument, but it has no attachment to the shell, and so far as I have been able to ascertain, this is all that remains of the muscle representing the elevator pedis.

Solen siliqua, L.

The muscular system in every way resembles that of *S. ensis*, and does not call for any special comment.

Solen marginatus, Pult. and Don. (Pl. ii, fig. 4).

In comparison with *S. ensis*, the muscles in this species are much more powerfully developed. The pallial muscles are wider and thicker, and at the posterior end, the circular portion carrying the siphon is considerably wider and more strongly built. The anterior adductor muscle is not nearly so broad, while the posterior adductor is normal. The free portion of the retractor pedis anterior is much shorter, the bifurcated parts lie much closer together, and the fibres crossing the foot pursue a more posterior direction, and pass underneath instead of over the longitudinal muscles, and are embedded in the muscular

integument of the foot. On the ventral integument there is only a very slight trace of the muscle connecting the foot with the anterior adductor muscle.

The arrangement of the muscles of the foot is similar to that in *S. ensis*, only they are much more powerfully developed, and passing posteriorly, spread out sooner into the muscular network, as noticed in the distal portion of the foot of *S. ensis*.

THE ALIMENTARY CANAL.

Solen ensis, L.

The fore-gut and the greater portion of the mid-gut and liver lie anterior to the visceropedal mass, which, in its distal portion, contains the caecum of the crystalline style, and the posterior portion of the left lobe of the liver.

The mouth (Pl. ii, fig. 2, *M.*) opens externally as a transverse slit of the body integument on its ventral surface. Its situation is anterior to the foot, but posterior to the anterior adductor muscle, and between the lips formed by the fusion of the labial palps. The outer palps give rise to the anterior or upper lip, and the inner ones to the posterior or lower lip. (Pl. ii, fig. 2, *A.L.*, *P.L.*).

The oesophagus (Pl. ii, fig. 2, *Oe.*) is short, slightly curved, and soon widens into the stomach on its antero-ventral surface.

The stomach is an irregularly shaped sac, divided into several parts, while the right lateral half differs from the left half.

For the sake of convenience, it is proposed to use the following terms for the different divisions: oesophagael—for the antero-ventral portion, cardiac—for the portion dorsal to the oesophagael, and pyloric—for the posterior portion.

The left oesophagael portion (Pl. iii, fig. 6, *Oe. St.*) is somewhat muscular, with a few slight folds of its walls, and is bordered by a muscular ridge (Pl. iii, fig. 6, *M.R.C.*), culminating at the postero-dorsal edge with a more muscular papilla (Pl. iii, figs. 6 and 11, *M.P.*). From the base of this papilla two other muscular ridges diverge, dividing the remaining portion of the side into three parts. The middle portion occupies a ventro-lateral position, adjoining the oesophagael part, and in a narrow and deep cavity. (Pl. iii, fig. 6, *Can.*). At its distal end it receives the small bile duct (Pl. iii, figs. 6 and 11, *Clav.*). It is separated from the pyloric portion by the muscular ridge passing ventrally (Pl. iii, fig. 6, *M.R.P.*), whereas the ridge running in a dorsal direction (Pl. iii, fig. 6, *M.R.C.*) divides the cardiac from the pyloric portion. The former is a large, deep, pocket-shaped lobe lying dorsal

to the oesophagael part, and projecting anteriorly to it. The pyloric portion is not so deep, or so large, and rises at its posterior end.

The right side of the oesophagael portion is smaller than the left side, but is likewise bordered by a slight muscular ridge (Pl. iii, fig. 7, *M.R.O.*). The remaining portion of this side is large, but is not divided in the same manner as the left half into cardiac and pyloric portions. At the anterior lateral end, just above the cardio-oesophagael ridge, it receives the large bile duct (Pl. iii, fig. 7, *B.Dt.*), and, at its posterior end on its ventral side, the intestine leaves it (Pl. iii, fig. 7, *In.*). The posterior end of the pyloric portion of the stomach contracts to form the caecum (Pl. iii, fig. 7, *C.C.*) containing the crystalline style. The caecum is of considerable length extending in a postero-ventral direction through the proximal portion of the foot.

The crystalline style (Pl. iii, fig. 7, *C.S.*) is a long rod of a light brown colour, traversing the whole of the caecum and the centre of the stomach, in a course tending from the left to the right side, to the anterior wall of the cardiac portion, where it generally has a hooked termination.

A transverse section of *S. siliqua* shows the epithelium (Pl. iii, fig. 10, *Ep.C.*) of the caecum to be very characteristic, and in marked contrast to that of the adjoining intestine. It consists of long regular columnar cells, with the nuclei generally situated nearer to the free end than the proximal one. The nuclei are so regularly placed that they appear to form a continuous ring around it. The cells stain deeply at the free end, and carry a dense mass of long cilia. A section through the anterior part of the caecum shows a curious growth in the end lying near the intestine, where there is a fibrous mass (Pl. iii, fig. 10, *x*) coming from the caecal wall; this afterwards gradually disappears.

After the intestine leaves the stomach, it proceeds to the foot where it makes a large number of closely lying convolutions (Pl. ii, fig. 2, *C.In.*), then describing a semi-circular course round the base of the caecum, containing the crystalline style, and between the transverse pedal muscles (Pl. ii, fig. 2, *T.P.M.*), it passes along the dorsal side of the caecum, on which it forms three large loops, and shortly afterwards another one, then at the postero-dorsal part of the stomach, it turns, and as the rectum (Pl. ii, fig. 2, *R.*) pursues a straight posterior course, passing through the pericardium, and encircled by the ventricle. (Pl. ii, fig. 2, *V.*) It continues over the posterior adductor muscle (Pl. ii, fig. 2, *P.R.P.*), and enters the cloacal cavity, where, having become free, it terminates at the bi-lobed anus. (Pl. ii, fig. 2, *A.*)

The folding and exact position of the folds vary somewhat in different specimens, but this is probably due to the extent of the contraction or distension of the proximal part of the foot.

When the intestine leaves the stomach, the wall on the one side is invaginated, and forms the typhlosole, which extends along the convoluted part of the intestine (Pl. ii, fig. 2, *C.In.*) near to where it passes the distal end of the caecum containing the crystalline style.

The typhlosole commences with a slight invagination of the wall of the intestine, this gradually increases in size and flattens out (Pl. iii, fig. 8, *Ty.*); at the same time, its walls become folded, and the width across the base is diminished. Towards its termination, it decreases in size and ends in the folded walls of the intestine.

The typhlosole is lined with ciliated epithelium, and the inside of it is filled with connective tissue. A transverse section of *S. siliqua* (Pl. iii, fig. 9, *Ty.*) across one of the first convolutions show the typhlosole of the one fold to be joined by connective tissue to the typhlosole of the opposite fold, without any divisional wall.

The tricuspid body, or the flèche tricuspidé, in the specimens examined, occupied the posterior portion of the stomach, with branches radiating from the muscular papilla into the lobes, and undoubtedly reminds one of what Fischer⁶ described as a body shaped like the screw propeller of a boat.

The digestive gland or liver (Pl. ii, fig. 2) is a large organ lying around the stomach, and covering the greater portion of it. The right lobe (Pl. iii, fig. 12, *R.L.*) spreads over the right and anterior sides, and projects over the anterior adductor muscle, while the left lobe (Pl. iii, fig. 12, *L.L.*) covers the left and ventral sides and projects posteriorly for some distance under the caecum of the crystalline style. The large bile duct, with branches ramifying the right lobe (Pl. iii, fig. 12, *B.Dt.*), enters the cardiac part of the stomach on the right antero-lateral side, and the small bile duct, though of no considerable size, ramifies the left lobe (Pl. iii, fig. 12, *B.Dt.*), and enters the small middle cavity situated between the cardiac and pyloric portions.

Solen siliqua, L.

The alimentary canal (Pl. ii, fig. 3.) is in all its important points similar to that of *S. ensis*, but differs somewhat from it in detail.

The oesophagus is straighter. The stomach is similar to that in *S. ensis*, but the divisions are more pronounced. The cardiac

portion (Pl. iii, figs. 13 and 14, *C.St.*) does not project so far anteriorly, nor does the posterior end of the pyloric portion rise so much dorsally. The muscular papilla is more central, and the folds of the stomach are more distinct. (Pl. iii, fig. 13).

The intestine leaves the pyloric portion more posteriorly, and is joined for some distance to the caecum of the crystalline style by connective tissue. This, however, appears to be subject, in some specimens, to some slight variation where a small portion of the liver interposes between them. The intestine after it has passed round the distal end of the caecum of the crystalline style, assumes a larger number of folds, and in some specimens it presents a very folded condition. (Pl. ii, fig. 3).

Solen marginatus, Pult. and Don.

The alimentary canal of *S. marginatus* (Pl. ii, fig. 4), presents many points of difference when compared with either *S. ensis* or *S. silipia*.

The mouth (Pl. ii, fig. 4, *M.*) is situated some distance anterior to the stomach, and not ventrally as in the before-mentioned species. The lips formed by the labial palps are directed forwardly (Pl. ii, fig. 4, *A.L.*, *P.L.*). The oesophagus is longer and proceeds posteriorly to the oesophageal portion of the stomach (Pl. iii, figs. 15 and 16). The stomach (Pl. ii, fig. 4, *St.*) lies in a more posterior position over the distal end of the foot, and whilst retaining the characteristic divisions as described in *S. ensis*, presents several striking modifications. The muscular wall (Figs. 15 and 16, *M.R.O.*), dividing the oesophageal from the cardiac portion, is much more developed and very muscular, and projects a considerable distance into the stomach, thus separating the anterior part of these divisions from each other. The caecum of the crystalline style, which is of greater length, leaves the pyloric portion on its ventral surface, curves and passes in an anterior direction near the ventral wall of the pedal cavity. (Pl. ii, fig. 4, *C.C.*).

The intestine (Fig. 4, *C.In.* and *In.*) pursues a course similar to that of *S. ensis*, and is for a long distance joined with connective tissue to the caecum of the crystalline style, both in going, and in returning along it, and afterwards forms only two or three small folds on the dorsal surface of the caecum, before passing into the rectum.

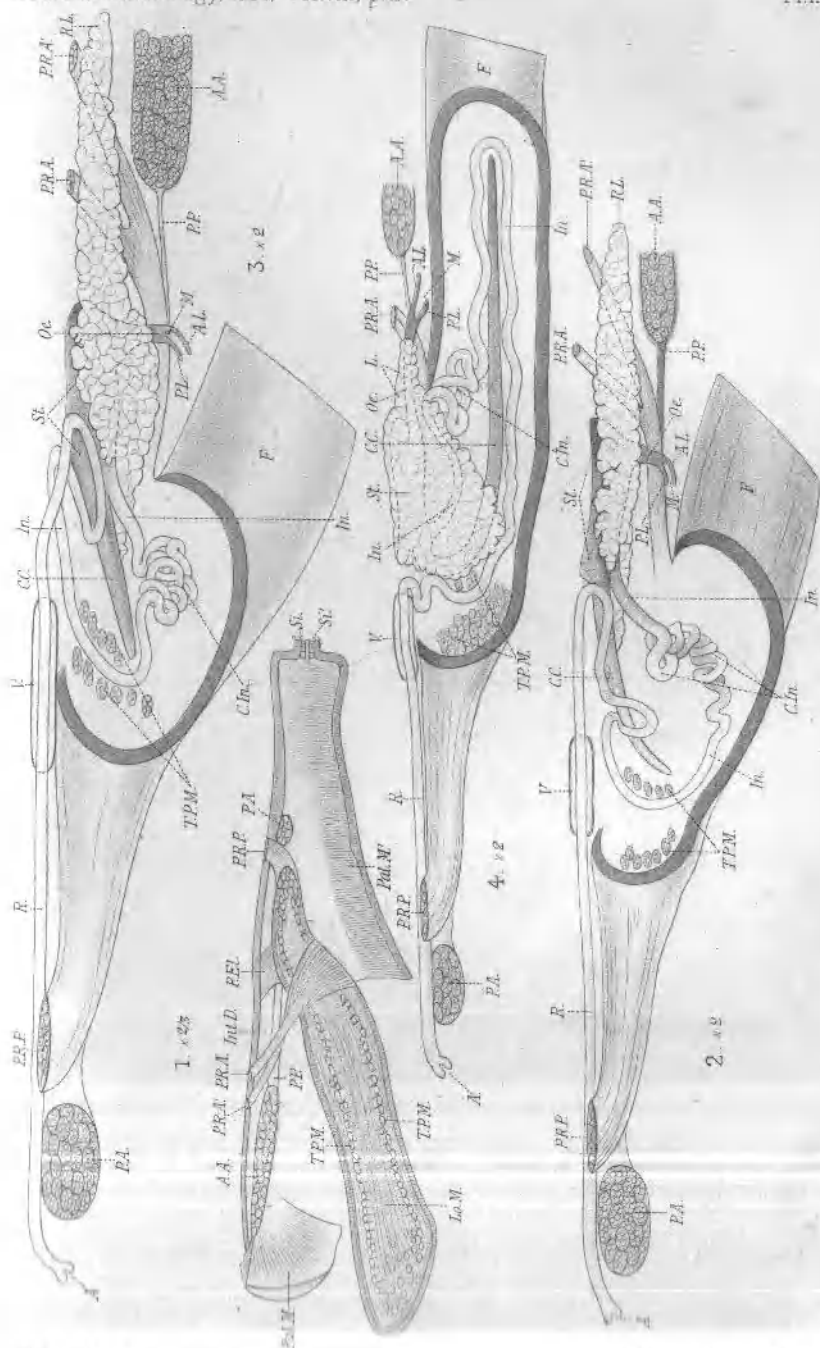
The liver surrounds the stomach and oesophagus, but a large part of it is situated ventrally to the stomach, and extending backwards. encloses a portion of the proximal parts of the intestine and caecum of the crystalline style. (Pl. ii, fig. 4).

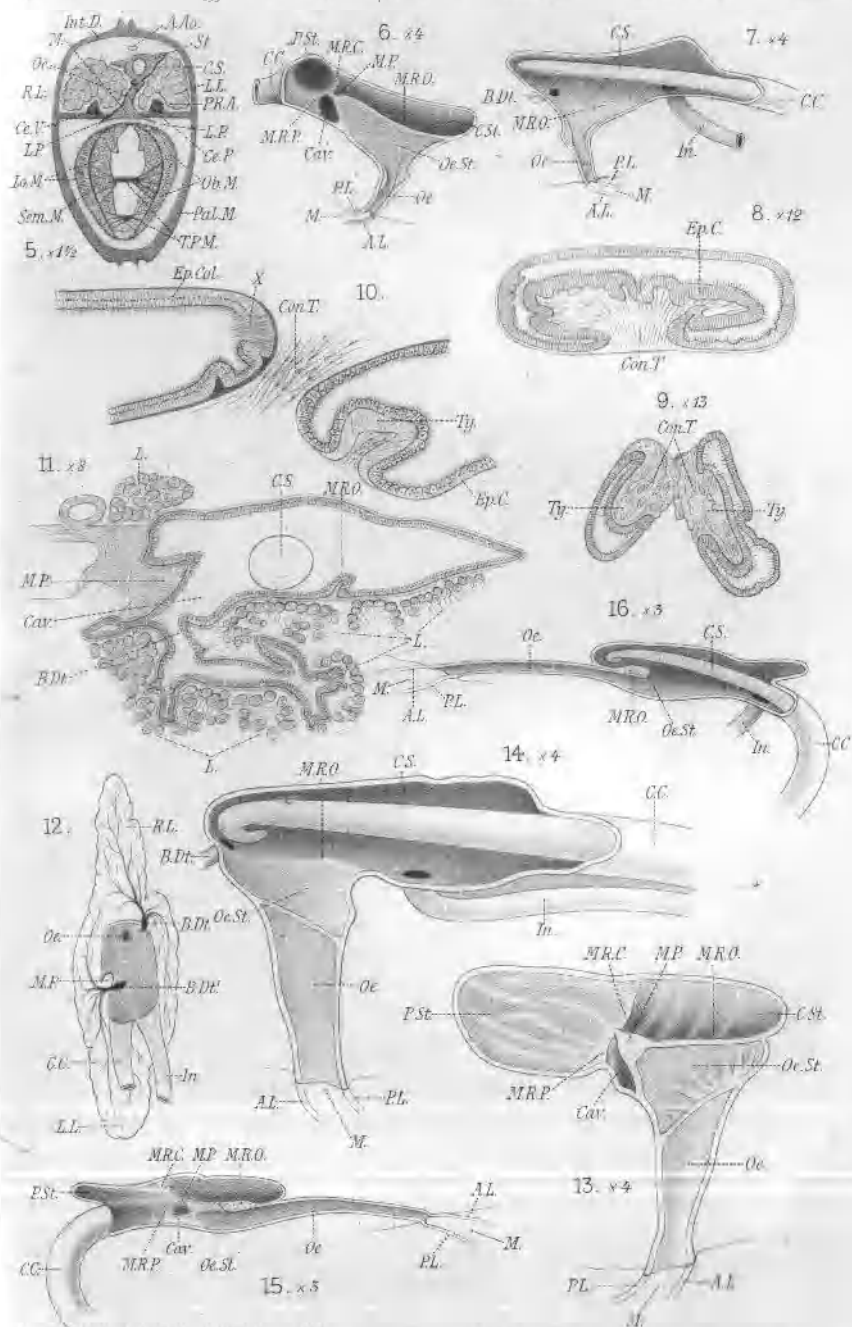
REFERENCE LETTERS.

<i>A.</i>	Anus.	<i>Ob. M.</i>	Oblique Muscles.
<i>A. A.</i>	Anterior adductor muscle.	<i>Oe.</i>	Oesophagus.
<i>A. Ao.</i>	Anterior aorta.	<i>Oe. St.</i>	Oesophageal portion of stomach.
<i>A. L.</i>	Anterior lip.	<i>P. A.</i>	Posterior abductor muscle.
<i>B. D_l.</i>	Large bile duct.	<i>P. El.</i>	Muscle representing elevator pedis.
<i>B. D_s.</i>	Small bile duct.	<i>P. L.</i>	Posterior lip.
<i>Cav.</i>	Small cavity receiving the small bile duct.	<i>Pal. M.</i>	Pallial muscles.
<i>C. C.</i>	Caecum of crystalline style.	<i>Pal. M'</i>	Muscles of pallial edge enclosing pedal aperture.
<i>C. In.</i>	Convolved portion of intestine.	<i>P. P.</i>	Muscle representing protractor pedis.
<i>C. P.</i>	Cerebro-pedal connective.	<i>P. St.</i>	Pyloric portion of stomach.
<i>C. V.</i>	Cerebro-visceral connective.	<i>P.R.A. P.R.A'</i>	Bifurcated parts of retractor pedis anterior.
<i>Con. T.</i>	Connective tissue.	<i>P. R. P.</i>	Bifurcated parts of retractor pedis posterior.
<i>C. S.</i>	Crystalline style.	<i>R.</i>	Rectum.
<i>C. St.</i>	Cardiac portion of stomach.	<i>Sem. M.</i>	Semicircular muscles.
<i>Ep.</i>	Epithelium.	<i>Si.</i>	Exhalant chamber of siphon.
<i>Ep. C.</i>	Ciliated epithelium.	<i>Si'</i>	Inhalant chamber of siphon.
<i>Ep. Col.</i>	Columnar epithelium.	<i>St.</i>	Stomach.
<i>F.</i>	Foot.	<i>T. P. M.</i>	Transverse pedal muscles.
<i>In.</i>	Intestine.	<i>Ty.</i>	Typhlosole.
<i>Int. D.</i>	Dorsal integument.	<i>V.</i>	Ventricle.
<i>L.</i>	Liver.	<i>X.</i>	Fibrous mass of the caecum of the crystalline style.
<i>L. L.</i>	Left lobe of liver.		
<i>Lo. M.</i>	Longitudinal muscles.		
<i>M.</i>	Mouth.		
<i>M. P.</i>	Muscular papilla.		
<i>M. R. O.</i>	Muscular ridge separating the oesophageal from the cardiac portion of the stomach.		
<i>M. R. C.</i>	Muscular ridge separating the cardiac from the pyloric portion of the stomach.		
<i>M. R. P.</i>	Muscular ridge separating the small cavity receiving small bile duct, from pyloric portion.		

EXPLANATION OF PLATES II AND III.

- Fig. 1. *Solen ensis*. Muscular system. $\times \frac{2}{3}$.
- Fig. 2. do. View from the right side showing alimentary canal &c. $\times 2$.
- Fig. 3. *Solen siliqua*. View from the right side showing alimentary canal.
- Fig. 4. *Solen marginatus*. View from the right side showing alimentary canal &c. $\times 2$.
- Fig. 5. *Solen ensis*. Transverse section of the animal showing the liver, stomach, oesophagus, musculature of the foot, &c. $\times 1\frac{1}{2}$.
- Fig. 6. do. Longitudinal section of the stomach, showing the internal structure of the left side. $\times 4$.
- Fig. 7. do. Longitudinal section of the stomach, showing the internal structure of the right side. $\times 4$.
- Fig. 8. *Solen siliqua*. Transverse section through intestine, showing the posterior portion of the typhlosole. $\times 12$.
- Fig. 9. do. Transverse section through a convolution of the intestine showing the fold of the typhlosole. $\times 13$.
- Fig. 10. do. Transverse section through the anterior portion of the caecum of the crystalline style and intestine showing the columnar epithelial lining of the former, and the ciliated epithelial lining of the latter. $\times 45$.
- Fig. 11. do. Transverse section of the stomach passing through the muscular papilla and small bile-duct. $\times 8$.
- Fig. 12. *Solen ensis*. Semi-diagrammatic view of the ventral portion of stomach, showing bile-ducts and their ramified tions in the lobes of the liver.
- Fig. 13. *Solen siliqua*. Longitudinal section of the stomach showing the internal structure of the left side. $\times 4$.
- Fig. 14. do. Longitudinal section of the stomach showing the internal structure of the right side. $\times 4$.
- Fig. 15. *Solen marginatus*. Longitudinal section of the stomach showing the internal structure of the left side. $\times 3$.
- Fig. 16. do. Longitudinal section of the stomach showing the internal structure of the right side. $\times 3$.





Figs 8, 7, 13-16 F.J.P. del ad nat.
Figs 5, 6-12 R.H.B. del ad nat.

Liu, Y. and A. W. J. van den Brink 2009

NOTES ON SOME KNOWN SPECIES OF PLECTOPYLIS, AND DESCRIPTION OF A NEW VARIETY OF PLECTOPYLIS PLECTOSTOMA, BENS.

By G. K. GUDE, F.Z.S.

SINCE concluding my series of articles on the genus *Plectopylis* in "Science Gossip" I have received from various sources a number of shells of this group.

From Mr. E. Boubée of Paris I have received a specimen of *P. jonia*, Mab., and one of *P. schlumbergeri*, Morlet, and from Mr. W. F. Webb, of Albion, N.Y., one specimen of *P. villedaryi*, Ancey; three species, the armature of which I had not hitherto examined. These materials enable me to supplement my remarks on these structures in "Science Gossip," 1897, N.S., vol. iv, pp. 138, 139, and to add figures of the plates, folds, and denticles *in situ*.

A comparison of these three species has shown that they are very closely allied, and that there is no difference of diagnostic value between the armatures. They differ, however, in external aspect sufficiently to rank as separate forms. *P. jonia* is the largest of the three, while *P. villedaryi* is the smallest, *P. schlumbergeri* being intermediate in size. The latter may also be distinguished by the raised flexuous ridge on the parietal callus, being much less developed than in the other two species, where this process assumes a tongue-shaped form.

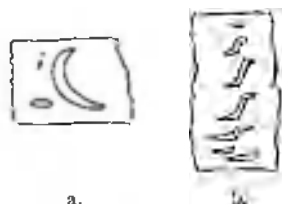
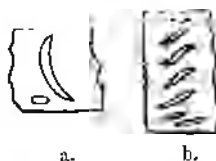


Fig. 1.—*Plectopylis jonia*.

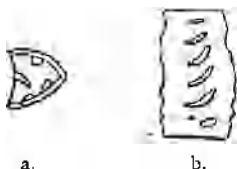
a. Parietal armature. b. Palatal armature.

In *P. jonia* the palatal folds numbers 2, 3, 4 and 5 are more vertical, and their extremities more angularly deflected, than in *P. schlumbergeri*, while the parietal plate in the former is stronger and more curved than in the latter.

Fig. 2.—*Plectopylis schlumbergeri*.

a. Parietal armature. b. Palatal armature.

Plectopylis schlumbergeri, as already stated, is intermediate in size between *P. jonia* and *P. villedaryi*, and the flexuous ridge on the parietal callus is much more depressed. The figure of the anterior view of the armature given by me in "Science Gossip," 1897, N.S., vol. iv, p. 138, copied from the Journal de Conchyliologie is unsatisfactory, and I am pleased to be able to figure these structures *in situ*.

Fig. 3.—*Plectopylis villedaryi*.a. Embryonic armature.
b. Palatal armature of mature shell.

My specimen of *P. villedaryi*, does not possess the upper denticle in front of the parietal plate, shown in Mr. Pilsbry's figure in the Manual of Conchology, 1893 (2), vol. viii, pl. 43, fig. 39, copied by me *t. c.*, p. 139, fig. 60b.

My shell was found to contain two embryos. As no embryonal armature had hitherto come under my observation, I was surprised to find that even at this early age, the creature is provided with rudimentary barriers. I have given a figure of the aperture of one of these embryos (Fig. 3a.).

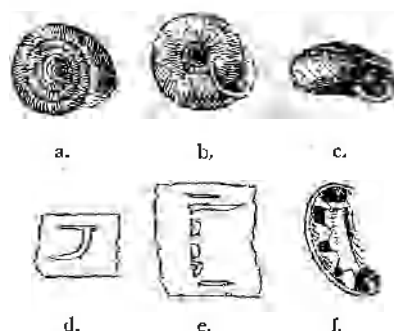
The armature here simply consists of four short denticles: one on the parietal wall, the other three on the outer wall—one above and two below the periphery; all four are situate at the aperture.

***Plectopylis lepida*, Gude.**

Ann. and Mag. Nat. Hist., March, 1900 (s. 7), vol. v, p. 313.

Hab.—Tinh-Tuc, Tonkin.

This species is now figured for the first time. The vertical palatal folds overlap the parietal plate, leaving scarcely any room for

Fig. 4.—*Plectopylis lepidota*.

- a. b. c. Shell, natural size.
 d. Parietal armature. e. Palatal armature.
 f. Posterior view of parietal and palatal armature.

the animal to emerge. The species is unique among its allies in having two horizontal palatal folds above the three vertical folds. In this respect it shows a certain affinity with the Burmese *P. achatina* and its allies; and this affinity is further evidenced by the fact that the three vertical folds are united by a low ridge; the sinuses between these folds would only have to be filled in, to constitute the single vertical plate characteristic of the group of *P. achatina*.

Fig. 5.—*Plectopylis plectostoma* v. *exserta*.

- a. b. c. Shell, natural size.
 d. Outline of the spire, enlarged.

***Plectopylis plectostoma* var. *exserta*, n.v.** Figs. 5a—d.

Differs from the type in the peripheral keel being exserted. The shell is also larger and more solid. More than thirty specimens were received from a native collector. Figure 5d shows the outline of the spire enlarged.

Major diam. 10.5, minor 9.75; alt. 7 mm.

Hab.—Khasi Hills, Assam. *Type* in my collection.

NOTE ON THE ANATOMY OF AMPHIDROMUS PALACEUS, MOUSS.

BY WALTER E. COLLINGE.

(Plate iv.)

DURING the past few years considerable attention has been given to the anatomy and classification of the different species of *Amphidromus*. Wiegmann¹ has described in great detail the structure of *A. adamsi*, Rve., *A. porcellaneus*, Mouss., and *A. contrarius*, Müll., and later² that of *A. porcellaneus*, Mouss., and *A. sinistralis*, Rve. Jacobi³ has given a valuable account of two Malayan species—*A. chloris*, Rve., and *A. interruptus*, Müll., while Pilsbry⁴ has recently written on the subgenus *Beddomea*, Nev., shewing its affinities to *Amphidromus*.

Some short time ago I received from Mr. H. Rolle of Berlin, two examples of *A. palaceus*, Mouss., from Java, of which I am now able to give a short account of the internal structure.

Fulton⁵ and Pilsbry⁶ both assign this species to the "Group of *A. javanicus*," none of the species of which, have as yet been anatomically described.

A. palaceus differs from all the above mentioned species in many characters, but particularly in the form and structure of the generative organs and free muscles.

The Generative Organs.—(Pl. iv, figs. 3—5).—The vestibule is small, beyond it is the vagina, a long, wide tube, the internal walls of which are thrown into a series of longitudinal plications, with short, fine transverse folds connecting them (Pl. iv, fig. 5). At the point where the receptacular duct and free-oviduct enter the vagina, it dilates to form a wide sac. The penis is a somewhat short, bulbous sac, and distally gives place to a long, densely coiled tube, the epiphallus, which penetrates the distal wall of the penis and terminates in a bluntly ending, fleshy papilla (Pl. iv, fig. 4,

1. Zool. Ergebnisse einer Reise in Niederländ. Ost. Indien, 1893, Bd. ii, pp. 151—210, T. xiv—xv.

2. Abhandl. d. Senckenb. naturf. Gesell., 1898, pp. 289—357, T. xxi—xxxi.

3. Archiv für Naturgesch. Berlin, 1895, pp. 251—318, T. xiv.

4. Proc. Malac. Soc. Lond., 1901, vol. iv, pp. 158—162, pl. xvi.

5. Ann. Mag. N. H., 1854 (ser. 6), vol. xvii, pp. 66—69, p's. v—vii.

6. Man. Cerch., ser. ii, 1900, vol. xiii, p. 124.

(*f. p.*); beyond the epiphallus there is a long flagellum, the extreme distal portion of which is folded upon itself, and forms a globose sac, with a short fleshy appendix (Pl. iv, fig. 4, *ap.*). Internally the wall of the penis is seen to consist of a series of muscular folds, which form a fringe distally around the fleshy papilla. Around the base of the papilla is a deep groove, from which arise a series of very fine grooves coming up on all sides towards the somewhat crescent-shaped opening (Pl. iv, fig. 4). The retractor muscle of the penis is short, and inserted on the right side towards its middle. The receptacular duct enters the vagina to the left of the free-oviduct. It is a long, wide tube, gradually tapering and terminating in the ovoid receptaculum seminis. In life the duct is richly pigmented and coiled around the common duct, so that the receptaculum seminis lies at the side of the albumen gland. Internally the lower portion shows a rich folding of the wall, which gives place to a series of longitudinal folds distally. The free-oviduct is very short. The common duct is closely wound upon itself for the greater part of its length. The albumen gland is small. The hermaphrodite gland is somewhat fan-shaped, with a fairly large, twisted duct.

The Free Muscles. (Pl. iv, figs. 1, 2, 6).—The buccal retractor consists of three more or less fused bands, inserted on the ventral side of the buccal cavity (Pl. iv, figs. 1, 2, 6). It is not united to the ocular retractors, which are free. The right ocular anteriorly consists of the superior and inferior oculars, and then fuses with the pedal muscles, and is continued posteriorly as two bands. The left ocular anteriorly is similar to the right one, posteriorly it is continued as a single band. Lying between the two oculars and dorsal to them (in dissection) is the large columella muscle. The retractor of the penis has already been mentioned, it arises from the diaphragm.

The Pallial Region. Pl. iv, fig. 7).—The kidney is a long, narrow, ribbon-like body measuring 47 millim. in length, and varying from 4.5 millim. to 5.5 millim. in breadth. The pericardium is 9 millim. in length.

Compared with the species which have so far been anatomically described, the following features seem to characterize *A. palaceus*.

- 1.—In the general form of the generative organs there are minor features, and more important ones in the form and structure of the penis and epiphallus.

- 2.—The form and position of the free muscles.

- 3.—The general characters of the kidney, ureter, etc.

EXPLANATION OF PLATE IV.

Amphidromus pulacens, Mous.

- Fig. 1. Lateral view of the buccal mass and oesophagus. $\times 1\frac{1}{2}$.
 2. Ventral view of the same. $\times 1\frac{1}{2}$.
 3. The generative organs. $\times 1\frac{1}{2}$.
 4. Penis dissected to show the fleshy papilla and internal wall.
 5. Vagina dissected to show the internal structure.
 6. Retractor muscles.
 7. Portion of the pallial complex. $\times 1$.

REFERENCE LETTERS.

<i>alb. gl.</i>	Albumen gland.	<i>pr.</i>	Prestate.
<i>an.</i>	Anal aperture.	<i>p. r.</i>	Pedal retractors.
<i>ap.</i>	Appendix.	<i>p. v.</i>	Pulmonary vein.
<i>au.</i>	Auricle.	<i>r.</i>	Rectum.
<i>b. c.</i>	Buccal cavity.	<i>r. ap.</i>	Renal aperture.
<i>b. r.</i>	Buccal retractor.	<i>r. d.</i>	Receptacular duct.
<i>c. m.</i>	Columellar muscle.	<i>r. m.</i>	Retractor of penis.
<i>ep.</i>	Epiphallus.	<i>r. o. r.</i>	Right ocular retractor.
<i>fl.</i>	Flagellum.	<i>r. s.</i>	Receptaculum seminis.
<i>f. ov.</i>	Free-oviduct.	<i>s. d.</i>	Salivary duct.
<i>f. p.</i>	Fleshy-papilla.	<i>s. gl.</i>	Salivary gland.
<i>h. d.</i>	Hermaphrodite duct.	<i>T.</i>	Superior ocular retractor.
<i>h. gl.</i>	Hermaphrodite gland.	<i>t.</i>	Inferior ocular retractor.
<i>k.</i>	Kidney.	<i>ur.</i>	Ureter.
<i>l. o. r.</i>	Left ocular retractor.	<i>v. d.</i>	Vas deferens.
<i>o.</i>	Oesophagus.	<i>v.</i>	Vestibule.
<i>ov.</i>	Oviduct.	<i>ve.</i>	Ventricle.
<i>p.</i>	Penis.	<i>vg.</i>	Vagina.
<i>pc.</i>	Pericardium.	<i>vw. p. c.</i>	Wall of pulmonary cavity.

DESCRIPTION OF TWO NEW SPECIES OF MICROPARMARION FROM THE ANDAMAN ISLANDS:

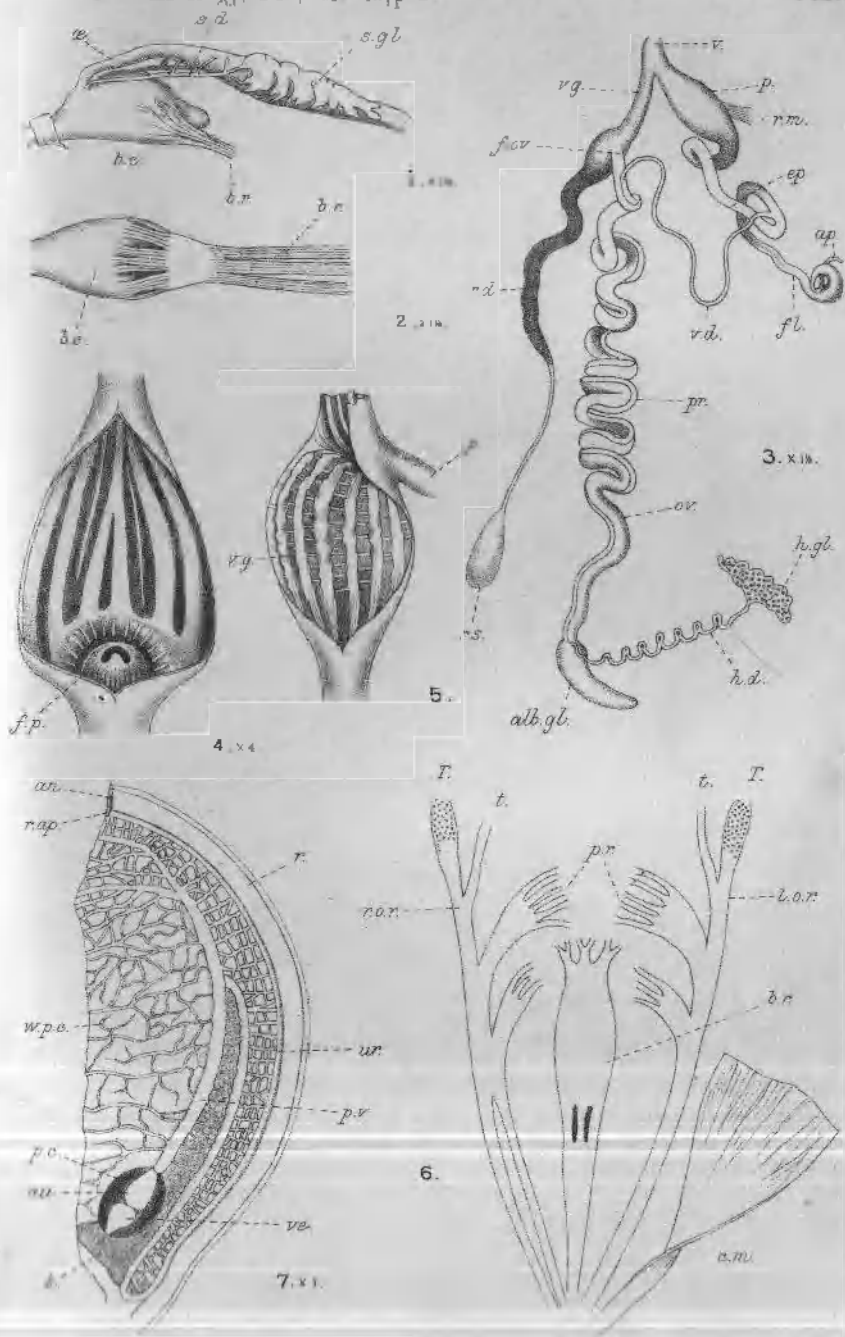
A CORRECTION.

By WALTER E. COLLINGE,

The University, Birmingham.

By a regrettable error, the two new species of *Microparmarion* (*M. möllendorffi* and *M. andamanica*) described in this Journal in March last (p. 16) were stated to have come from the Andaman Islands. Dr. O. F. von Möllendorff, however, writes me "they came from Annam, where Mr. Roebelen collected them. A distinct locality was not given, but they are from the Mekong valley." (*in litt.* April 6th.)

Unfortunate as the name of the second species is, it appears better to allow it to remain.



PROCEEDINGS OF THE MIDLAND MALACOLOGICAL SOCIETY.

25TH MEETING, FEBRUARY 15TH, 1901.

The President in the chair.

PAPER READ.

"On the Anatomy and Systematic Position of the Genus *Apera*., Heyn."
By the President.

EXHIBITS.

By Mr. Bloomer: Shells of *Helix arbustorum* from Nexin.

By Mr. Breeden: Shells of *H. arbustorum* from Dudley Castle, Brodrip, Lynton and Doncaster.

By Mr. Overton: Shells of *H. arbustorum* from Dudley, Dover, Canterbury and the Isle of Wight.

By the President: Specimens of various species of *Atopos*.

26TH MEETING, MARCH 8TH, 1901.

The President in the chair.

EXHIBITS.

The President showed and explained some sections illustrating the various glands met with in the integument of molluscs.

By Mr. Breeden: Shells of *Helix cantiana* from Portsdown, Ingleton and Lewes; also shells of *H. carthusiana* from Dover, Newhaven and Lewes, Sussex.

By Mr. Overton: Shells of *H. cantiana* from Deal, Dover, Canterbury and Bridlington; also shells of *H. carthusiana*, and *H. terrestris* var. *grisea* from Dover.

27TH MEETING, APRIL 12TH, 1901.

The President in the Chair.

PAPER READ.

"Note on the Anatomy of *Amphidromus palaceus*, Mouss."

By Walter E. Collinge.

EXHIBITS.

By Mr. Overton: Two interesting shells of *Limnaea palustris*. The first was an elongated form (30.5×11.5 mm.) collected in Sutton Park, the second a dwarfed, turreted form (12.5×7.5 mm.) from Sandwich. Both had five whorls, the latter specimen being easily contained in the mouth of the former.

By the President: A small collection of marine shells from the Shetlands and Firth of Forth.

CURRENT LITERATURE.

Meisenheimer, J.—Entwicklungsgeschichte von *Dreissensia polymorpha*, Pall.
Zeit. f. wiss. Zool., 1900, Bd. lxix, pp. 1—137, Tfn. i—xiii, u. 18 fign. im Text.

In this work the author presents us with another of those exhaustive treatises on cell-lineage, for which the younger continental and American zoologists, following the lead of Prof. E. B. Wilson, are becoming so noted.

Dr. Meisenheimer, who has already given us the results of an investigation on the cell-lineage of the Pulmonata, taking *Limnaea* as an example, now deals with the Lamellibranchia, basing his conclusions upon a detailed study of the cleavage exhibited by the fertilized egg of *Dreissensia*, a particularly happy selection since this form belongs to an undoubted lowly division viz. the Filibranchia. *Dreissensia* is further interesting, for it alone of our fluviatile bivalves retains a free swimming Trochophore larva, a fact which is usually interpreted as indicating a comparatively recent incursion into freshwater, whereas in the other genera which have been similarly investigated (*Chelona* by Stauffacher, and *Unio* by Little and others), the stage corresponding to this is almost wanting.

Unfortunately the results to be derived from such an investigation as the above, are hardly commensurate with the toil which it involves, since the results arrived at by the now numerous investigators in this field are so uniform. We, consequently, cannot help wishing that Dr. Meisenheimer had directed his attention and marvellous patience towards some other group of animals less known, in this respect, than the Mollusca.

With regard to the conclusions deduced from a study of this nature, we think a word of warning should be offered to those who have never attempted to trace back the ontogenetic history of any adult organ beyond its first definite appearance as a cell-complex, back to the earliest divisions of the egg, back even to one of the four primary blastomeres. These zoologists will hardly realize the difficulties and uncertainty which beset the attempts to identify a given cell in the different cleavage stages, and consequently they will be inclined to accept without hesitation the conclusion which investigators in this field put forward, their acceptance of these deductions will be still more readily given, if they study the beautiful figures in the monograph before us, where they will find each cell carefully lettered and its history traced, as if its existence had been followed continuously in a single specimen. This, however, is not the case, and when we consider the enormous difficulties in homologizing these cells, each having to be identified anew at every stage, since it is impossible to keep a live egg under observation for any time, it will be apparent that these numbers merely signify a certain observer's interpretation of the cells at a given stage, and consequently the conclusions cannot be unhesitatingly accepted, their main value lying in the fact that for the most part they are in accord with those of other workers in the same field of inquiry.

Dr. Meisenheimer, as we have implied above, treats in great detail with the cleavage of the fertilized egg, and the subsequent fate of the derived blastomeres, and in this his observations differ in no vital respects from those of all former workers. He then traces the formation of the Trochophore and its organs. Here he is at variance in many points with most of the earlier observers, since he finds that in *Dreissensia*, as in *Limnaea*, the primitive kidney is of ectodermal origin, and his figures in this respect appear to be most conclusive.

One of the most interesting observations from a phylogenetic standpoint, is to be found in his account of the origin of the nervous system, where distinct pleural ganglia are seen to arise in the embryo from the post-velar ectoderm, and therefore quite distinct from the cerebral ganglia, with which, however, they eventually fuse, since the latter arise as usual from the apical plate of the velum.

A most radical change in our ideas will be necessary if Dr. Meisenheimer is correct in his interpretation of the origin of the adult kidney and heart, for he would derive these organs in *Dreissensia* as in *Limnaea* from the ectoderm, whereas all other

observers trace them to the mesoderm. We do not think that our author's observations on this point will meet with general acceptance, especially as his figures are by no means conclusive. The origin of one of these organs, the heart, has been traced so conclusively to the mesoderm in so many invertebrates, that we do not think a couple of isolated cases like these, even supposing them to be correct, can invalidate it.

Our author traces the origin of all the remaining organs in the same detailed manner, but unfortunately, as it appears to us, he loses sight of the broader features of the homology and morphology of the organs in the study of the origin of their component cells. We cannot help thinking that ontogenists are tending to lose their powers of discrimination, so far as features of phylogenetic significance are concerned, in the minutiae of the ontogeny of the individual. The true study of phylogeny can only be based upon a combination of comparative morphology and embryology, certainly not upon the study of embryology alone. In this respect, we think, Professor Sedgwick was right in his vigorous attack upon von Baer's hypothesis that ontogeny recapitulated phylogeny, though he possibly carried his onslaught upon the law of recapitulation too far, but that such a warning was necessary we see daily in the ever increasing detailed ontogenetic works, and the phylogenetic conclusions based thereon.

Dr. Meisenheimer concludes with a careful comparison of the Trochophore of *Dreissensia* with those of other Mollusca and Annelida, but even here we cannot help thinking that he has been led astray in concluding that the Trochophore is of such great phylogenetic importance. He himself states that he formerly held the reverse view, and, we think, if he had not restricted himself so much to ontogeny, he would still regard this interesting and undoubtedly important larval form as having less phylogenetic significance than he now assigns to it.

Unfortunately owing to the iniquitous system at present in vogue, all the cream has been skimmed off this paper by the publication of no less than three preliminary communications, two of them being illustrated. Personally we utterly fail to understand why anyone should wilfully set to work to spoil his own work in this way, and can only express the pious wish, that the time will come when that horror the preliminary communication shall trouble us no more.—M. F. WOODWARD.

MacMunn, C. A.—On the Gastric Gland of Mollusca and Decapod Crustacea: its Structure and Functions. Phil. Trans. Roy. Soc., 1900, B. vol. 193, pp. 1—34, pls. 1—4.

The objects of this investigation, the author states, were "to determine (1) the form in which entero-chlorophyll and the associated pigments occur in the glandular epithelium of the gastric gland; (2) the nature of the bodies with which the pigment is associated * $\frac{1}{2}$; (3) how this pigment is formed in the gland; and (4) if not actually formed there, how does it get into the glandular epithelial cells;" finally the relation (if any) of Chaetopterin to entero-chlorophyll, and the general histology of the gland are discussed.

From an examination of *Ostrea*, *Patella*, *Aplysia*, *Helix*, *Limax*, and *Arion*, the author shows that there is a complete absence of glycogen, that the colouring matters are taken up from the intestine and accumulated in the gland, which is capable of storing fat and pigment, and has also an excretory function.

The author discusses in some detail the results of spectro-photometric observations, and other points mentioned above.

Baleh, F. N.—List of Marine Mollusca of Coldspring Harbor, Long Island, with descriptions of one new Genus and two new species of Nudibranchs. Proc. Boston Soc. N.H., 1899, vol. 29, pp. 133—162, pl. i.

The author enumerates 83 species comprised in 63 genera. The new forms are *Polycerella davenportii* related to *P. emeritoni*, Verrill, and *Corambella* (gen. nov.) *depressa* closely allied to *Corambe sargassicola*, Bgh., and *C. testudinaria*, H. Fisch.

Andre, E.—Organes de défense tégumentaires des *Hyalinina*. Rev. Suisse de Zool., 1900, T. 8, pp. 425—433, pl. 32.

The author here describes and figures certain curious structures found in the skin of different species of *Hyalinina*, to which the name of phylacites is given. Each phylacite is enclosed in a parent-cell or phylacoblast, and consists of a transparent body composed of a transparent and more or less granulose substance, enclosing a round, ovoid or sometimes fusiform vesicle, in which are a number—3 to 21—of round or ovoid refractive spherules. The phylacoblast at first closely resembles ordinary connective tissue cells, but when the development of the phylacite is complete, the protoplasmic contents and nucleus disappear. The expulsion of these bodies is very rapid. In certain features they resemble nematocysts and are probably defensive. The chemical composition remains uncertain.

Möllendorff, O. von.—Neue und kritische Landschnecken von Japan und den Linkiu Inseln. Nachr. d. Deutsch. Malak. Gesell., 1900, pp. 33—45.

Dr. von Möllendorff describes the following as new: *Gastrodontella japonica*, g. et. sp. n. *Bulinus* (*Subulinus*) *nipponicus*, *Clausilia* (*Stereophaedusa*) *euryzona*, Maris., subsp. *brachyphala*, *C.* (*Megalophaedusa*) *frutoni*, Sykes, subsp. *chirula*, *C.* (*Hemiphaedusa*) *breviluna*, *C.* (*H.*) *omienensis*, *Cassidula* *pleurocymatulus*, subsp. *japonica*, *Diplommatina* (*Smith*) *minutissima*, and *Georissa japonica*.

Möllendorff, O. von.—Zur Binnennollusken-Fauna von Annam iv. Nachr. d. Deutsch. Malak. Gesell., 1900, pp. 45—50.

The following are new: *Tamprocystis annamitica*, Möll., subsp. *subrubella*, *Xestina denserugata*, *X. tenera*, *X. pharangensis*, *Amphidromus rhodostylus*, *A. meblatus*, subsp. *pachyphalus* and *insularis*, and *A. haematostoma*.

Dautzenberg, Ph.—Croisieres du Yacht *Chazalie* dans l'Atlantique. Mollusques. Mém. Soc. Zool. de France, 1900, T. xii, pp. 145—265, pl. ix—x.

The author enumerates 444 species, of these three quarters are from the Antilles and the northern coast of South America, 44 have been collected from Cape Blanc and the Bay of Lévrier, 32 from the islands of Branco, Maderia, Teneriffe, 7 from the pelagic fisheries, while the excursions on land have furnished about 40 land and freshwater species.

The following species are new: *Plecochilus dalmani*, *Dritia rhodochroa*, *D. chazaliei*, *D. claudoni*, *D. jousseaumii*, *Phos chazaliei*, *Modulus guerci*, *Lucapinella verlayi*, *Uhlomys* (*Aequipeeten*) *barayi*, *Pecten chazaliei*, *Nucula dalmani*, *Leda chazaliei*, *Tellina* (*Tellinella*) *verlayi*.

EDITOR'S NOTES.

In the March issue (p. 32) we stated that a specimen of *Pleurotomaria adamsmonia*, Cr. & Fisch., obtained in Barbados by Surgeon-Col. S. Archer, had been presented by him to the Manchester Museum. We find, however, that we were wrong in stating that this was presented by the finder. The Museum is indebted, for this valuable specimen, to the generosity of Mr. R. D. Darbishire.

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VOL. VIII.

NOTICE SUR LE PROFESSEUR DE
LACAZE-DUTHIERS.

PAR A. VAYSSIÈRE,

*Professeur de Zoologie à l'Université de Marseille,
Conservateur du Muséum (Zoologie).*

La France vient de perdre le 21 Juillet dernier, en la personne du Professeur de Lacaze-Duthiers, un de ses savants les plus éminents.

Né à Montpezat (Lot-et-Garonne) le 19 Mai 1821, après avoir terminé ses études classiques, Félix Joseph Henri de Lacaze-Duthiers vient faire de la Médecine à Paris. Une fois Docteur, il abandonna cette carrière pour se consacrer à l'étude des Sciences naturelles sous la direction de l'illustre zoologiste Henri Milne-Edwards.

Vers 1849 il passe son doctorat es-sciences naturelles avec une thèse remarquable sur "L'armure génitale femelle des Insectes," et en 1854 il est nommé professeur de Zoologie à la Faculté des Sciences (Université) de Lille.

En 1862 Lacaze-Duthiers est chargé de poursuivre des recherches sur la reproduction du corail, et après un séjour d'un an le long des côtes de l'Algérie, surtout à la Calle, il publie son "Histoire Naturelle du Corail," magnifique travail accompagné de nombreuses planches coloriées sur l'organisation et le développement de ce zoophyte."

Avant de commencer ses recherches sur le corail, Lacaze-Duthiers avait étudié l'anatomie de divers types de Mollusques: Histoire de l'organisation et du développement du Dentale (1857); Histoire anatomique et Physiologique du Pleurobranche orangé (1859); de l'Haliotide (1859); de l'Anomia (1854); des Vermets (1860); ainsi que divers travaux sur les Tuniciers.

Après sa mission en Algérie il dirige toutes ses recherches scientifiques dans cette double voie: Etudes sur les divers types de Coralliaires des nos côtes, et études sur divers mollusques terrestres, marins ou des eaux douces. Après 1870 il a publié entr'autres travaux sur les Mollusques: Otocystes ou capsules auditives des Mollusques Gastéropodes aquatiques (1872); Etudes anatomiques de l'*Aspergillum* (1883); de la *Testacella* (1888); du *Magilus* . . .

En 1864 il avait été chargé de suppléer Valenciennes au Muséum de Paris. L'année d'après, à la mort de ce dernier, il le remplace en qualité de professeur administrateur de la Section de Malacologie.

Mais son activité professorale pouvait difficilement s'exercer au Muséum, aussi dès 1868 il abandonne cet Etablissement pour prendre une place vacante de professeur de Zoologie à la Sorbonne.

Ses nombreux travaux lui valurent l'honneur en 1871 d'être nommé Membre de l'Académie des Sciences en remplacement de Longuet.

C'est à cette époque que Lacaze-Duthiers conçut l'idée de fonder une Revue Scientifique et de faire créer une station de Zoologie marine.

La revue qu'il a fondé en 1872 et qui porte la nom d' "*Archives de Zoologie Expérimentale*" constitue une des principales publications françaises de Zoologie; elle contient surtout des travaux du Maître et de ses élèves.

C'est en 1873 que Lacaze-Duthiers put ouvrir à Roscoff un laboratoire de Zoologie Marine sur les côtes de la Manche, station dans laquelle il menait fréquemment tous ses élèves, mais sa situation géographique en faisait surtout un Laboratoire d'été; aussi désirait-il créer un autre laboratoire sur un point qui put permettre des recherches scientifiques en Hiver. En 1881, il arrêta son choix sur le petit port de Banyuls (Pyrénées Orientales) à l'entrée duquel il a établi une station très bien installée.

On peut dire que Lacaze-Duthiers fut le véritable créateur de nos stations marines en France, car le laboratoire de Concarneau (Bretagne) que Coste avait créé vers 1855, avait plutôt le caractère d'un établissement de pisciculture et ce sont ses successeurs seulement (Pouchet, Filhol) qui ont élargi plus tard le cadre des recherches poursuivies en ce point.

L'influence de Lacaze-Duthiers sur le marche des études de Zoologie marine pendant ces vingt-cinq dernières années a été considérable; tous ses travaux personnels sont d'une exactitude telle dans les moindres détails anatomiques, qu'ils pourront longtemps servir de base à tous les naturalistes qui s'occuperont des mêmes sujets.

MALACOLOGICAL NOTES.*

By E. R. SYKES, B.A., F.L.S.

6.—On a new species of *Helicina* from Kangean Island.*Helicina rollei*, n. sp.

T. depresso-conica, solidiuscula, leviter lineis incrementi notata, aurantiaca vel straminea, apice acuto; anfr. 5 planiusculi, ultimus valde carinatus, antice non descendens; apertura obliqua, angulato-ovalis; columella brevis, excavata, basi extrorsum valde angulata; peristoma crassiusculum undique reflexum; callus basalis tenuis. Operculum non vidi.

Diam. max. 15.5; alt. 6.5 millim.

Hab.—Kangean Island, north of Bali (comm. H. Rolle).



Fig. 1.—*Helicina rollei*, n. sp.

This interesting shell recalls in form and colour, *H. amaliae*, Kobelt. It is however much more depressed, the spire much more pointed, the lip is much more reflexed and the denticle at the base of the columella more marked. In this last respect it resembles *H. agglutinans*, Sby., but here again the lip is in *H. rollei* much more expanded and reflexed and the upper margin does not descend in front.

7.—The value of the name *Otenopoma*.

The name *Otenopoma* was first used in a generic sense by Peters in 1844 (SB. Ak. Berlin, 1844, p. 34) for an African fish. Subsequent reference to it in Ichthyology may be found so far back as 1855 in

* See ante, p. 20

Heckel (SB. Ak. Berlin, 1855, Bd. xvii, p. 168) and Peters (Wiegman. Arch., Bd. xxi, i, p. 247).

The earliest publication of the name that I can trace in Mollusca was by Pfeiffer (Malak. Blätt., Bd. iii, p. 58) in 1856, where he states that the name was communicated to him by Shuttleworth and gives as the type *Cyclostoma rugulosum*, Pfr. Subsequently Pfeiffer (Mon. Pneum. Suppl. I, p. 102) refers to it as "Shuttleworth in litt. 14 Sept., 1852."

If these facts be correct the name cannot stand in Mollusca and I therefore propose, taking *C. rugulosum*, Pfr., as the type, to replace *Otenopoma*, Pfr. non Peters, by

RHYTIDOPOMA, nom. nov.

8.—Note on *Cecina manchurica*, A. Ad.

This genus and species were characterised by Adams (Ann. Nat. Hist., ser. 3, vol. viii, p. 308) in October, 1861, without any figure. Authentic examples have come into my hands, and I take this opportunity of illustrating the form.



Fig. 2.—*Cecina manchurica*, A. Ad.

It may be noted, while dealing with this species, that the note by Dr. Moellendorff (Nachr. Deutsch. Malak. Ges., 1900, p. 153) that *Blanfordia japonica*, A. Ad. "niemals diagnosticirt, sondern nur abgebildert worden," is inaccurate. The species, as also *B. bensoni*, was described in the same paper as *Cecina*, under the generic term *Tonichia*.

NOTE UPON TROPHON UMBILICATUS, TENISON WOODS.

By HENRY SUTER,

Auckland, New Zealand.

A short note on *Murex octogonus*, Q. and G., and *M. umbilicatus*, T. Woods, by Mrs. Agnes F. Kenyon,¹ induced me to study the specimens at my disposal, and I wish here to publish a short account of the results arrived at.

The literature I was able to consult reveals the following facts: *Trophon umbilicatus* was described by Tenison Woods in 1875,² from specimens obtained on the east coast of Tasmania. He says that at one time he considered it to be a Tasmanian variety of *T. hanleyi*, Ang.

Bednall in 1886,³ classed it under *Murex octogonus*, Q. and G., and he has no doubt of the identification of the S. Australian shell with *M. octogonus*. He also states quite correctly, "In New Zealand the species attains twice the size it does in these waters."

The same shell had already been described by A. Adams in 1853,⁴ under the name of *Murex scalaris*, which name, however, is preoccupied by Brochi for a fossil shell. T. Woods was no doubt not cognisant that the species had already been described.

In his "Catalogue," Brazier⁵ gives the synonyms and localities for *M. umbilicatus*, T. Woods, which are repeated in the Proc. Linn. Soc., N.S.W., 1894 (2 ser.), vol. viii, pp. 116, 117, where he states: "There is not the slightest connection between *M. octogonus*, Q. and G. and *umbilicatus*, T. Woods; the former is a large shell with very fine lirae between the longitudinal lirate ribs; the latter is a much thicker and smaller shell with a large umbilicus margined with rounded imbricated scales."

Dr. Verco⁶ enumerates *Murex umbilicatus*, T. Woods, and remarks that "Tryon in his Manual, vol. ii, p. 155, has placed it in *Urosalpinx*, which he describes as having a purpuroid operculum. But this species has a muricoid operculum, and belongs to the genus *Murex*. It was formerly confounded with *M. octogonus*, Q. and G."

¹ Proc. Malac. Soc. Lond., 1890, vol. iv, p. 39.

² Papers and Proc. Roy. Soc. Tasmania, 1875, p. 115.

³ Trans. and Proc. Roy. Soc. Sth. Austr., 1884-85 (publ. 1886), vol. viii, p. 64.

⁴ Proc. Zool. Soc., 1853, p. 71.

⁵ Catal. Marine Shells of Australia, 1893, part iii.

⁶ Trans. Roy. Soc. Sth. Austr., 1891, p. 96.

The same author, in 1896,⁷ published a note upon *Murex umbilicatus*, T. W., in which he explains that Tryon proposed the name *M. angasi* as a substitute for *scalaris*, not knowing its identity with *M. umbilicatus*, and mentions that Brazier sent a specimen to H. Adams, who said it was identical with that named *M. scalaris* by his brother. Dr. Verco further gives a good figure of the shell (*L. c. Pl.* vii. f. 4).

Pritchard and Gatliff⁸ in their "Catalogue of Marine Shells of Victoria," reproduce part of the synonymy, and observe, "Considerable confusion has surrounded this species of wrongful identifications, etc."

This is about the curriculum vitae of the species.—Returning to Mrs. Kenyon's note the following passage is difficult to understand: "*Murex octogonus*, Q. and G. One very fine specimen, showing that Mr. Brazier erred in considering *M. octogonus* to be identical with *M. umbilicatus*." Where Mr. Brazier does consider the two identical is unfortunately not stated, but on reading the foregoing quotations Mrs. Kenyon will, I hope, be convinced that Mr. Brazier took just an opposite view. It was Mr. Bednall who took the view assigned to Mr. Brazier.

After comparing a good many examples from Hauraki Gulf, and also a few from South Australia, I have come to the conclusion that *M. umbilicatus*, T. Woods, is absolutely nothing more than a variety of *M. octogonus*, Q. and G. I have a number of specimens of both before me in which there is decidedly no other difference to be found, but that in the var. *umbilicata* there is a more or less open umbilicus present, which of course causes the spines round the base to spread much further out. Mrs. Kenyon says that in *M. octogonus* the shell is much more fusiform and turreted. I measured six specimens of each and the result is as follows: In *M. octogonus* the proportion of breadth to length was found to be 1 : 1.8, and in the var. *umbilicata* it varied from 1 : 1.7 to 1 : 1.21, the mean being 1 : 1.8.

The sculpture in *M. octogonus*, Q. and G., varies greatly according to the locality and the depth in which the molluscs live. Shore specimens in New Zealand average the size of my specimens from South Australia, about 20-25 millim. in length, but when we get specimens from deeper water, say 10-20 fathoms, the shells are much larger, up to 50 millim. in length. This also applies to the var. *umbilicata*. The same conditions also influence the sculpture of the shell. Deep water specimens are almost always beautifully ornamented with prickly spines on the varices and round the base, but shore

⁷ *Ibid.*, 1896, p. 316.

⁸ *Trans. Roy. Soc. Victoria, (Melb.)*, vol. 5, p. 354.

specimens have shorter spines, which often become obsolete, the shells becoming almost devoid of all ornamentation, being simply spirally grooved and longitudinally costate; this is Hutton's var. *espinoza* of *M. octogonus*. This great variability in size and sculpture, and the presence or absence of an umbilicus, have, no doubt, been at the bottom of all the confusion. I must not forget to mention that of my three specimens from South Australia received as *M. umbilicatus*, T. Woods, one only has an umbilicus, the two others show no trace of it; otherwise they are alike.

ON THE ANATOMY OF THE VITRINA IRRADIANS OF PFEIFFER.

By WALTER E. COLLINGE.

(Plates v and vi.)

THE mollusc which forms the subject of the present communication, has at different periods, and by different writers, been relegated to various genera. Originally described by Pfeiffer¹ in 1852 as a member of the genus *Vitrina*, it was placed by Theobald² in that heterogeneous genus *Helicarion*; as a member of this genus it was treated of (or at least its shell) by Nevill³, Clessin⁴, Tryon⁵, and others. In 1898 Lieut-Col. Godwin-Austen⁶ intimated that he proposed to describe a new subgenus for its reception, to which he gave the name *Ratnadvipia*, and in the following year⁷ he gave a diagnosis and some brief notes on the anatomy of the generative organs. The jaw and radula were shown to be of the type seen in *Hemiplecta*, and the male organ (only partially described) was compared with that of *Euplecta*, *Nilgiria*, and *Ariophanta*, and thought to be allied to the two latter.

¹ Proc. Zool. Soc., 1852, p. 156.

² Suppl. Catal., p. 24.

³ Handlist of Gastrop., 1876-85, p. 16.

⁴ Nomencl. Helic., 1881, p. 31.

⁵ Man. Conch., 1885 (ser. 2), p. 176, pl. 47, fig. 71.

⁶ Proc. Malac. Soc. Lond., 1898, vol. iii, p. 243.

⁷ Moll. of India, 1899, vol. ii, pt. 3a, pp. 9-10, pl. LXIV, fig. 1-4.

In connection with my studies on the Asiatic slug-like molluscs, I have had occasion to examine the internal structure of many genera of Indian molluscs, and as these are as yet very imperfectly understood, I cannot, in the present instance, do better than place on record the results obtained.

I have pleasure in expressing how greatly indebted I am to the kindness of Mr. Oliver Collett, who has sent me many choice examples of this species, as of many other Cingalese genera.

RATNADVIPIA, Godw.-Aust.

Ratnadvipia, G.-A., Proc. Malac. Soc. Lond., 1899, vol. iii, p. 253;
Moll. of India, 1899, vol. ii, p. 95.

Animal slug-like, with the mantle bordering the shell on all sides, postero-laterally produced into tongue-like extensions. Dorsum flattened behind visceral hump, posteriorly sharply keeled. Caudal mucous pore large. Foot-sole not divided into median and lateral planes. Viscera does not extend into posterior portion of body, which is solid. Intestinal tract rather short, exhibits four loops. Generative system with well developed penis-sheath, containing evertible penis; diverticulum, epiphallus, and kalk-sac present. Receptaculum seminis sessile. Dart-sac and large dart-gland,* no calcareous dart, but short, blunt, muscular papilla.

Shell thin, with few whorls, body whorl large.

I see no objection to the name proposed by Lieut.-Col. Godwin-Austen, excepting that it should rank as a distinct genus. The incomplete description given by this author, and the still more incomplete figures, give one very little idea of the form and structure of the internal parts, and consequently the affinities, of this very interesting genus. I propose, therefore, to describe the anatomy in some detail.

The foot-sole varies much in different specimens: in some it is perfectly smooth, exhibiting no trace of a median groove, while in others a well-defined median groove is present, with raised lateral portions.

Godwin-Austen thinks (l. c. p. 95) that this indicates that a similar contraction prevails in life, and perhaps points to an arboreal habit of the animal. This median groove is never present in specimens of *Girasia*, preserved in alcohol, he further points out, a

* The term "dart-gland" refers to the large, almost solid portion, shown on plate v, fig. 2, *d. gl.* with a transverse section on plate vi, fig. 10.

statement which I can confirm after an examination of a large number of specimens in my own collection.

As Simroth⁸ has pointed out, the terminology employed by Godwin-Austen for the mantle-lobes is somewhat confusing. I have tried to use it, but find it unsatisfactory. The mantle comes round the shell on all sides, being produced posteriorly on each side into tongue-like extensions, a further and similar extension is present on the right side.

Ratnadvipia irradians, Pfr.

(Pls. v and vi, figs. 1—13.)

Vitrina irradians, Pfeiffer: Proc. Zool. Soc., 1852, p. 156.

Helicarion irradians, Thenbald: Supp. Catal., p. 24.

Ratnadvipia irradians, Godw.-Aust.: Moll. of India, 1899, vol. ii, p. 93, pl. lxxxv, figs. 1—8a.

Animal steel-grey, the head and dorsum variable, sometimes being almost yellow or even blue. Mantle lobes surround the shell on all sides, postero-laterally produced into tongue-like extensions. Dorsum sharply keeled. Peripodial groove deep, and well defined. Rugae large. Caudal mucous pore large, but not extending to foot-sole. Foot fringe bluish-grey. Foot-sole yellow, not divided into median and lateral planes. Usually there is a median groove, with oblique lines running from the foot fringe.

Length (in alcohol) 72 millim., breadth of foot-sole 7·5 millim.

Shell thin, but not transparent, whorls few, body whorl large, lip produced on the right side.

Hab—Kandy, 1500 ft. Ceylon. (O. Collett).

The Alimentary Canal (Pl. v, fig. 1).—The intestinal tract is thrown into four loops, the third being somewhat short. Posterior to the crop the intestine exhibits three constrictions (Fig. 1), a feature constant in all but one of the seven specimens dissected. The stomach is fairly large and completely surrounded by the lobes of the "liver." The remaining parts call for no special mention.

The Generative Organs (Pls. v and vi, figs. 2—11).—Externally the generative orifice leads into a small vestibule into which the dart-sac opens anteriorly, the vagina in the middle, and the penis posteriorly.

The vagina is a long tube-like duct with its internal walls plicated (Fig. 3. *vg.*). At its posterior end it receives the globular, sessile

receptaculum seminis, and the free oviduct. The latter is of considerable length, and just beyond its middle it expands and forms a thick walled cavity, beyond which it is continued as a tube. The whole of its internal walls are richly plicated, the plicae taking various forms as shown in Fig. 3. The penis is a large, muscular organ with a diverticulum. Its internal structure is very interesting, and presents many points difficult of interpretation. Commencing at the vestibule as a fairly uniform tube, it expands distally into a somewhat bulbous head, beyond which is the diverticulum, a blindly ending tube, while to the left side is an epiphallus,* somewhat S-shaped, and tube-like at first, but becoming more globose at the point where it meets with the vas deferens. In one, the largest, of the seven specimens dissected, the epiphallus exhibited the form shown in Fig. 6. When dissected (Fig. 4) a thick, muscular penis-sheath is seen, whose internal walls are studded with numerous, minute, fleshy, knob-like processes, enclosed by this sheath is the eversible penis (Figs. 4 and 5), which is also covered with fleshy, knob-like processes. It has a narrow neck, expanding terminally into a globular head, while passing through the whole of its length is a fine canal. The diverticulum is a hollow, blindly ending sac, with smooth, muscular walls; as it touches the eversible penis the lumen of the cavity narrows and becomes continuous with the canal passing through the penis (Fig. 4, *div.*). The epiphallus has also richly plicated walls for part of its length, the plicae being somewhat moniliform; the walls of the last bend, the kalk-sac, are almost smooth and the cavity is filled with a mass of minute, white, calcareous granules, while from the base of the cavity, in the two largest specimens, a long, hollow spicule, measuring about 6.5 millim., in length, arises. (Fig. 7). At first sight, this body reminds one of a dart, for basally it expands slightly, and is firmly implanted in the muscular tissue at the base of the sac. Clustered around it are large numbers of the white, calcareous granules. When examined under the microscope, these granules are seen to vary greatly in size, shape, and composition, and seem to be most numerous in fully matured animals. The largest are biconvex (Fig. 6a) and when viewed under a high power ($\frac{1}{15}$ th water immersion), they are seen to contain certain definite contents (Fig. 6a); still more numerous are smaller oval granules (Fig. 6b), while a few perfectly spherical granules, of various sizes, are also present (Fig. 6c). When pressure was brought to bear upon the cover glass, the large biconvex

* In specimens measuring 36 to 50 millim. this organ was very short.

granules (Fig. 6a) and the spherical ones (Fig. 6c), were ruptured, and it was clearly evident that they contained some substance very like protoplasm, for it readily stained with magenta (50% Al. sol.), Grenacher's carmine, and other stains, whilst a denser portion (? a nucleus) took the stain much more readily. Treated with dilute hydrochloric acid (5 and 10 per cent.), all the granules excepting the largest of the spherical ones, were dissolved, these latter remaining unchanged even when treated with strong hydrochloric acid.

The question naturally arises, what is the function of the spicule and granules?: to which at present, I am unable to give any satisfactory answer. We know that no calcareous matter is required for the spermatozoa, and it seems out of the question to suppose that they are transferred from here to the dart-sac, nor is it any more likely that they are in any way connected with the formation of the spermatophore. It is important to point out that in the specimens in which these bodies were either present in only small numbers or absent altogether from the kalk-sac, large numbers of the spherical granules only were found in the receptaculum seminis. This fact would lead one to suppose that they had been transferred with the spermatozoa.

When examining a specimen of *Nilgiria tranquebarica*, in which the spermatophore was only partially formed, I thought that possibly the spicule found in *Ratnadvipia* might also be a spermatophore in the process of formation, but a more careful examination of a second example, the one figured, convinced me that this is not so. The two found were present in fully matured animals measuring (in alcohol) 72 and 76 millim. in length, respectively, further in both cases the spicule was firmly implanted at its basal end in the substance of the wall of the kalk-sac, and only by very careful teasing was it separated from the surrounding tissue.

The retractor muscle of the penis is inserted into the apical portion of the diverticulum (Fig. 2, *r. m.*). The vas deferens is long, and in life lies upon the vagina and free-oviduct. The dart-sac and gland (Fig. 2, *d. s.*, *d. gl.*) form a large organ lying upon the floor of the body cavity, the distal end of the gland extending to the extreme posterior portion. In some cases it is recurved forward owing to its great length. Usually it exhibits the sharp bend shown in Fig. 2, but this is not always present, it may be almost straight. Attached to the distal end is a short muscle, which arises from the ventral wall of the body cavity.

In none of the specimens dissected was any calcareous dart found, but at the distal end of the somewhat baggy dart-sac, a blunt, fleshy

papilla was present, reminding one very much of the condition obtaining in certain Indian species of *Nitigiria*, only there was no trace of the "*virgula amatoria*."

Serial sections were made of both the gland and dart-sac, which proved very interesting. Below I give descriptions of the transverse sections. Externally the gland is seen (Fig. 10) to be covered by a thin muscular sheath (*m.s.*), beneath which is a thick layer of large, ovoid and circular gland cells (*gl. c.*), with radiating muscle fibres intervening. In the section from which the drawing is made, there are twenty-eight of these bundles of radiating fibres, they do not, however, traverse the whole length of the gland, but in longitudinal median sections are seen to be irregularly arranged at varying intervals, somewhat in the same manner as the medullary rays are in the stem of a plant. They extend from the outer side of the lining epithelium (*l. ep.*) up and into the large gland cells. Internal to this glandular tissue are bundles of longitudinal muscles, followed internally by a ring of circular muscle fibres (*c. m. f.*). The central portion of the gland consists of a loose connective tissue, with small, round cells scattered throughout, bounded on its inner face by the small, cuboid, lining epithelial cells, which are arranged in a wavy outline and bound a small, central cavity. A somewhat similar structure has been indicated by Weigmann^o in *Xesta cincta*, Lea, and *X. halmaherica*, Strub.*

A similar section through the dart-sac exhibits the following structure: externally there is a layer of fairly large, cuboid epithelial cells (Fig. 11, *e. p.*) with muscle fibres and connective tissue below, then a series of small, rounded cells, scattered amongst more connective tissue. The dart consists of an external layer of muscle, connective tissue and small cells, followed by a layer of circular muscle fibres, then a mass of tissue similar to that in the dart-gland, bounded by cuboid epithelial cells, which enclose a small, central cavity.

The common duct is folded twice, and the prostatic portion stands out conspicuously. The hermaphrodite duct is closely coiled, and the gland is small and somewhat pyriform (Fig. 2, *h. gl.*).

The Free Muscles (Pl. vi, fig. 12).—The buccal retractor divides anteriorly into two branches, each of which again divides, the four muscle bands being inserted on the ventral side of the buccal cavity. The oculars are similar on both right and left sides, the inferior and superior being separate for over half the length. From the former a

^o Abhandl. d. Senckenb. naturf. Gesell., 1896, 7. xxx, fig. 23, T. xxxi, fig. 8.

* Semper also gives good figures.

short labial muscle is given off, while from the superior ocular, the short pedal muscles arise. The columellar muscle is small, and divided into four main branches.

The Pallial Region (Pl. vi, fig. 13).—The kidney is short, being only a little over twice the length of the pericardium. The ureter arises from the left anterior side of the kidney, it is very wide, and forms a conspicuous V-shaped tube. Unlike the condition obtaining in some of the Indian species of *Nilgiria*, the kidney does not extend to the side of the rectum, but terminates bluntly before the bend of the ureter. The pulmonary cavity is comparatively small.

Affinities.—So little detail is known of the anatomy of what at first sight appear allied genera to *Balnadvipia*, that it is difficult to institute comparisons. I have examined the internal structure of different species of *Nilgiria*, to which genus the one under discussion is probably nearly related, but until I have worked out the same in greater detail, and know the anatomical position of *Nilgiria*, I prefer to reserve any expression of opinion.

For Explanation of Plates and Reference Letters, see next page.

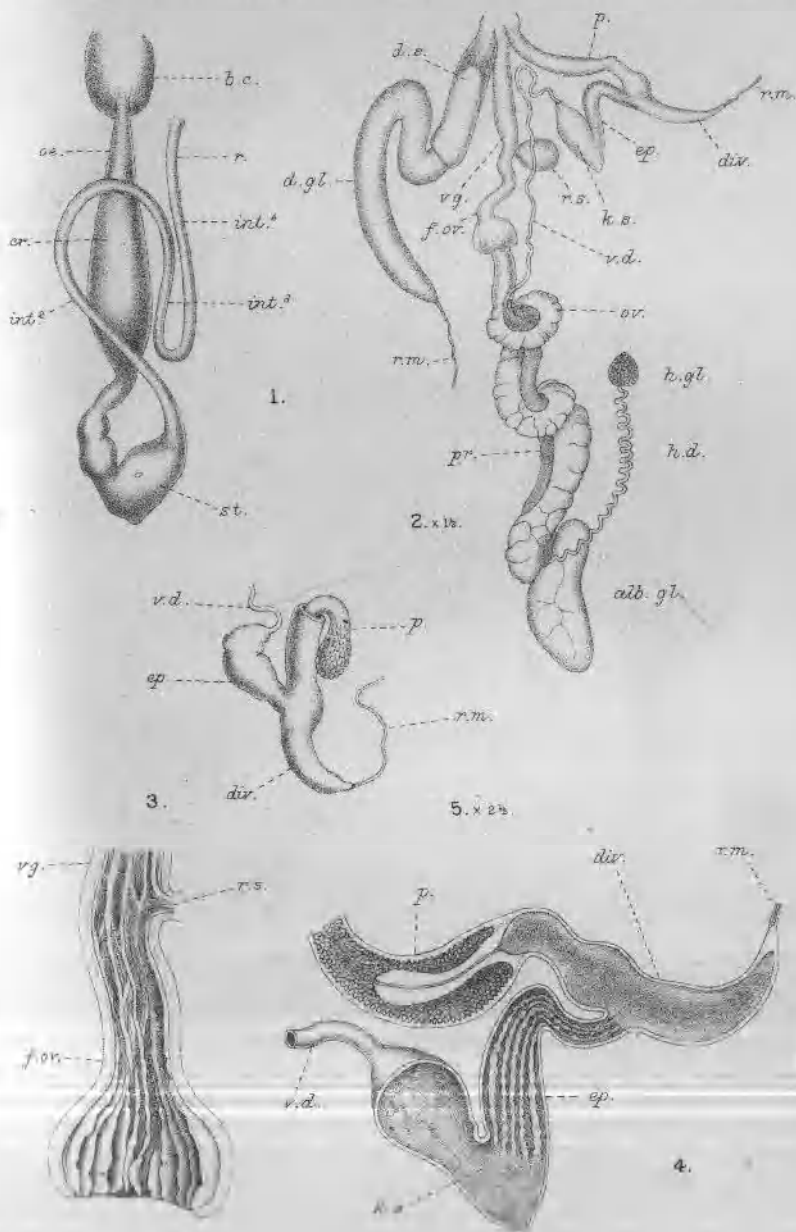
EXPLANATION OF PLATES V AND VI.

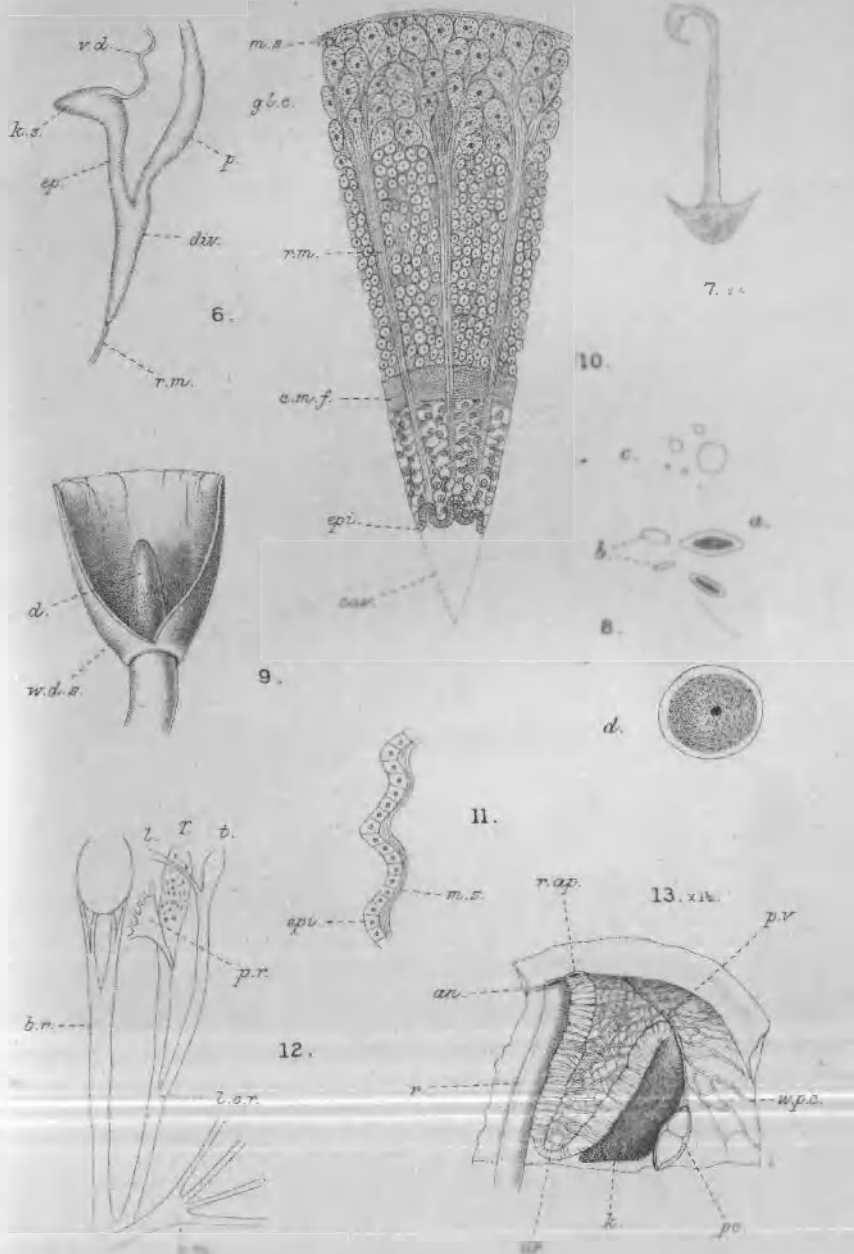
Ratnadrifia irradians, Pfr.

- Fig. 1. Intestinal tract.
 Fig. 2. Generative organs. $\times 1\frac{1}{2}$.
 Fig. 5. Dissection of the vagina and free-oviduct to show the internal walls
 Fig. 4. Dissection of the terminal ducts of the male generative organs, showing
 evertible penis, lumen of the diverticulum and plicae of the
 epiphallus.
 Fig. 5. Terminal ducts of the male generative organs of a young specimen,
 showing the penis everted, and the short epiphallus. $\times 2\frac{1}{2}$.
 Fig. 6. Terminal ducts of the male generative organs of a fully matured
 specimen, showing variation in the epiphallus.
 Fig. 7. Spicule from the kalk-sac. $\times 4$.
 Fig. 8 a-d Calcareous granules from the kalk-sac.
 Fig. 9. Dart-sac opened to show the fleshy dart.
 Fig. 10. Transverse section of the dart-gland.
 Fig. 11. Epithelial layer of the dart-sac.
 Fig. 12. The free muscles.
 Fig. 13. The pallial complex. $\times 1\frac{1}{2}$.

REFERENCE LETTERS.

- | | | | |
|-----------------|-------------------------|-----------------|----------------------------|
| <i>alb. gl.</i> | Albumen gland. | <i>m. s.</i> | Muscular sheath. |
| <i>an.</i> | Anal aperture. | <i>oe.</i> | Oesophagus. |
| <i>b. c.</i> | Buccal cavity. | <i>ov.</i> | Oviduct. |
| <i>b. r.</i> | Buccal retractor. | <i>p.</i> | Penis. |
| <i>car.</i> | Cavity of dart-gland. | <i>pe.</i> | Pericardium. |
| <i>c. m.</i> | Columellar muscle. | <i>pr.</i> | Prostate. |
| <i>c. m. f.</i> | Circular muscle fibres. | <i>p. r.</i> | Pedal retractors. |
| <i>cr.</i> | Crop. | <i>p. v.</i> | Pulmonary vein. |
| <i>d.</i> | Dart. | <i>r.</i> | Rectum. |
| <i>d. gl.</i> | Dart-gland. | <i>r. ap.</i> | Renal aperture. |
| <i>d. s.</i> | Dart-sac. | <i>rm.</i> | Radial muscle fibres. |
| <i>ep.</i> | Epiphallus. | <i>r. m.</i> | Retractor muscle. |
| <i>epi.</i> | Epithelium. | <i>r. s.</i> | Receptaculum seminis. |
| <i>f. ov.</i> | Free-oviduct. | <i>st.</i> | Stomach. |
| <i>gl. c.</i> | Gland cells. | <i>T.</i> | Superior ocular retractor. |
| <i>h. d.</i> | Hermaphrodite duct. | <i>t.</i> | Inferior ocular retractor. |
| <i>h. gl.</i> | Hermaphrodite gland. | <i>ur.</i> | Ureter. |
| <i>int. 1-4</i> | Loops of intestine. | <i>vg.</i> | Vagina. |
| <i>k.</i> | Kidney. | <i>v. d.</i> | Vas deferens. |
| <i>k. s.</i> | Kalk-sac. | <i>w. d. s.</i> | Wall of dart-sac. |
| <i>l.</i> | Labial muscle. | <i>w. p. c.</i> | Wall of pulmonary cavity. |
| <i>l. o. r.</i> | Left ocular retractor. | | |





W.E.C. del. ad nat.
Fig. 10 & 13 F.P. del. ad nat.

A.S. Hutch, hold. London

NOTE ON THE ANATOMY OF *APER*A BURNUPI, E. A. SMITH.

By WALTER E. COLLINGE.

IN 1897¹ I briefly described some parts of the internal organs of *Apera burnupi*, E. A. Sm., and later² I have given a similar description of *A. natalensis*, Collg. Both these specimens had been in alcohol for some years, and I pointed out how difficult it was to make out the form of the various organs owing to their exceedingly brittle nature. Recently I have been able to examine a further specimen of the former species, and I find that my earlier description is incorrect in one very important feature, viz. the male generative organs. In the specimen previously examined I was unable to trace any distinct penis, and so far as I could interpret the form of the terminal ducts, the vas deferens seemed to open into the vestibule, the anterior portion dilating slightly, and this I termed the penis (Cf. op. cit., pl. v, fig. 6 p.).

In the specimen now examined I find a well developed penis, which opens into the vestibule on the right side. It is a long, muscular organ, gradually becoming larger distally and then tapering to a blunt point. The vas deferens joins it on the inner side, nearly at its distal end as a bulbous sac, and attached to the left side of this sac is a small diverticulum (Fig. 1, d.), possibly the homologue of the flagellum common to many *Testacellidae*. Passing then closely along the inner or left side of the penis to the region of the vestibule, the vas deferens makes a turn backward and here becomes slightly dilated. The retractor muscle of the penis is very long, measuring 14.5 millim. in the present specimen, whose total length is about 52 millim. It takes its origin from the mid-dorsal body-wall, and is inserted in the penis at its extreme distal end.

The condition of the male organ is probably similar in *A. natalensis*, where I was unable to find any penis in the type specimen.

In their beautiful work on the land mollusca of the Celebes, the Sarasins express the opinion that *Apera* is an ancestral form of *Atopos*, Simr., and that both genera are nearly related to the *Testacellidae*. While admitting that *Apera* is closely allied to this family, I am inclined

¹ Ann. Mag. N. H., 1897 (s. 6), vol. xx, pp. 291-295, pl. v.

² Ann. Sib. Afr. Mus., 1900, vol. ii. pp. 1-8, pls. i, ii.

to regard the Testacollid resemblances of *Atopos* as independently acquired, in fact I think when we know more of their minute structure, it will probably form a very interesting example of parallelism in evolution.

In the three specimens of *Apera* which I have examined, I have seen nothing which might be compared with the spider glands of Simroth, which have been described as common to *Atopos*, while the pallial complex, pedal gland, and generative organs are totally different.

Further, the above authors are, in my opinion, incorrect in stating that Heynemann was wrong in supposing that the orifice near the right upper tentacle was common to the male and female organs.

I venture to appeal to malacologists and others in South Africa, for more examples of *Apera*, in order that anatomical investigations at present in hand may be carried out.



Figure of the Generative Organs of *Apera burnupi*, E. A. Smith.

alb. gl.	Albumen gland.	p.	Penis.
d.	Diverticulum.	r. m.	Retractor muscle.
f. or.	Free-oviduct.	r. s.	Receptaculum seminis.
h. d.	Hermaphrodite duct.	v. d.	Vas deferens.
ov.	Oviduct.	vg.	Vagina.

ON THE GENUS *ASHMUNELLA*, PILS. & CKLL.

By C. F. ANCEV.

WITH ANATOMICAL NOTES,

By R. MURDOCH.

(Plate vii.)

THE genus *Ashmunnella* was established by Messrs. H. A. Pilsbry and T. D. A. Cockerell,¹ for the reception of some shells, externally difficult to separate from *Polygyra*, and especially from the group generally known as *Triodopsis*. The form and texture of the shell, form of the aperture, and teeth when present, do not furnish a single character that would separate them from *Polygyra*. Strangely enough the soft parts differ anatomically, and the geographical distribution is peculiar. All the species are confined to the boundaries of New Mexico and Arizona. These, say Pilsbry and Cockerell, "fairly define a region of arid plains from which rise numerous mountain ranges, upon whose summits the humidity refused by the dry and warmer air of the plains is precipitated. Upon the elevations thus set apart by the circumstance of a moister and colder climate, the snails inhabiting the region are chiefly found. And standing island-like in a waterless sea, the mountains exhibit to a considerable extent the peculiarities of insular faunas, each range having its own special assembly of forms, specific or varietal, in addition to a series of species common to ranges over the greater part of the region." These mountains are the home of *Ashmunnella*, a genus which occurs in New Mexico from the latitude of Santa Fé to the White Mountains (Sierra Blanca), and westward to S.E. Arizona.

The authors above cited state that the shell offers no characters different from *Triodopsis* or *Mesodon* sections of *Polygyra*, and that "it is helicoid, depressed and umbilicated, dull coloured, not banded so far as known, with lunate aperture and reflexed peristome: parietal tooth, when present, simple, not v-shaped or biformose."

My observations are quite in accord with the above, but, in my opinion *Polygyra mearnsii*, Dall, and *P. levettei*, Bland, probably are members of the genus and hitherto the most toothed forms known. They belong to the same region, and their soft parts being unknown, I am inclined to place both species in this group, rather than in the

¹ Proc. Acad. Nat. Sci. Phila., 1899, p. 125.

true *Polygyra*; and with all due deference to the opinion of Messrs. Pilsbry and Cockerell, who referring to *A. thomsoniana*² state that "the species differs widely from *Polygyra levettei*, which is not an *Ashmunella*, but apparently a true *Polygyra*." If I am correct, that is if we must include in *Ashmunella* *P. levettei* and *P. mearnsii*, the shell diagnosis has to be modified in regard to the parietal tooth. In the latter species there are two converging lamellae, not united at their inner ends into a **A**, the basal lamella stouter and its outer extreme bent towards the umbilicus.

CATALOGUE AND SHELL CHARACTERS OF ASHMUNELLA.

Ashmunella mearnsii (Dall).

Polygyra mearnsii, Dall: Proc. U. S. Nat. Mus. 1896, p. 343, pl. xxxii, figs. 7, 8, 11.

Shell depressed, 5-whorled, of a pinkish brown colour, with more or less conspicuous incremental lines; spire nearly flat; sutures very distinct; periphery rounded, but nearer the upper surface of the whorl; base rounded with a compressed appearance; umbilicus deep and narrow; body whorl slightly descending at the termination, and constricted behind the reflected lip of a very oblique aperture; peristome somewhat flexuous, united over the body by a distinct callus; the body with two converging lamellae, and the basal part with two distinct clear-cut lamellae transverse to the lip; outer lip broad, receding, with a similar lamella set on somewhat obliquely and more deeply within the aperture.

Alt. 5.5; diam. max. 15, min. 11 millim.

Loc.—Huachuca Mountains, Arizona; Hachita Grand Mountain, S.W. New Mexico, altitude 8,000 to 9,400 feet (Dr. Mearns); Organ Mountain, New Mexico (Prof. Townsend).

Ashmunella levettei (Bland).

Triodopsis levettei, Bland: Ann. N. Y. Ac. Sci., 1881, ii, p. 115.

Polygyra levettei, Bland: Dall, Proc. U. S. Nat. Mus., 1896, p. 341.

Shell larger than *mearnsii*, with 7 whorls, less depressed, and a single oblique tooth on the parietal wall.

Loc.—Said to occur in Santa Fé Canyon, near Santa Fé, New Mexico, but not again found there since its discovery by Levette. (Specimens sent from this locality by the late J. H. Thomson are not

² Nautilus, 1896, vol. xiii, p. 30.

levettei, but *thomsoniana*, Ancey). Near Tucson, Arizona (Cox); Fort Huachuca, Arizona (Fisher); Huachuca Mountains, Arizona, near the summit of the higher peaks (Mearns).

Ashmunella thomsoniana (Ancey).

Triodopsis levettei, Bland var. *thomsoniana*, Ancey: Conch. Exch., 1887, ii, p. 64.

Triodopsis levettei, Bland var. *orobaena*, Ancey: Loc. cit. supra.
(This is but an individual modification of *thomsoniana*, and not a true variety).

Shell depressed, in form closely resembling *A. pseudodonta*, but with an acute denticle within the outer lip and a single hardly bifid basal tooth; there is no notch as in *pseudodonta*, but a distinct basal tooth, in some specimens it is simple or nearly so, while in others it is bifid, in the latter case the tubercle nearest the umbilicus is less raised than the outer one; whorls $5\frac{1}{2}$, the last deflected at its termination; surface shining, with faint incremental striae; spire depressed, but not flat.

Alt. 7.5; diam. 12.14 millim.

Loc.—Santa Fé Canyon, New Mexico (Thomson, also Ashmun).

Ashmunella thomsoniana (Ancey), var. **porterae**, Pils. and Ckll.

Nautilus, 1899, vol. xiii, p. 49.

Shell corneous, shining, with distinct lines of growth and minute spiral incised lines; umbilicus broadly exposing the penultimate whorl; whorls $5\frac{1}{2}$ —6; lip ochreous-tinged above and at the edge, the teeth white; parietal tooth well-developed, outer tooth long, basal tooth always bifid.

Diam. max. 14 to 16.5 millim.

Loc.—Bulah, Upper Sapello Canyon, New Mexico (Miss W. Porter and Miss H. Blake).

Ashmunella pseudodonta (Dall).

Polygyra pseudodonta, Dall: Proc. U. S. Nat. Mus., 1896, No. 1111, p. 343.

Similar to *A. ashmuni* in size and form, but with the whorls slightly flattened above and below, and of a yellowish-straw colour instead of livid brown; the spiral striations less sharp and largely obsolete. The aperture with a narrow reflected lip, pink or whitish; on the internal edge of the basal part is a slight callosity, which is divided by a narrow sulcus in the direction of the coil of the shell; within the aperture and nearly midway between the outer and pillar

lips is a small, low, simple, short, oblique parietal tooth or ridge, with the outer end nearer the pillar.

Alt. 5.5 to 7; diam. 13.5 to 15 millim.

Loc.—White Oaks, New Mexico, at an altitude of 7,500 feet (Ashmun).

Nearly allied to *A. thomsoniana*, but wanting the denticle within the outer lip, and with the basal edge notched, not toothed.

***Ashmunella pseudodonta*, Dall subsp. *capitanensis*, Ashmun and Ckll.**

Nautilus, 1899, vol. xii, p. 131.

Shell depressed, shining, dark horn colour or even reddish; the usual striae distinct, but not sharp, spiral impressed lines visible with a lens; whorls $5\frac{1}{2}$, rounded; aperture oblique, semilunar; lip expanded, broad, reflected, strongly tinged with pinkish or coffee colour, edentulous, except that the basal part bears within a distinct but slight callus, which is more or less livid; parietal denticle either rudimentary or distinct, but never large; umbilicus broad, exposing the penultimate whorl.

Alt. 8 to 10; diam. max. 17 to 18.5, min. 14.5 to 15 millim.

Loc.—Near Baldonado Springs, Capitan Mts. (Sierra Capitana), Lincoln Co., New Mexico, altitude 8,200 feet (Ashmun).

***Ashmunella ashmuni* (Dall).**

Polygyra ashmuni, Dall: *Proc. U. S. Nat. Mus.*, 1896, No. 1111, p. 342.

Differs from *A. chiricahuana* in size, being only 14 mm. in greatest diameter and 7 mm. in height; also the surface when strongly magnified is seen to be covered with sharp, delicate, spiral, incised lines with wider interspaces. The number of whorls is but slightly less, if at all different. If the element of actual size be ignored, the figure given by Dall of *A. chiricahuana* will equally well represent the species in question. A careful scrutiny of a series of *A. chiricahuana* shows that incised lines occur quite frequently in some individuals, so that the species under discussion may only represent a dwarf race of it with more emphatic sculpture. I fully share Dall's opinion.

Loc.—Bland, New Mexico, altitude 8,000 feet (Ashmun).

***Ashmunella chiricahuana* (Dall).**

Polygyra chiricahuana, Dall: *Proc. U. S. Nat. Mus.*, 1895, p. 2, also 1896, vol. xviii, p. 341, pl. xxxii, figs. 9, 10, 12.

Shell depressed, thin, polished, and of a dark brownish colour; whorls $5\frac{1}{2}$, sculptured only with fine incremental lines; sutures distinct, whorls moderately rounded; periphery rounded, the termination of

the last whorl constricted behind the lip and somewhat descending; umbilicus deep and narrow, showing a part of the penultimate whorl near the aperture; aperture oblique, with a narrow strongly reflected lip of a livid whitish colour; the pillar and outer lips connected in fully matured specimens by a smooth callus; the outer lip is flexuous, receding near the periphery, and more vertical near the base. The aperture is destitute of teeth, but, sometimes (in Jemez mountain specimens) there is an obsolete parietal denticle and occasionally an obscure thickening on the basal edge, in one specimen from this locality the edge is flexuous within, recalling that of *A. pseudodonta*, but not notched.

Alt. 7.7; diam. max. 18, min. 14.8 millim.

Loc.—Fly Park, Chiricahua Mountains, Arizona, at an elevation of 10,000 feet (Fisher); Jemez Mountains and Jemez Sulphur Springs, S.W. of Santa Fé, New Mexico, alt. 8,000 to 10,000 feet (Ashmun); near Tucson, Arizona (Cox).

The specimens from Chiricahua Mountains which may be regarded as typical, are rather more elevated and perhaps a trifle more tightly coiled than those from New Mexico, and are entirely destitute of teeth. Those from near Tucson are large, much depressed, more yellow, and the examples before me with pale varices marking stages in the growth of the shell; the whorls appear to be slightly less in number, and the aperture is edentulous. It seems to be at least a local race and I name it var. *varicifera*. Further investigation may perhaps prove that it is distinct.

Ashmunella altissima (Cockerell).

Nautilus, 1898, vol. xii, p. 76.

Shell with $5\frac{1}{2}$ whorls, pale yellowish-brown; sutures moderately deep; spire flattened and low, periphery rounded; apical whorls nearly smooth, and with little sculpture as far as the middle of the penultimate whorl, after which the shell becomes distinctly and strongly obliquely ribbed, the ribs near the aperture being particularly strong, the last whorl has about 48 of these ribs; umbilicus narrow and deep; aperture obliquely semilunar; the peristome subcircular, except where interrupted by the parietal wall, strongly thickened, recurved with a sharp edge, yellowish white, and without teeth; no parietal denticle.

Alt. 6; diam. max. 12, min. 10 millim.

Loc.—Highest summit of White Mountains (Sierra Blanca), Lincoln Co., W. New Mexico, alt. 11,092 feet (Townsend).

Much smaller and flatter than *A. rhyssa*, with the aperture more narrow and the last whorl less evenly rounded.

Ashmunella miorrhysa (Dall).

Polygyra miorrhysa, Dall: Nautilus, 1898 (Nov.), vol. xii, p. 75.

Shell depressed, dark brown; about $5\frac{1}{3}$ rounded whorls, the periphery somewhat rounded above the middle of the last whorl; sutures distinct; umbilicus small, deep, narrowing rapidly towards the apex. The surface polished, with microscopic revolving striae, and fine, slightly irregularly distributed, oblique transverse ridges. Aperture subcircular, with a reflected, white peristome continued over the body by a thin, translucent callus; the reflected peristome has an obscure thickening inside the peripheral part, and another more distinct inside the base; within the aperture is a small, oblique, white parietal tooth.

Alt. 8.5; diam. 15.5 millim.

Loc.—Eagle Creek, Sierra Blanca, Lincoln Co., New Mexico, alt. 7,500 to 8,500 feet (Ashmun, also Townsend).

Ashmunella rhyssa (Dall).

Polygyra rhyssa, Dall: Nautilus, 1897 (May), vol. xi, p. 2.

Shell dark yellowish-brown; whorls 6, rounded and the sutures rather deep; the spire low but not flattened; nuclear whorls nearly smooth, the others rather coarsely obliquely striated, the last fourth of the last whorl with rather sharp, elevated riblets with wide interspaces and a marked constriction behind the reflected peristome. The entire surface more or less distinctly finely spirally striate; the periphery somewhat above the middle of the last whorl; umbilicus small and deep; aperture subcircular and oblique, with a reflected and rather solid peristome, a small obscure thickening on its basal part and a light wash of callus over the body; slightly within the aperture is a small, oblique, elongated parietal denticle.

Alt. 9; diam. max. 17, min. 14 millim.

Loc.—Sierra Blanca, W. New Mexico (Ashmun).

Ashmunella rhyssa, Dall var. **hyporhyssa**, Ckll.

Nautilus, 1898, vol. xii, p. 77.

Like *rhyssa* in size and form, but, the umbilicus wider exposing the penultimate whorl; the sculpture finer, consisting of striae rather than riblets.

Alt. 9; diam. max. 15, min. 12.66 millim.

Loc.—Lower slopes of Sierra Blanca, New Mexico, above head of Ruidoso Creek, in aspen belt, altitude about 9,500 feet.

The following forms of the variety are also recorded by Cockerell³

³ Nautilus, 1900, vol. xiv, p. 72.

from Cloudercroft, Sacramento Mountains, New Mexico.

Escentata.—Lacking, like the following, the parietal tooth; shell horn-colour or pale greyish-brown.

Rufescens.—Shell deep ferruginous or chestnut colour, lip tinged with pink.

Alba.—Shell creamy white. The first albino reported in *Ashmunella*.

The present paper was written and ready for publication, when another form of *A. thomsoniana* was discovered and described as follows by T. D. A. Cockerell:¹

"*Ashmunella thomsoniana cooperae*, n. var.—Shell with max. diam. from 13 to 15 millim., but usually of the smaller size; basal tooth single, occasionally slightly double; umbilicus narrower than in the type or var. *porterae*, exposing less of the penultimate whorl; genitalia as in *porterae*, with the same long (22 mm.) spermoetheca, and double insertion of the penis retractor.

Hab.—Las Vegas Hot Springs, 1900, 1901. Discovered by Miss Mary Cooper; later taken in quantity by Miss Cooper and Miss Maud Ellis. The locality is in the Transition Zone, at about 7,000 feet altitude; *porterae* belongs to the Canadian Zone, about 1,000 feet higher. This is not a very distinct form, conchologically; but it is worth calling attention to as a species of *Ashmunella* in the marking, probably derived from the *porterae* form rather than from the true *thomsoniana*."

I can add nothing to this, the form now being unknown to me.

ANATOMICAL NOTES.

By R. MURDOCH.

Ashmunella pseudodonta (Dall).

(Pl. vii, figs. 1—7.)

THE specimens from which the following notes are taken were collected by the Rev. E. H. Ashmun, and received in alcohol in a good state of preservation. The locality given is White Oaks, New Mexico, at an altitude of 7,500 feet.

EXTERNAL FEATURES.

The upper surface is covered with fine granules, somewhat irregularly arranged and darkish in colour. The foot-sole is whitish and rounded above. There are no pedal grooves. The mantle has an

even and slightly reflexed margin, with a small lappet at the respiratory pore. Tentacles black, the inferiors appear to be very small; labial projections well marked and triangular in outline. Generative orifice a little below and slightly posterior to the right tentacle.

INTERNAL ANATOMY.

The Jaw and Radula (Pl. vii, figs. 1, 2).—The jaw is arcuate, stout, with five or six slightly unequal, broad ribs in the middle area and the ends with a number of small riblets. The dentition has the formulae varying from 25—1—25 to 27—1—27. The central teeth with stout mesocones, having well developed cutting points and small right and left side cusps; laterals with meso- and ectocones, the latter small and the basal plates produced on the outer sides. From laterals to marginals the change is gradual, the latter have the mesocones bifid, and as they proceed outward the basal plates become shorter with frequently two outer thorns, and occasionally three from the splitting of a thorn.

The Alimentary Canal (Pl. vii, fig. 3).—The buccal mass has the usual shape; enveloping the oesophagus are two salivary glands, intimately united along their inner edges, which gives to them the appearance of a single gland with two ducts, the latter empty into the buccal cavity in the usual position. The stomach forms a comparatively large elongated sac, its posterior end is curved forward and receives the right and left bile ducts. The intestine passes forward until arriving at the posterior margin of the kidney, when it curves to the right and then back through the folds of the liver, after which it again passes forward, and terminates in a long, narrow rectum; it thus divides the left lobe of the liver into three irregular shaped lobules, from each of these lobules is a bile duct, but all unite to form a single duct before opening into the stomach.

The Pallial Organs, etc. (Pl. vii, fig. 3).—The kidney is long and narrow, in length nearly four times its width, slightly more than two and a half times the length of the pericardium, and rather more than half the length of the pulmonary chamber. The ureter arises from the left anterior side of the kidney, follows the right margin, on which it partially rests, back to the posterior end, then curving to the right it forms a narrow tube and proceeds forward parallel with the rectum, terminating a little in front of the respiratory orifice. The great efferent vessel is conspicuous and runs direct to the auricle, its numerous branches collect the blood from the right anterior corner, middle area, and greater portion of the right side of the pulmonary chamber; alternately with the efferent branches are the afferent vessel.

and branches. The venation on the right side and right anterior corner, is much more strongly marked than on the left, in the latter it is minute and widely separated. There is also a small, left, posterior efferent vessel, the branches from which are exceedingly minute, this runs forward following the margin of the pericardium, and enters the auricle at the same point as the greater vessel. On the right of the pericardium is another small vessel, which proceeds from the kidney and apparently enters the auricle with the other vessels; it appears to be the final channel for the blood received by the kidney, from the several efferent branches which enter its right margin.

Compared with *Helix aspersa*, Müll., the above species presents no marked difference in the form of the stomach, track of the intestine, division of the left lobe of the liver and track of the ureter, the efferent vessels proceeding direct to the auricle are also the same. The branching and rebranching of the tributary vessels differ as might be expected, and the venation throughout the left region is strongly marked in *H. aspersa*. This latter species differs in the kidney being short and subtriangular in shape, it has a length of less than twice its width, only twice the length of the pericardium, and less than half the length of the pulmonary chamber. It has also a large efferent branch with several tributaries, on the left of the great efferent vessel, which unites with the latter close to the pericardium. In *A. pseudodonta* there are no conspicuous branches on the left side, the first is slightly better defined than those immediately following, but its junction with the greater vessel is considerably anterior to the pericardium.

The arterial system I failed to follow with sufficient exactness to give a detailed description; the great arteries apparently follow a course similar to those in *H. aspersa*; the nervous system is also, as regards the position and union of the several ganglia, very similar.

The Free Muscles.—The penis retractor is attached to the diaphragm, as usual. The right and left bands which supply the foot and tentacles unite posteriorly, but, their junction is anterior to the point where the buccal mass retractor coalesces with them, the latter forms a comparatively wide, shallow trough, immediately before its attachment to the buccal mass. The right ocular retractor passes between the terminal ducts of the generative organs.

The Generative Organs (Pl. vii, figs. 4—7).—The penis is short and stout, somewhat abruptly contracted. The epiphallus is a long, slender tube, the vas deferens opening into it a little below the apex. The retractor muscle of the penis has a double attachment, it is inserted in the lower third of the epiphallus, and from there continued free to the penis, to which it unites in the form of a thin sheath. The

portion of the epiphallus between the upper and lower insertions of the muscle exceeds the latter in length, and remains in a free loop when the muscle is pulled out straight. A specimen in which the penis is everted, shews the eversible portion slightly more than equals the difference in length between the epiphallus and muscle. The internal wall of the penis (Fig. 5) exhibits three large plications and several smaller threads, these are continued within the epiphallus, where they are smaller and finely convoluted. The hermaphrodite gland is embedded in the right lobe of the liver, and consists of four small masses of follicles, which from the arrangement of their ducts are seen to be paired. The hermaphrodite duct is convoluted, and at its junction with the albumen gland there is a minute club shaped appendix (Fig. 4, *ap.*). Cross sections of the latter (Fig. 6) shew two tubes within this body, one of which is minute, and the other well marked and lined with ciliated epithelial cells, the apex forms a small chamber lined with epithellum, and into this cavity both tubes open. In this and the following species, the so-called appendix branches from the hermaphrodite duct partly within the albumen gland, and externally, has the appearance of springing direct from the latter organ (Fig. 7). Small as it is, the hermaphrodite duct on separating from the appendix, is very much less in diameter, and forms an exceedingly fine tube enveloped in a thin muscular membrane, which is attached to the prostate, the base of the albumen gland, and also partially envelopes the appendix. No spermatozoa were noticed within the appendix, neither were they abundant in the convolutions of the hermaphrodite duct. The free-oviduct is short, and exhibits a slight contraction immediately below the point from where the receptaculum seminis arises. There is no indication of any accessory organs, or any evidence of degeneration; a simple, slight introversion of the walls produces the above mentioned contraction. The internal walls have the usual small, longitudinal folds. The receptaculum seminis is of medium length, slightly enlarged above and attached to the uterus by a delicate membrane.

Ashmunella thomsoniana (Ancey), var. **porterae**, Pils. and Kell.

Of this species there is but a single example of the animal, from Beulah, Upper Sapello Canyon, New Mexico.

The anatomy has been worked out by Pilshry,⁵ but, unfortunately, I am unable to refer to this paper.⁶

⁵ Proc. Acad. Nat. Sci. Phila., 1900, p. 108.

⁶ Pilshry simply says (loc. supra cit.) "Genital system similar to that of *thomsoniana*, except that it is larger, with a doubtless insertion of the penis retractor muscle" (C. F. Ancey).

INTERNAL ANATOMY.

The dentition gives the formula 26—1—26 or 11—15—1—15—11, in transverse, nearly straight rows; the form of the teeth is very similar to that of the preceding species. The jaw is strong, arcuate, with fourteen or fifteen ribs which denticulate the margins, those in the middle area are strongly developed, but towards the ends they become weak and indistinct.

The Generative Organs (Pl. vii, fig. 8).—The penis is of medium length, slightly contracted in the middle, with the posterior portion less robust; continuing as the epiphallus, which is about three times the length of the penis, the vas deferens opens into it a little below the apex. The retractor muscle is inserted in the lower third of the epiphallus, and differs from that in the preceding species in that it has but a single attachment. The internal wall of the penis exhibits several fleshy plications, which are continued into the epiphallus and are delicately convoluted. The receptaculum seminis forms a narrow tube shortly after branching from the free-oviduct, with an expanded apical portion. It extends almost to the base of the albumen gland. Internally the walls of the lower portion are studded with small granules, while those of the free-oviduct have the usual plications. Other organs are similar to those of the preceding species.

In addition to the shell characters, the external features of the animal, the jaw and dentition are the same as *Polygyra*; on the other hand the generative organs resemble the Epiphallogonous Helices. Pilsbry and Cockerell assign *Ashmunella* to the Belogona group, regarding it as having lost by degeneration the dart-sac and associated mucous glands. In cases such as this it would be of special value could we determine the group to which it is allied, by organs totally uncorrelated with the generative organs. Pilsbry⁷ states that the pallial organs supply facts for phylogenetic research not less in importance than those derived from the generative organs, and supports the statement with comparative measurements of a number of genera, all of which are included in the Epiphalloгона. The characteristic feature in the above group is the long, ribbon-like kidney, which is from four to ten times the length of the pericardium, and extends to as much as three-fourths of the total length of the lung. *A. pseudochonta* is seen to differ considerably from the above, and apparently does not belong to the group, but a knowledge of the Belogona Eudendia is required before accepting this evidence as conclusive.

It may perhaps not be out of place to add the measurements of the pallial organs of a few other species: *Helix subapertura*, Ancey. Kidney in length, twice its width, nearly twice the length of the pericardium, and scarcely half the length of the lung. *Helix (Otala) constantinae*, Forbes. Kidney in length, four times its width including the ureter, and twice the length of pericardium. The rectal portion of the ureter, in the form of a groove. *Helicella zaccarensis*, Kob. Kidney in length, nearly four times its width, rather more than twice the length of the pericardium, and about half the length of the lung. *H. (Trochula) zitounica*, L. and B. Kidney in length, nearly four times its width, considerably less than twice the length of the pericardium, and nearly half the length of the lung. The rectal portion of the ureter, in the form of a groove. *Leucochroa candidissima*, Drap. Kidney scarcely twice the length of the pericardium and considerably less than half the length of the lung. *Helix (Levantina) hierosolyma*, Boiss. Kidney in length, nearly four times its width, two and three quarter times the length of the pericardium, and less than half the length of the lung. The rectal portion of the ureter in the form of a groove.

NOTE BY C. F. ANCEY.—Mr. Murdoch had no access to the paper published by H. A. Pilsbry, under the title: "Note on the Anatomy of the Helicoid genus *Ashmunnella*," in the Proc. of the Ac. of Natural Sciences, Philadelphia, 1900, pp. 107—109. From this I extract the following data concerning *Ashmunnella thomsoniana* typical.

... "The single specimen secured extruded its penis in drowning, and I found it impossible to retract it. It is notable that only the lower and wider portion is everted, not the tapering upper part, which is probably epiphallic.

"The general proportions of the genitalia are as in var. *porterae* the spermatheca being long, decidedly over half the length of the penis + epiphallus, in both forms. The lower insertion of the penis retractor muscle in var. *porterae* seems to be wanting in *thomsoniana*.

"The jaw is strongly arcuate with seven moderately strong, separated, distinct ribs.

"Radula with 27 or 27 teeth, similar to those of *A. hyporhyssa*, the tenth to the thirteenth transitional, outer ten margins, with the inner cusps bifid."

Pilsbry adds (p. 108): "The tridentate forms *thomsoniana* and *porterae* differ from the others in the greater proportionate length of the spermatheca."

EXPLANATION OF PLATE VII.

Ashmunella pseudodonta.

- Fig. 1. Jaw.
 Fig. 2. Teeth.
 Fig. 3. The Alimentary canal, pallial organs, etc.
 Fig. 4. Generative organs.
 Fig. 5. Cross section through the penis showing the internal plications.
 Fig. 6. Cross section through the appendix to the hermaphrodite duct.
 Fig. 7. Albumen gland, much enlarged, to show the natural position of the appendix, hermaphrodite duct, and the membrane enveloping the latter.

Ashmunella thomsoniana var. *porterae*.

- Fig. 8. Generative organs.

REFERENCE LETTERS.

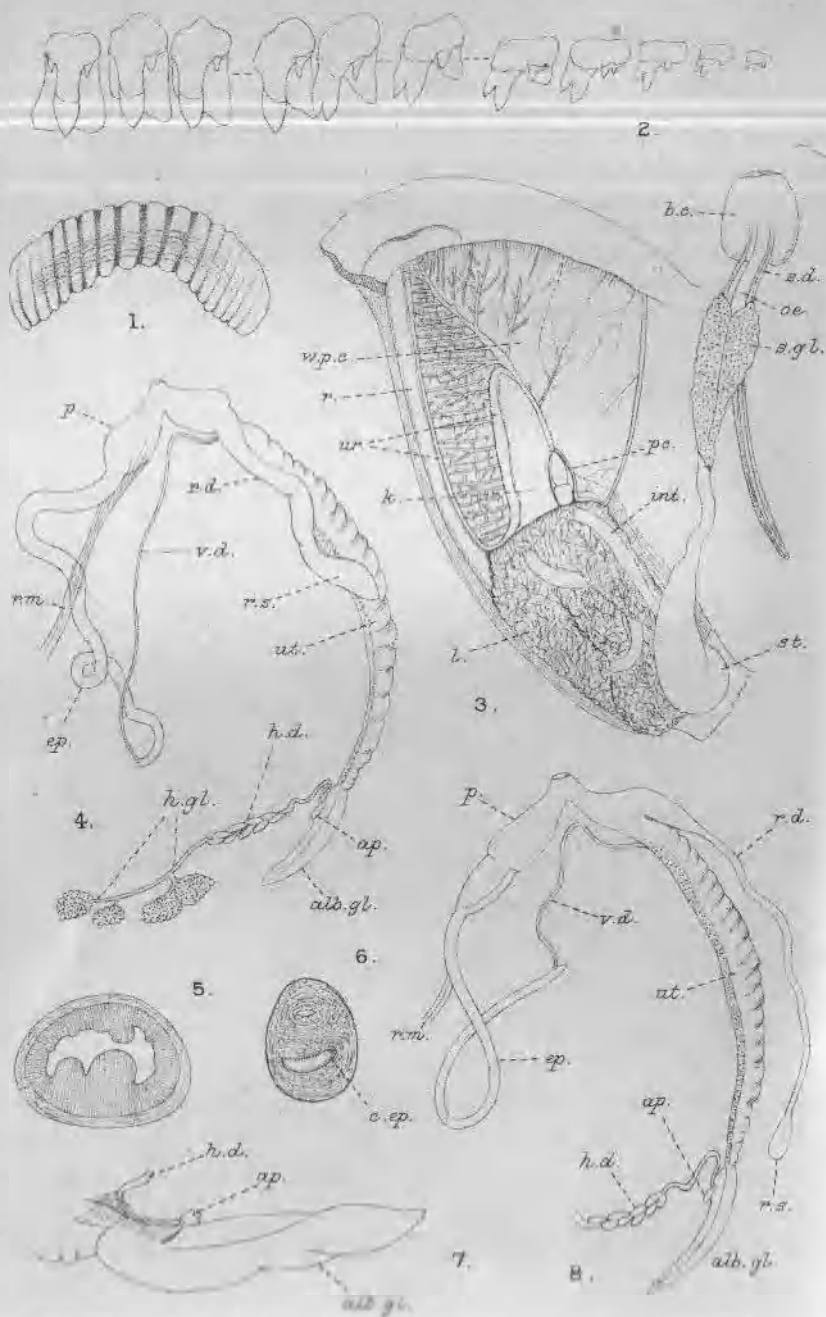
<i>alb. gl.</i>	Albumen gland.	<i>pc.</i>	Pericardium.
<i>ap.</i>	Appendix.	<i>r.</i>	Rectum.
<i>b. c.</i>	Buccal cavity.	<i>r. d.</i>	Receptacular duct.
<i>c. ep.</i>	Ciliated epithelium.	<i>r. m.</i>	Retractor muscle.
<i>h. d.</i>	Hermaphrodite duct.	<i>r. s.</i>	Receptaculum seminis.
<i>h. gl.</i>	Hermaphrodite gland.	<i>s. d.</i>	Salivary duct.
<i>int.</i>	Intestine.	<i>s. gl.</i>	Salivary gland.
<i>k.</i>	Kidney.	<i>ur.</i>	Ureter.
<i>l.</i>	Lung.	<i>ut.</i>	Uterus.
<i>oc.</i>	Oesophagus.	<i>v. d.</i>	Vas deferens.
<i>p.</i>	Penis.	<i>w. p. c.</i>	Wall of pulmonary cavity.

THREE NEW NUDIBRANCHS FROM CALIFORNIA.

By T. D. A. COCKERELL.

Coryphella cooperi, n. sp.

LENGTH about 20 millim.; foot narrow, posterior end long attenuate, anterior end produced into well-developed foot-tentacles at the sides, these curled backward, not half as long as oral tentacles; rhinophores as long (about 4 millim.) as oral tentacles, and similar to them, except that they are slightly verrucose; eyes very distinct, immediately behind rhinophores; branchial tufts in six pairs, the second largest; anterior tufts with about 28 papillae; the tufts are close together, and spreading, so that as the animal crawls they do not appear separate. Pellucid white with a decided pink tinge; a brilliant greenish-blue patch



FM del agent.

A. E. Huth, Lab[†] London

ANATOMY OF ARHMUNELLA

between the first two tufts of branchiae, in the area just in front of and to the left side of the heart; a little of the same greenish-blue colour at the bases of the branchial tufts. Branchial papillae reddish-brown, greenish at base, apex white. The heart was observed to beat 86 times a minute.

Hab.—San Pedro, California, on mud flats in the harbour, at low tide, July 19 (W. P. and T. D. A. Cockerell). It occurred with *Hermisenda opalescens* (Cooper). Named after Dr. J. G. Cooper, who was the first to study the nudibranchs of California.

This species has the lingual dentition of *Coryphella*, and agrees in general type with *C. rufibranchialis*, except that the lower corner of the lateral teeth in *C. cooperi* is very much more produced. The median tooth has a large central denticle, and 7 to 10 long sharp denticles on each side; the lateral teeth are much produced at both ends, with the median portion of the inner face bearing a number (about 10) of small spines, of which the lower five are relatively large and the others very small.

In having a colour-patch in the region of the heart, *C. cooperi* resembles *Eolis olivacea*, but in that species the patch is bright pink.

***Facelina stearnsi*, n. sp.**

Length about 30 millim.; foot narrow, posterior end long attenuate; colour of foot pale pink; foot-tentacles curled backward, short (about one-fourth length of oral tentacles), brilliant scarlet above; oral tentacles long (7 or 8 millim.), often curled backward, brilliant vermillion above, with white tips, otherwise pink; rhinophores about half length of oral tentacles, whitish at base, otherwise brilliant vermillion, except the extreme tips, which are white; the red portion which is somewhat broader than the basal, is very strongly annulated; eyes very distinct, just behind rhinophores; branchial papillae tapering, quite long, very pale greyish olivaceous, with the tips brilliant vermillion; branchiae in eight tufts on each side, so close as not to be readily distinguishable, anterior tufts very large, of about 28 papillae; sides of head speckled with vermillion; back white, no colour in region of heart. Teeth very much as in *Hermisenda opalescens*, with no lateral teeth. A long narrow central denticle, and four long lateral denticles, hardly half the length of the central one. The central denticle is longer and more slender than in *H. opalescens*.

Hab.—San Pedro, California, July 19, on mud flats at low tide with the last (W. P. Cockerell). Named after Dr. R. E. C. Stearn who has contributed to the knowledge of Californian nudibranchs.

Thecacera velox, n. sp.

Length about 12 millim., narrow, general form of *T. pennigera*. White, marked with black stripes, appendages tipped with orange. Foot tentacles and oral tentacles both long, the first white with a purple-black line beneath, continuous with the lowest body-stripes; oral tentacles with the apical three-fourths bright orange. Rhinophores laminated, with a terminal finger-like process; apical third (including more than half of the laminated portion) bright orange. Rhinophore-sheath taking the form of a thickened tentacle, about as long as the rhinophore, lateral of the rhinophore and curling behind it; this pseudotentacle is purple-black above and white beneath, with the end broadly orange; the anterior lobe of the sheath, found in *T. pennigera*, is wholly wanting in *T. velox*. Appendages latero-posterior to branchiae formed as in *T. pennigera*, with the apical half orange (a small black spot beneath at the base of the orange), the upper side, from the base of the orange forward, with a broad purple-black stripe, these stripes passing forward and joining in the middle line of the back anterior to the branchiac, thence sending a short process forward, and another backward on to the median branchial plume, meeting the orange of its extremity. Branchial plumes three, about as in *pennigera*, bipinnate, the lateral ones with a purple-black patch and a little orange mark beyond; the middle one broadly orange at the end. Hind end of foot bright orange, the black bands stopping abruptly at the orange. The purple-black longitudinal stripes are a dorsal and two on each side; the dorsal begins very broadly on the front of the head, and thence narrows until it ends some distance before the branchiae; posterior to the branchiae it is continued, and goes nearly to the end of the foot. The subdorsal stripes are interrupted in the region of the branchiae, but otherwise are nearly entire. There are very short stripes in the area between the dorsal and subdorsal stripes, about the middle of the anterior part of the back. The lateral stripes border the narrow sole, and are continuous, but end before the subdorsal ones.

Hab.—La Jolla, San Diego County, California, among rocks at low tide, August 3, 1901 (Helen Blake). Very active when swimming with an undulating motion on the surface of the water. Described from a living specimen.

NOTES.

Limax nyctellus, Bgt., in Washington. On May 19, 1899, I found a number of *L. nyctellus*, alive and healthy, in the sheathing bases of the leaves of a date palm just imported from Orleansville, Algeria. This is of interest as indicating the habits of the slug, and the way in which it may be carried from one country to another; but the other palms of the same lot were sent to Arizona, where I afterwards saw them, and if there were any slugs upon them I am sure they could not survive.—T. D. A. COCKERELL.

Psammobia ferroensis var. pallida.—In the Journal of Conchology, 1901, p. 14, I see *P. ferroensis* v. *pallida*, Marshall. Is not this subsequent to *P. ferroensis* v. *pallida*, Ckll., Zoologist, 1887, p. 115? I presume they are identical, but I think Mr. Marshall must have overlooked my description.—

T. D. A. COCKERELL.

Conchological Society: Committee for Collective Investigation.—The following are the subjects for enquiry proposed for 1901—1902. Returns should reach the Secretary (A. E. Boycott, The Grange, Hereford) by September 1st, 1902.

i.—Do you find *Valtonia pulchella* and the form *costata* together or separately? in dry or moist situations? do intermediate forms occur? does each form seem to affect a particular kind of habitat?

ii.—Do *Tachea nemoralis* and *T. hortensis* occur together or separately? (1) in the same district? (2) in the same locality (hedgerbank etc.)? is there any difference in the nature of the habitat most affected by each species?

iii.—Do *Clausilia rugosa* (*bidentata*) and *Batia perversa* occur together? what habitats are they found in?

iv.—Are there any constant differences between the radulae of (1) *Hyalinia cellaria* and *H. albiaria*, (2) *Limnæa peregrina* and *L. avicularia*, (3) *Succinea putris* and *S. elegans*, (4) *Tachea nemoralis* and *T. hortensis*?

v.—Record the circumstances attending the periodical disappearance to which certain species, such as *A. glutinosa*, *H. fusca*, and *V. edentula*, are subject. How are such disappearances to be accounted for?

PROCEEDINGS OF THE MIDLAND MALACOLOGICAL SOCIETY.

28TH MEETING, MAY 10TH, 1901.

The President in the chair.

Various donations to the Library were announced, including a valuable series of works from Prof. L. H. Plate.

EXHIBITS.

The President exhibited and made some remarks upon various collections of shells from Tavoy, Amherst, and the Philippines.

By Mr. H. Overton: Decollated specimens of *Clausilia laminata* from Gloucestershire.

By Mr. Breeden: *Helix nemoralis* and varieties, and *Arion empiricorum* v. *bicolor* from Capet Curig.

29TH MEETING, JUNE 14TH, 1901.

The President in the chair.

EXHIBITS.

By Mr. Breeden: Shells of *Helix nemoralis* from Birdlip with curious malformation of the mouth, also specimens of *Planorbis carinatus* with the last whorl produced and growing ventrally.

By Mr. Linton: A living example of *Vivipara vivipara*, in which the sutures of the shell were deeply separated to form a shoulder to each whorl, also a shell of *Planorbis cornus* m. *sinistrorsum*, and a beautiful series of malformed specimens of *P. spirorbis* from Tenby.

By the President: Sinistral examples of *Helix pomatia*, *aspersa*, *hortensis*, and *Limnæa peregra*; also malformed specimens of *Dentalium entalis* and *Ostrea virginica*.

30TH MEETING, JULY 12TH, 1901.

The President in the chair.

EXHIBITS.

By Mr. Overton: An interesting collection of land, freshwater, and marine shells from Oban and district.

By Mr. Linton: *Physa heterostrophæ* from South Staffordshire; also foreign Clausilias.

By the President: Various foreign Clausilias.

CURRENT LITERATURE.

Pilsbry, Henry A.—Tryon's Manual of Conchology, ser. ii, vol. xiv (pt. 53), pp. 1-64, pls. 1-15. Philadelphia: Academy of Natural Sciences.

In the present part Dr. Pilsbry completes the account of the genus *Amphidromus*, Alb., treating of the subgenera *Beddonæa*, Nev., and *Pseudopartula*, Plr.; then conveniently follow the following genera: *Draparnaudia*, Montr., with *D. crossi*, n. sp. from New Caledonia, which stands between *D. sinistrorsa*, Desh., and *D. lifuana*, Pils., this latter being a new name for the *D. theobaldianus*, Gass., preoccupied by Benson. The genus is perhaps most closely related to *Papuina* than to any other genus. A new subgenus (*Dollicheulota*) of *Eulota*, Hartm., is described, the author here remarking that the anatomy, at present unknown, will probably be found to agree essentially with *Euhadra*. The type is *Bulinus fornosensis*, H. Ad., but as the name is preoccupied in *Eulota*, it is suggested that if on examination of the anatomy a new one is required, it may be termed *E. elongata*. *Calycia*, H. Ad., and the somewhat unsatisfactory genus *Bocourtiæ*, Rochebr., follow.

Passing then to the American *Bulimulidae*, the subfamily *Odontostominae* is first dealt with. That the genera treated of are Bulimuline is unmistakably indicated by the exceedingly short kidney, and by the absence of accessory organs upon the penis. *Macrodonates*, Swains., is accorded generic rank, then follow *Aactus*, v. Martis., and *Odontostomus*, Beck, with the following sections: *Moricandia*, Pils. and Van., *Bahiensis*, Jouss., *Cyclodontina*, Beck, and *Odontostomus*, Beck, s. str.

Hedley, C.—Studies on Australian Mollusca. Part iii. Proc. Linn. Soc. N. S. W., 1900, pp. 721-732, pl. xlviii, and 8 figs. in text.

The following new species are described and figured: *Mathilda rosæ*, *Leuconopsis cornis*, *Stenothyra australis*, *Iravadia australis*, *Callionophala globosa*, *Endodontus carinatus*, *Chlamys fenestrata*. In addition to these, figures are given of many other species, particularly interesting amongst which is that of *Asaphis contraria*, Desh., a new and unexpected addition to the Australian fauna.

Hedley, C.—Some new or unfigured Australian shells. *Rec. Aust. Mus.*, 1901, vol. iv, pp. 22—27, 9 figs.

The new species are *Philobrya tatei*, *Periploma micans*, *Sarcopla? tellinaeformis*, and a new variety (*depressa*) of *Thersites gulosa*, Gld.

Kew, H. Wallis.—On the Pairing of *Limax maximus*. *Naturalist*, 1901, pp. 241—254, figs. 1—5.

In the present paper the author sets forth the various accounts which have been given by Lister (1678), Werlich (1819), Rech-Buschmann (1853), Purkyne (1859), Bland (1858), Baudelot (1863), and Laurent (1895), together with those of Latzel, Ashford, and Adams. Some hitherto unpublished and interesting notes of Tye, Standen, and the author are given, confirming and supplementing previous observations.

Vanatta, E. G.—New Marine Mollusks. *Proc. Acad. Nat. Sci. Phila.*, 1901, pp. 182—187, pl. v, part

Hamulus zanziboricus (Zanzibar), *H. succinea*, Conr. var. *solidior* (West Indies), *Atis sharpi* (West Indies), *Tornatina bermudensis* (Bermuda), *Iucina* (*Divaricella*) *daham* (South Africa), *L. (D.) huttoniana* (Auckland, N. Z.), and *Venus* (*Anomalocardia*) *malouei* (South Africa), are described and figured.

Pilsbry, H. A.—New species of Mollusks from South Africa and Burma. *Proc. Acad. Nat. Sci. Phila.*, 1901, pp. 188—190, pl. v, part

Vivipara henzadaensis from Henzada, Burma, constitutes the type of a new sub-generic group of south-eastern Asia, in which the operculum is peculiarly modified. Dr. Pilsbry proposes the name *Idiopoma* for this group. *Ampullaria winkleyi* Henzada, and *Denax bertini* and *Fossarus capensis* (South Africa) are also new.

Pilsbry, H. A.—New Mollusca from Japan, the Loo Choo Islands, Formosa and the Philippines. *Proc. Acad. Nat. Soc. Phila.*, 1901, pp. 193—210.

The new forms are: *Eulota succincta* var. *amblytropis*, *E. sargentiana*, *Lamprocythis spadix*, S. and R. var. *cinctus*, *Vitroconus moellendorffi*, *Succinea ogusawarae*, *S. punctulispira*, *Columbella polynyma*, *Chrysodomus intersculphus*, Sby. var. *frater*, *Peristernia ustulata*, Rve. var. *luchuana*, *Echinella crenangi*, Phil. var. *luchuana*, *Turtonilla varicifera*, *Cantharidus* (*Phasianotrochus*) *hirasei*, *C. bisbaltatus*, *Canculus gemmulifer*, *C. microdon* var. *ater*, *C. hizenensis*, *Euchelus ruber*, A. Ad. var. *brunneus*, *Chlorostoma argyrostomum* var. *basiliratum*, *Aemaea heroldi* var. *signata*, *Patella luchuana*, *Onithochiton hirasei*, *Cryptoplax japonicus* and *rhodoplax* (sine descr.), *Petricola cyclus*, *Venus hirasei*, *Tapes platyptycha*, *T. phenax*, *Donax kiusuensis*, *Anatina impura*, *Lima hirasei*, *Arca* (*Scapharca*) *nipponensis*. Nearly all the specimens have been collected by Mr. Hirase, of Kyoto.

Pilsbry, Henry A.—The Anatomy of the sub-genus *Beddomia* and the Relationships of the genus *Amphidromus*. *Proc. Malac. Soc. Lond.*, 1901, vol. iv, pp. 158—162, pl. xvi.

From an examination of specimens of *Amphidromus* (*Beddomia*) *intermedius*, Rve., *albizonatus*, Rve., and *ceylanicus*, Pfr., Dr. Pilsbry finds that they agree in their general anatomy with *Amphidromus* (s. s.), and he is not inclined to accord to *Beddomia*, G. Nev., more than sub-generic rank.

Pilsbry, Henry A.—Morphological and Descriptive Notes on the genus *Cryptoplax*. *Proc. Malac. Soc. Lond.*, 1901, vol. iv, pp. 151—157, pls. xiv, xv.

Pilsbry, Henry A.—Notes on the Recent Literature of Japanese Land-Snails. *Ann. Mag. N. H.*, 1901 (s. 7), vol. viii, pp. 1—9.

The author briefly discusses certain questions of distribution and classification, and gives a list of the species described since the beginning of 1900, together with the somewhat extensive synonymy established during that period. The total number of new species and varieties is 129, of which 22 are known to be synonyms, while possibly a half-dozen more are doubtful.

Baker, F. C.—The Digitations of the Mantle in *Physa*. Bull. Chicago Ac. Sci., 1901, vol. ii, pp. 225—228, pls. i, ii.

The author has examined the edge of the mantle which is reflected over the parietal wall, in various species of *Physa*, and finds the marginal digitations very uniform in those species whose shell exhibits little or no variation, while in those species subject to great variation, there is a corresponding variation in the mantle.

Baker, F. C.—Description of a new species of *Limnaea*. Ibid., pp. 228—230, figs.

L. woodruffi, from the southern part of Lake Michigan.

Gude, G. K.—A third report on Helicoid Land-shells from Japan and the Loo Choo Islands. Proc. Malac. Soc. Lond., 1901, vol. iv, pp. 191—201, pls. xix—xxi.

The main value of the report lies in the generic corrections and the figures, unfortunately these latter are not printed in the text but on a glazed paper. Two new varieties are described, viz. *Trishoptila goodwinii* v. *carinata*, and *Eulota (Aegista) friedeliana* v. *tumida*.

Gude, G. K.—Description of a new species of *Chloritis* from the Loo Choo Islands. Ann. Mag. N. H., 1901 (s. 7), vol. viii, pp. 157—158, figs. 1—4.

C. oshimana, n. sp. resembles *C. cheratomorpha*, Tap., from New Guinea.

Smith, J. P.—The Larval Coil of *Baculites*. Amer. Nat., 1901, vol. xxxv, pp. 39—49, pls. A, B.

Until comparatively recently *Baculites* was supposed to be an ammonite that had reverted to the orthoceran form, but the discovery, in the Cretaceous beds of Dakota, of young examples possessing a larval coil attached to the straight shaft, was rightly interpreted as indicating the descent of this genus from a coiled ancestor. A recent find of numerous larval coils of *B. chicoensis*, has enabled the author to describe the ontogeny and phylogeny of the genus, and to illustrate the same.

Smith, J. Perrin and Weller, S.—*Prodromites*, a new Ammonite genus from the Lower Carboniferous. Journ. of Geol., 1901, vol. ix, pp. 255—266, pls. vi—viii.

In this new genus we have, the authors state, the oldest known and most complex ammonite yet described from strata older than the Permian. The new genus is founded partly on Miller's *Goniatites gorbyp*, of which corrected figures are given, and a new species *P. praematurus*.

Fischer, H.—Description d'une espèce nouvelle de *Melampus* provenant du Golfe de Gascogne. Journ. de Conchyl., 1900, vol. xlviii, pp. 66—69, figs. 1.2.

Dr. Fischer now describes the specimen of *Melampus* previously referred to as *M. eriquius*, Lowe (J. de Conchyl., 1899, p. 55, fig. 1), and proposes for it the name of *M. biseauensis*.

Nabias, B. de.—Noyau lobé des cellules nerveuses chez le Gastéropodes pulmonés aquatiques (*Limnaea stagnalis* et *Planorbis cornutus*). Action des anesthésiques généraux (Chloroforme). Soc. Scient. Stat. Zool. Arcachon, Trav. d. labor., 1899, pp. 36—38. 1 pl.

Murdoch, R.—On the Anatomy of some *Agrathous* Molluscs from New Zealand. Proc. Malac. Soc. Lond., 1901, vol. iv, pp. 166—173, pl. xvii.

The specimens described are *Rhytida greenwoodi*, Gray, *R. meesoni*, Suter, *Weneia corexia*, Gray, *Schizoglossa novoseelandica*, Pfr., *Parryphantus hochstetteri*, Pfr., and *Natalina caffra*, Fér.

Murdoch, R.—On the Anatomy of *Butliminus djurdjurskensis*, Ancey, from the Djurdjura Mountains, Kalylia. Proc. Malac. Soc. Lond., 1901, vol. iv, pp. 174—177, figs. i—vi.

GENERAL REVIEWS.

Land and Freshwater Shells: an Introduction to the study of Conchology.

By J. W. Williams. cr. 8vo. pp. 112, 34 figs. in text. 3rd and revised edition. London: 1901. Swan Sonnenschein and Co., Ltd.

We are pleased to welcome a further edition of this little handbook. The text of Chapters i-iii, treating of the anatomy and physiology of a snail and a freshwater mussel, have not been altered, excepting to make some slight corrections. In a remarkably small space they give a clear and intelligent survey of their subject.

Mr. J. W. Taylor has revised [?] the systematic part, and with Mr. Roebuck contributes an imperfect census of the distribution of the land and freshwater mollusca. We really cannot take Mr. Taylor's revision seriously nor the so-called census. Mr. Williams would have been well advised, if he had revised the systematic portion himself and entirely omitted the "census."

Our Country's Shells and how to know them. A Guide to the British Mollusca.

By W. J. Gordon. pp. vii + 152, with 33 pls. and figs. in text. London: [1901] Simpkin, Marshall, Hamilton, Kent, and Co., Ltd.

We have carefully examined and read through this book, looking for some redeeming feature, but our task has been in vain. It is such publications as this which act rather as hindrances than helps, to the collector and student of popular conchology.

Shell Life an introduction to the British Mollusca. By Edward Step. cr. 8vo. pp. 414, 32 pls. and figs. in text. London: 1901. F. Warne and Co.

That there is an opening for a cheap and popular handbook treating of the Mollusca of this country few will deny, but it is absolutely necessary that the author of such, should be one possessing a practical acquaintance with his subject and the literature thereon. Mr. Step possesses neither of these qualifications, with the result that the present work is little more than a careless compilation.

Good use has been made of Mr. Cooke's interesting work (Mollusca, Cambridge Natural History), but where the author obtained the information that *Limax tenellus*, Nilss., was a British slug and that *Amalia carinata*, Risso, was the same as *A. marginata*, Drap., is more than we can tell, but such statements will serve to illustrate the general inaccuracy.

The almost entire absence of any references is a marked feature; as we have stated time after time in this paper such a practice is most reprehensible, no author is justified in making statements "as though he himself had investigated and was responsible for the accuracy of these statements in virtue of his own observations on the objects described, when all the time he is simply stating what this man and that man have seen, and he has not seen, though he omits to mention the name of those to whom he is indebted."

Most of the figures on the 32 plates are good; many in the text, however, are very poor.

EDITOR'S NOTES.

We regret to have to record the decease of Mr. Thomas Rogers of Manchester, in his seventy-fourth year, who died on Helvellyn on May 30th, whilst making an ascent of the mountain.

As we go to press, we learn with deep regret that Mr. Martin F. Woodward, while on a zoological excursion to the west coast of Ireland, was drowned on the 15th instant.

THE
JOURNAL OF MALACOLOGY.

No. 4.

DECEMBER 30TH, 1901.

VOL. VIII.

ON SOME LAND SHELLS FROM BRITISH EAST
AFRICA.

By EDGAR A. SMITH.

THE specimens about to be described were collected by the late William Doherty near the present terminus of the Uganda Railway, between September 1900 and April 1901. The escarpment where they were obtained is at an elevation of 6500—9000 feet.

***Ennea (Gulella) ugandensis*, n. sp. Fig. 1.**

Testa breviter pupiformis, tenuis, polita, pellucida, albida; spira cylindrica, superne obtuse conoidea; anfractus 8 leviter convexi, infra suturam anguste pellucido-marginati, et obsolete subplicati, vel crenu-



Fig. 1.—*Ennea (Gulella) ugandensis*, n. sp.

lati, microscopice spiralliter striati, lineisque incrementi obliquis parum distinctis sculpti, ultimus antice nec descendens nec adscendens, pone labrum triscribiculatus; apertura rotunde quadrata, longit. totius

circiter acquans, dentibus pluribus munita: peristoma albidum, leviter incrassatum, expansum et reflexum, margine externo tridentato, basali dente unico parvo munito, columellari dente bifido, parietali dente lamelliforme superne labro fere juncto.

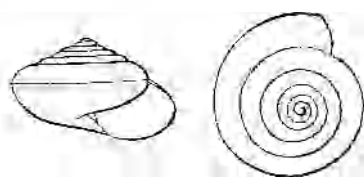
Longit. $10\frac{1}{2}$ millim., diam. $5\frac{1}{2}$; apertura cum perist. 4 longa, $3\frac{1}{2}$ lata.

Of about the same size and general appearance as *E. hanningtoni*, Smith, but somewhat broader, with a squarer aperture, a different columellar tooth and different teeth within the outer lip. These are three in number, the central being most prominent and the anterior one the smallest. The spiral striation is only visible under a powerful lens and is most observable upon the back of the body-whorl.

Martensia permanens, n. sp. Figs. 2, 3.

Testa depresso conoidalis, carinata, anguste perforata, supra pallide fusca, infra albida; spira breviter conica, ad apicem obtusa; anfractus $6\frac{1}{2}$ lente accrescentes, duo superiores leviter convexi, microscopice spiraliter striati, coeteri convexiusculi, ad suturam carinati, oblique confertim et arcuatim costulato-striati, ultimus ad peripheriam acute angulatus, vel carinatus, antice haud descendens, infra fere laevis, lineisque tantum incrementi tenuibus sculptus; apertura oblique lunata; peristoma tenue, margine columellari ad insertionem breviter expanso et reflexo.

Diam. maj. 21 millim., min. $18\frac{1}{2}$; alt. 12.



Figs. 2 and 3. — *Martensia permanens*, n. sp.

There is a distinct difference in the colour of the upper and lower surfaces of this species. The former is of a pale brown tint varied with pale hair-like streaks in the direction of the lines of growth, whilst the latter is of an uniform pale or whitish colour. The minute spiral striation is limited to the protoconch, consisting of about two whorls. The keel or angulation of the body-whorl in adult specimens is not very sharp, but in young examples it is much more acute, as may be seen by the distinct carina which marks the suture.

Limicolaria dohertyi, n. sp. Fig. 4.

Testa ovato-pyramidalis, ad apicem obtusa, solida, imperforata, vel subrimata, saturate castanea, strigis albis irregularibus picta, lineis incrementi obliquis striisque spiritalibus undique decussata; anfractus 7 convexi, sensim accrescentes, sutura pallida lineari sejuncti; apertura inverse auriformis, intus caerulescens, longit. totius $\frac{2}{3}$ adaequans; labrum tenue, arcuatum; columella incrassata, reflexa, sordide albida.

Longit. 59 millim., diam. 28; apertura 23 longa, 13 lata.



Fig. 4.—*Limicolaria dohertyi*, n. sp.

This very interesting species is remarkable for its solidity and its pupoid form. The white stripes upon the deep chestnut ground are irregular and somewhat wavy, oblique, or zigzag in form. The three apical whorls are smoother than the rest of the shell, whitish or bluish and devoid of striping. One of the three specimens under examination is rimate, the two others being imperforate.

Named *dohertyi* as a tribute to the memory of the collector, the late William Doherty.

Buliminus bambuseti, Martens, var. Fig. 5.

Buliminus bambuseti, Martens: Sitz. Ber. Gesell. nat. Freunde Berlin, 1900, p. 118.

Testa ovata, supra acuminata, imperforata, vel vix rimata, saturate vel pallide fusca, solidiuscula, lineis incrementi obliquis striisque spiritalibus tenuibus confertis minute decussata; anfractus $6\frac{1}{2}$ convexius-

culi, superiores duo laeves; ultimus magnus, inflatus, antice flavescens, oblique descendens. ad medium obsolete carinatus; apertura inverse auriformis, intus rufescens, longit. totius $\frac{1}{2}$ paulo superans; peristoma incrassatum, reflexum, pallidum, margine dextro curvato, columellari rectiusculo, supra leviter expanso.

Longit. $29\frac{1}{2}$ millim., diam. 18; apertura cum perist. 14 longa, 11 lata.



Fig. 5.—*Buliminus bambuseti*, Martens, var.

Dr. E. von Martens has kindly compared a specimen with his *B. bambuseti*, and he is of opinion, notwithstanding slight differences, that they belong to the same species. He noted that the present variety was a little larger, the last whorl rather more inflated, and the peristome paler, also that the faint angulation or ridge around the middle of the body-whorl was more distinct in the Uganda shell.

***Opeas crenulata*, n. sp. Fig 6.**

Testa gracilis, subulata, pellucida, nitida, tenuis: anfractus 12 lente accrescentes, duo apicales laeves, convexi, coteri convexiusculi, oblique leviter striatuli, ad suturam minute crenulati, sutura leviter oblique sejuncti, ultimus brevis; apertura inverse auriformis, parva; peristoma tenue, margine columellari expanso et reflexo.

Longit. 12 millim., diam. 3; apertura $2\frac{1}{4}$ longa.



Fig 6.—*Opeas crenulata*, n. sp.

Well characterised by the numerous short whorls and the minute plication at the suture. The form is somewhat variable, some specimens being more slender than others.

THE ANATOMY OF THE BRITISH SPECIES OF THE GENUS SOLEN. Pt. II.⁴

By H. H. BLOOMER.

(Plate viii.)

CIRCULATORY SYSTEM.

The circulatory system of *Solen* presents not a few difficulties. In the following account I have been guided very largely by the valuable work of Menegaux, but the whole system has been subjected to very careful investigation, particularly the venous system.

Venous System.—*Solen ensis*, L. (Pl. viii, fig. 17).

As in all the Pelecypoda, the venous system of *Solen* is very complicated and difficult to make out. There are no defined vessels conveying the venous blood from the tissues, but it finds its way through the lacunous parts of the animal and accumulates in the various sinuses.

Running along the elongated foot is a large canal, the homologue of the posterior pedal sinus of other pelecypoda (*P. S.*). It is nearly median and enclosed by the bundles of longitudinal and transverse muscles, leaving between them, openings by which the blood passes to it from the secondary sinus, the latter being situated dorsally (*A. P. S.*).

The posterior pedal sinus branches at the proximal end of the foot into anterior and posterior divisions, the latter following inferiorly the visceral mass, from which it receives the blood, and describing a curve terminates just opposite the viscero-renal orifices (*V. R. O.*). In the retraction of the foot the orifices open and allow the blood to pass through the kidneys (*K.*). The blood then accumulates in the pallial sinuses (*Pa. S.*), which are situated on the inner surfaces of the mantle lobes near to the line of their dorsal concrescence, and just behind the posterior adductor muscle (*P. A.*). The

anterior division of the posterior pedal sinus bifurcates and communicates with the sinus lying over the anterior adductor muscle (*A. A. S.*), this sinus extends posteriorly over the viscera and laterally down the sides of the same.

The sinus of the viscero-parietal ganglion (*V. P. S.*) is situated between the bifurcated parts of the posterior retractor pedis muscle and the posterior adductor muscle, and dorsal to the viscero-parietal ganglion.

The venous system in the mantle does not possess well-walled passes, but being very lacunous and very soft it is capable of receiving an enormous quantity of blood. In its posterior part the venous blood mixes with the arterial, and collects in the pallial sinus. The siphonal tentacles exhibit large lacunae opening directly into the siphonal sinus (*St. S.*). The afferent branchial vessel (*A. B. V.*) originates from the sinus of the viscero-parietal ganglion (*V. P. S.*). The efferent branchial vessel (*E. B. V.*) conveys the arterial blood to the auricle (*Au.*), opening into it at the posterior end, and as the gills extend a little anterior to this part of the auricle, the vessel has consequently, one portion of it anterior and the other posterior to the point of junction.

Solen sitiqua, L., and *Solen marginatus*, Pult. and Don.

There is nothing calling for comment in the venous system of these species.

The Heart.—This is typical of the Pelecypoda, a median fusiform ventricle and lateral triangular auricles.

Arterial System.—*Solen ensis*, L.

Arising from the anterior end of the ventricle is the anterior aorta (*A. Ao.*), it proceeds dorsally over the viscera and shortly gives off an artery which passes to the wall of the pericardium, from there to the sinus of the foot, and then to the kidney. The anterior aorta in its passage forward gives off various hepatic or gastric branches, and on reaching a position dorsal to the mouth it curves in slightly and then descends perpendicularly. At the point of incurving it sends off a branch to the anterior portion of the right lobe of the liver (*A. A. M.*), after leaving this organ, the branch passes over the anterior adductor muscle to the region of the hinge teeth of the shell; its further course has not yet been traced owing to the injury always caused to this part of the animal in its removal from the shell.

During the descent of the anterior aorta, a large artery is given off, the visceral artery (*A. V.*), which vascularises a large portion of the viscera. Two branches of it pass along the caecum of the crystalline style and cover the latter with their fine ramifications. The largest branches, however, pass on to the intestinal folds and terminate there.

The anterior aorta then turns anteriorly, at which point it gives rise to the pedal artery (*P. Ar.*) and later to the labial branches, and a branch to each bifurcated anterior retractor pedis muscle. It then passes underneath the anterior adductor muscle, vascularising this and finally dividing in the mantle into two branches. Menegaux is of opinion that it continues by the circumpallial, although he has not been able to trace the connection very clearly.

The pedal artery (*P. Ar.*) passes to the foot and buries itself in the tissues. It supplies the pedal ganglion, follows the length of the foot dorsal to the anterior pedal sinus, and gives off numerous alternating branches before dividing into two divisions at the extremity of the foot.

Arising from the posterior end of the ventricle is the posterior aorta (*P. Ao.*), which very shortly after leaving the ventricle forms the dilatation known as the bulbus arteriosus (*B. A.*). The latter is separated from the ventricle by a small valve, it is of considerable length, and extends to the posterior adductor muscle (*P. A.*), surrounding the rectum like a sheath and attached to it by small muscular columns.

From the bulbus arteriosus a small artery arises which passes to the dorsal part of the pericardium.

Near the posterior adductor muscle the posterior aorta divides into the two posterior pallial arteries (*P. P. A.*), one going to the right and the other to the left, and both passing underneath the muscle and communicating with the rectal lacunae, these two branches then open into the two pallial sinuses. They further communicate with the tissues surrounding these organs; sinking into the walls, they reach the connected marginal borders of the mantle lobes, passing round these, they enlarge very much and give off on the external surface numerous small branches, not a fused network, and finally return anteriorly to the level of the attachment of the dorsal integument to the shell. Owing to the damage sustained in the removal of the animal from the shell, as mentioned above, it has not yet been possible to trace any connection between the anterior and posterior aortae.

The branches of the posterior aorta are themselves true arteries, but the existence of an endothelium in them has not yet been demonstrated. In all cases these are walled canals exhibiting, laterally, orifices leading to the pallial lacunae. Everywhere in all the arteries of the mantle Menegaux states that he has found this character to exist.

In the Pelecypoda generally the arteries open into the lacunae, but in the visceral mass of the foot these are only fine ramifications,

which have their walls pierced with small holes. In the mantle these are large trunks which form lateral openings. This fact may be explained by the rapid displacement which the blood has to submit to at times. Besides this, in consequence of the respiratory function of the mantle, the blood must spread over as large a surface as possible.

S. siliqua, L.


The arterial system of *S. siliqua* is similar to that of *S. ensis*, and only differs from it in a few minor details which it is unnecessary to enumerate.

S. marginatus Puh and Don.

The arterial system of *S. marginatus* is somewhat different owing to the anterior portion of the animal being shorter than in the species *ensis* and *siliqua*. The anterior aorta is dorsal to the anterior end of the right lobe of the liver, before curving and proceeding in a ventral direction.

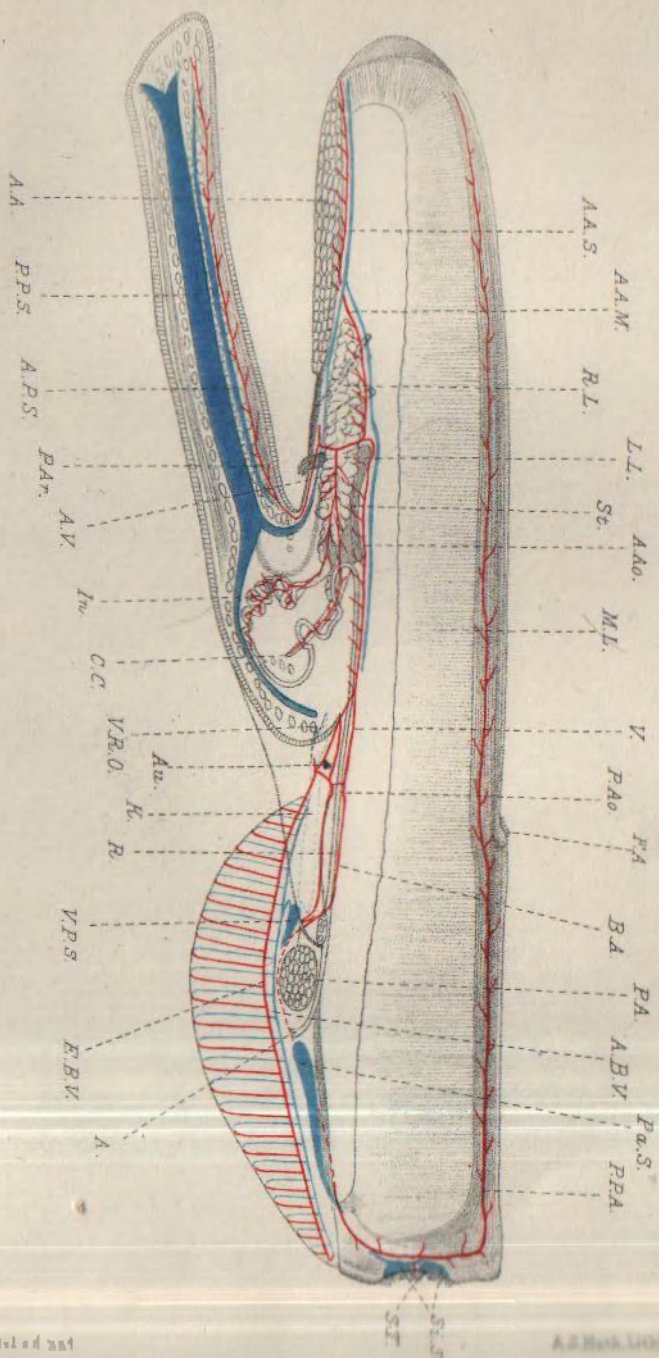
From the pedal artery arises a large branch which also vascularises the viscera and particularly the caecum of the crystalline style. The pedal artery being more superficial forms fewer branches, but at the point of the terminal curve of the intestine it gives off a large lateral branch which passes between the muscular bundles of the distal end of the foot.

EXPLANATION OF PLATE VIII.

Fig. 17.  diagrammatic view of *Solen ensis* from the left side, showing the circulatory system.

REFERENCE LETTERS.

A.	anus.	M. L.	Mantle lobe.
Ant.	Auricle.	P. A.	Posterior adductor muscle.
A ₁	Anterior adductor muscle.	P. Ao.	Posterior aorta.
A ₂	Anterior aorta.	P. Ar.	Pedal artery.
A. a. A.	Artery of the Anterior adductor muscle.	P. P. A.	Posterior pallial artery.
A. A. S.	Anterior adductor sinus.	P. P. S.	Posterior pedal sinus.
A. B. V.	Afferent branchial vessel.	P ₁ S.	Pallial sinus.
A. P. S.	Anterior pedal sinus.	R.	Rectum.
A. V.	Visceral artery.	H. L.	Right lobe of liver.
B. A.	Bulbus arteriosus.	R. P. A.	Retractor pedis anterior artery.
C. C.	Caecum of crystalline style.	St. S.	Siphonal sinus.
E. B. V.	Efferent branchial vessel.	St.	Stomach.
F. A.	Fourth aperture.	S. T.	Siphonal tentacles.
In.	Intestine.	V.	Ventricle.
K.	Kidney.	V. P. S.	Viscero-parietal sinus.
L. L.	Left lobe of liver.	V. R. O.	Viscero-renal orifice.



DESCRIPTIONS OF FIVE NEW SPECIES OF SHELLS.

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

(Plate ix, figs. 1—5.)

Conus beddomei, n. sp. Pl. ix, fig. 1.

Shell rather solid, light yellowish-brown, ornamented with large irregular white patches, which are mostly longitudinally oblong and here and there zigzag, those at the angle being smaller and arranged in a regular way; the growth lines form slightly-waved longitudinal striae, crossed by very faint spiral ridges, which become stout and prominent towards the base. Spire broadly conical, but little raised, rather sharply angled: whorls slightly concave above the angle, separated by a well-defined impressed suture, sculptured with three rather deep spiral grooves, crossed by numerous rather prominent oblique striae. Interior of the aperture pink.

Length 22, breadth at angle 16 millim.

Hab.—"West Indies" (C. E. Beddome).

This pretty cone bears no very close resemblance to any known species; its markings somewhat resemble those of *C. colubrinus*, Lamk., but of course it does not belong to that section of the genus.

The shell was found in the collection of the late C. E. Beddome (recently acquired by us), labelled "*Conus zigzag*, Muhl., West Indies." This led me to look up the description of that species which has not been recognized by modern authors. Reeve (*Conch. Icon.*) and Weinkauff (*Conch. Cab.*) make no mention of it; Sowerby (*Thes. Conch.*) places the name in the index with "Unknown to me." Tryon (*Manual of Conch.*) only quotes Sowerby. I now find *Conus zigzag*, Megerle von Mühlfeldt described and figured (*Mag. Gesellsch. Naturf. Berlin*, vol. viii, p. 4), and it does not at all resemble the shell which I now call *C. beddomei*, and it is certainly not that species. The question what it is, is perhaps not so easy to answer, as the figure is a poor one, but in my opinion it is nothing but a form of *C. mediterraneus*. The locality quoted "Mediterranean Sea," the obtusely elevated form of the spire as figured, and the general contour of the shell (although the markings are rather peculiar) lead me to that conclusion. I may say also, that in the description there is nothing to render the correctness of this identification improbable.

Plsania delicatula, n. sp. Pl. ix, fig. 2.

Shell elongated, rather narrow, pale yellow, with an obscure interrupted white zone about the middle of the body-whorl; spire acutely pyramidal; apex brown, papillary; whorls 7, the first two smooth,

rounded and polished, the next slightly convex, decussated with rather strong longitudinal ridges crossed by spiral striae, the ridges and striae become gradually less pronounced on the subsequent whorls, the last being almost smooth, excepting towards the base where it is strongly spirally ridged, and at the upper part, where fine close striae and a few more distant ridges are faintly visible. Aperture rather small, oblong-ovate; columella arched in the middle, and slightly recurved towards the base, and furnished above with a small projection marking the entrance to the posterior canal; outer lip slightly thickened, very slightly crenulated, and furnished with two or three small tooth-like projections near the posterior end; anterior canal short, rather wide, posterior canal narrow and shallow.

Length 17, breadth 6 millim.

Hab.—Bird Island, Pacific.

A small lemon-coloured shell allied to *P. montrouzieri*, Crosse, but smaller, proportionately narrower, smoother, and of a different colour.

***Vanikoro expansa*, n. sp.** Pl. ix, fig. 3.

Shell small, white, rather solid, obliquely rounded, strongly latticed, with 5 stout nodulous spiral ribs, crossed by numerous stout rounded ridges, the 5 middle ones being the most prominent, the interstices forming deep pits; spire very small, apex acute; whorls $3\frac{1}{2}$, rapidly increasing, first $1\frac{1}{2}$ smooth, minute, the next somewhat obliquely plicate; last whorl slightly flattened at the top, with an irregular callus next the suture. Umbilicus moderately open. Aperture wide, rather oblique; lip acute; interior smooth.

Length 5, width 6 millim.

Hab.—North-west Australia.

This little species may be readily distinguished from its congeners, and notably by the comparative width of its aperture. Several specimens of it were found among a quantity of small shells (until recently unsorted) brought some years ago by Mr. J. J. Walker from north-west Australia.

***Mangilia eudeli*, n. sp.** Pl. ix, fig. 4.

Shell white, with a very faint zone of pale buff colour; spire turreted, acute; whorls 7, the first 3 smooth, subpellucid, the rest shouldered, and slightly convex with about 13 longitudinal ribs which are rendered nodulous by the crossing of numerous spiral ridges; last whorl rather more than half the length of the shell; sides rather straight. Aperture rather narrow, very slightly attenuated at each end; interior lirate; lip thick, crenulated; posterior sinus rather broad and moderately deep, situated close to the whorl; anterior canal very short and rather wide.

Length $4\frac{1}{2}$, width scarcely 2 millim.

Hab.—St. Pierre, Réunion Island.

Compared with *M. rugulosa*, Phil., this shell is narrower and more straight sided, and has more numerous ribs.

A few specimens of this species were taken by the late Captain Eudel at the above locality in 1863, but it does not appear to have been hitherto described.

***Cardium (Papyridia) hungerfordi*, n. sp.** Pl. ix, fig. 5.

Shell of very thin substance, rather inflated, rounded in front, slightly expanded and bi-angular behind; anterior side radiately grooved, posterior strongly ribbed; valves equal; completely closed; colour light reddish brown, becoming very pale towards the margin. Umbones tumid, incurved, approximating. Lunule rather long, slightly impressed. Posterior produced, concave.

Length $8\frac{1}{2}$, width 9 millim.

Hab.—Japan.

Some years ago I noticed specimens of this species in the collection of Surgeon-General Hungerford, but although I could not identify it, I thought it might be the young of a larger species. Having now received specimens direct from Japan, I am inclined to think they are mature.

DESCRIPTIONS OF NEW SPECIES OF XESTA, AMPHIDROMUS, AND CYCLOSTOMA FROM MADAGASCAR AND PERAK.

By HUGH FULTON.

(Plate ix, figs. 6—10.)

***Xesta piperata*, n. sp.** Pl. ix, fig. 7.

Shell dextral, general form as figured, thin, very narrowly umbilicated, whitish with irregular oblique light brown stripes which are more numerous on the last whorl, *the whole exterior of shell marked with numerous, irregularly arranged, dark brown spots*, a narrow dark brown band at periphery of last whorl continued and fading away at suture of the penultimate whorl; whorls barely 6, slowly increasing; peristome simple, quite thin, slightly expanded at joint of insertion; interior of aperture dark brown, the exterior band showing through.

Alt. 20; maj. diam. 22 millim.

Hab.—Fort Dauphin, Madagascar (Sikora).

This distinct new species is well characterised by its peculiar peppered coloration. The position of the band on the body-whorl gives it a somewhat carinate appearance, but there is no trace of a carina.

Amphidromus perakensis, n. sp. Pl. ix, figs. 8-10.

Shell dextral or sinistral, solid, general form as figured, imperforate, polished, yellow with a narrow conspicuous band at the suture; whorls $7\frac{1}{2}$, slightly convex, with weak oblique striae or lines of growth; columella bearing a thin and somewhat flat projecting plate, situated inferiorly at about a third of a revolution from the exterior; peristome white, thick, expanded and slightly reflected, margins connected by a transparent raised callus, columellar portion triangularly dilated above, somewhat angular below; aperture sub-ovate, whitish within.

Alt. (sinistral specimen) 48; maj. diam. 26 millim.

An. (dextral specimen) 50; maj. diam. 27 millim.

Hab.—Perak (Grubauer).

At first sight one could easily take this species to be one of the numerous varieties of *A. perpersus*, but on holding the shell obliquely, the very characteristic columellar projection becomes conspicuous. This plate appears, from an exterior view, to be thick, but on breaking away the wall of the shell, it is seen to be quite thin. All the numerous specimens collected are quite constant in the possession of this peculiarity, although it is more prominent in some than in others.

Cyclostoma sikorae, n. sp. Pl. ix, fig. 6.

Shell solid, moderately umbilicated, general form as figured, somewhat shining, milk-white, ornamented with several dark purple-brown bands situated as shown in illustration; whorls $5\frac{3}{4}$, very convex, with inconspicuous oblique striae or lines of growth; aperture circular, interior of a light brown colour; peristome white, rather broadly expanded at outer and basal portions, narrower on columellar part, margins connected by a rather thin callus; operculum normal.

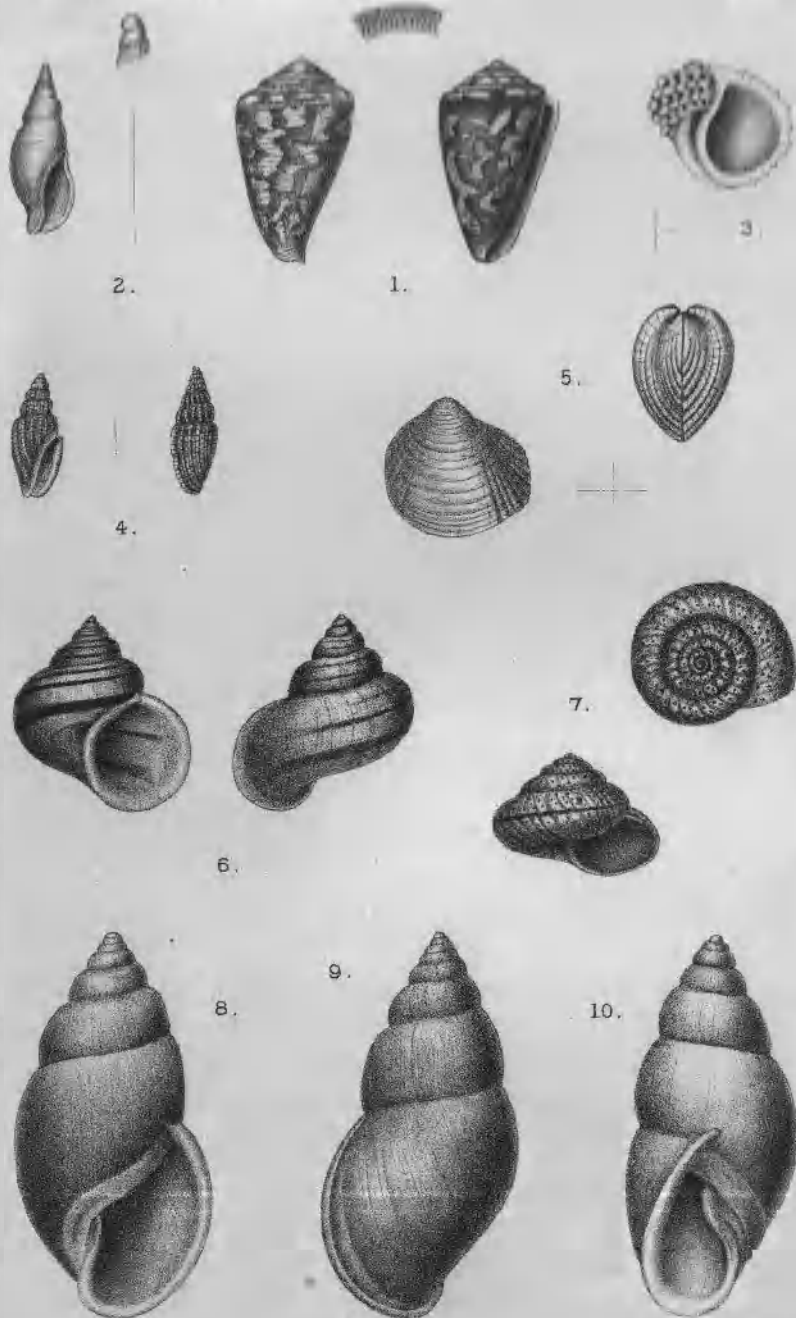
Alt. 25; maj. diam. 24 millim.

Hab.—Fort Dauphin, Madagascar (Sikora).

This species is chiefly distinguished by its smoothness especially at the umbilical area. In general form it is very near *C. filostriatum*, Sowb., but differs in other characters. More rarely *C. sikorae* is almost covered by two or three dark coloured bands which also shew through the interior of aperture.

EXPLANATION OF PLATE IX.

- Fig. 1. *Conus beddomei*, n. sp.
 Fig. 2. *Pisania arliculata*, n. sp.
 Fig. 3. *Vanikoro expansa*, n. sp.
 Fig. 4. *Maagilia endeli*, n. sp.
 Fig. 5. *Cardium hungerfordi*, n. sp.
 Fig. 6. *Cyclostoma sikorae*, n. sp.
 Fig. 7. *Xesta peracata*, n. sp.
 Figs. 8-10. *Amphidromus perakensis*, n. sp.



G.B. Sowerby del.

A.C. Smith Lith London

MALACOLOGICAL NOTES.*

By E. R. SYKES, B.A., F.L.S.

(Plate x.)

9. What is *Cyclostoma giganteum*?

(Pl. x, figs. 1-3.)

RECENTLY I have had brought to my notice the fact that considerable confusion exists with regard to the identification of this form. There appears to be a general agreement that the species belongs to the genus *Neoncyotus*, but various works figure and describe varying forms. In the British Museum occur, under this name, what I take to be three distinct species, and having come into possession, through Mons. Boucard, of all three, I have endeavoured in the following notes to throw some light on the difficulty.

Perhaps the most convenient course is to set out the names I attribute to these forms, to give the references, and then to discuss the matter as a whole.

I. *Aperostoma giganteum* (Ree.).

(Pl. x, fig. 1.)

Cyclostoma giganteum, Gray MS. in Mus. Brit.

" " Gray: Reeve, Conch. Syst. [1842], vol. ii, pl. clxxxiv, fig. 17.

" " Sowerby: Proc. Zool. Soc., 1843, p. 30.

" " Sowerby: Thes. Conch. [1843], vol. i, p. 92
[figures relate to *fischeri*.]

Cyclotus giganteum, Gray: Cat. Cycloph. Brit. Mus., 1850, p. 7.

Cat. Phanerop. Brit. Mus., 1852, p. 7.

II. *Aperostoma fischeri* (Hidalgo).

(Pl. x, fig. 3.)

Cyclostoma cumingii, Sby.?: Jay, Cat. Shells, 1839, p. 122, pl. vii, figs. 4, 5.

Cyclostoma giganteum, Sby.: Thes. Conch., vol. i, p. 92, pl. xxiii, figs. 8, 9. [1843; figures, and included in text.]

Cyclotus giganteus, Sby.: Reeve, Conch. Icon. [1863], pl. i, fig. 3.

Cyclotus fischeri, Hidalgo: Journ. Conchyl., 1867, tom. xv, p. 305, pl. viii, fig. 3.

Cyclotus giganteus, Gray: Hidalgo, Viaje. Pacif. Moll., p. 144, pl. viii, figs. 9-11. [*fischeri* as synonym.]

? *Aperostoma giganteum*, Gray: Mousson, Malak. Blatt., 1869, Bd. xvi, p. 175.

? " " Gray: Mousson, Op. cit., 1873, Bd. xxi, p. 17.

Cyclotus giganteus, Gray, var. *fischeri*, Hida₁₈₇₉: Miller, Malak. Blatt, 1879, N. J., B. 1, p. 140.

III. *Aperostoma confusum*, n. sp.

(Pl. x, fig. 2.)

Cyclostoma giganteum, Gray: Pfeiffer, Conch. Cab., Cyclostomacea [1846], p. ii, pl. i, figs. 11—14.

The first reference I can trace is that of Reeve (Conch. Syst.) which appears to have really appeared in 1842, and he refers to "Gray MS. in Mus. Brit.," figuring a specimen which I have, I believe, succeeded in tracing (so-labelled), and which belongs to the large depressed form (I). Reeve gives no diagnosis and does not refer to Sowerby's paper in the Proceedings of the Zoological Society, 1843, though it may possibly be that they are nearly of the same date. One reference, to "Sowerby, Sp. Conchyl., f. 9, 10," I have entirely failed in tracing: so far as I know only one portion of the "Species Conchylorum" appeared, and this did not relate in any way to land operculates. Included in my copy of the "Malacological and Conchological Magazine" there appear, in both parts (1838 and 1839), advertisements stating that the author "is actively engaged in completing the second and third parts of the Species Conchylorum, of which all the plates are engraved, some are printed off and coloured; and all the manuscript is ready, a part of that also being printed off." It may well be that proof copies were distributed and that from one of these Reeve was quoting, and that these plates were used in the early parts of the "Thesaurus." From a copy of one of the covers of the "Thesaurus," preserved in the British Museum, I find that in 1845, only one part of the "Species Conchylorum" was advertised for sale.

In 1843 Sowerby gave a latin diagnosis, but no figure, and his description is somewhat vague, but one or two points may be gleaned. Firstly, the habitat is Panama, which agrees with that of the shell I now identify. Secondly, the shell has a "*cornu, fulva*" periostracum, and he makes no mention of any darker coloured bands; further, though no size is given, the very name implies that it is about the largest species he knew; also the shell is "*orbiculato-subdepressa*" and the apex is "*rufescente*." One point of difficulty in referring this to Form I is that he describes the operculum, and this I am unacquainted with in that form. The colour does not tally with Form II, and Form III would not be well characterised as "*orbiculato-subdepressa*." I think therefore that the diagnosis refers to Form I. When however we come to the "Thesaurus" we find that the figure is darkly banded and resembles Form II, while the latin lettering

relates to Form I, and the English apparently to both. Probably he considered both to be varieties of one species. The references by Gray in 1850 and 1852 relate, no doubt, to Form I.

In 1846 Form III first appears on the scene, being figured by Pfeiffer, and he notes that the form figured in the "Thesaurus" (Form II) is larger and more depressed. The shell figured by Reeve in 1863 as a *Cyclotus* is, I feel sure, Form II; he gives a fresh diagnosis and suggests that "this fine species should be regarded as the type of the genus."

In 1867 Hidalgo described *Cyclotus fischeri*, which later on he sank as a synonym of *giganteum*.

Later authors throw but little light on the difficulty, and I therefore suggest the following as the best course.

That the name *giganteum* be used for the large depressed form, which has no dark colour bands. I have seen several specimens, which are constant, and it comes from Panama (coll. Boucard), the original locality given. That the name *fischeri* be used for the smaller, not so depressed form, with corrugated sculpture on the upper surface and darker bands of colouring; this comes from Ecuador (Hidalgo, etc.); Isle of Tumaco (Jay). Very possibly the shells referred to *C. giganteus* by Bland (Contrib. Conch., p. 228), and collected in "New Granada," belong here, as he refers to Sowerby's figure in the "Thesaurus."

I propose the name *confusum* for the well elevated shell, with a strong sinuation at the top of the outer lip, and the same general colouring as *giganteum*. This is the shell which Prof. von Martens refers to when he states (Biol. Centrali-Amer., Mollusca, p. 598) "This species [*gigantoma*] is mentioned by Boucard among the shells from Vera Paz (N. Guatemala) . . . , probably an error in determination, as *C. giganteus* has not been recorded by anyone else from so far north as Guatemala." I have specimens from Mons. Boucard.

A few remarks in conclusion as to the generic name to be used for these shells.

Aperostoma was proposed by Troschel (Zeitschr. f. Malak., 1847, p. 44) for "*rotundus*, Lam., *mericanum*, Mke., *blanchetianum*, Moric, und viele andere." Later on in the same volume (pp. 47, 104) Pfeiffer removed *rotundus* to *Cyclophorus* and left, with a number of other species, both *mericanum* and *blanchetianum* in *Aperostoma*, adopting the generic name. In 1852 Mörch (Cat. Yoldi, pp. 39, 40) placing *Aperostoma* as a synonym of *Cyclotus*—which was proposed for very different shells—left *blanchetianum* (= *linea*) there, and proposed *Cyrtotoma* for *mericanum*. In 1855 the brothers Adams in their "Genera"

placed *Aperostoma* as a subgenus of *Cyclotus* for many species including *inca* and adopt *Cyclotoma*.

To complete the history of *Cyclotoma*, I may remark that Martens in 1865 formed a new species from some of the shells previously placed under *Cycl. mexicanum*, and later on Crosse and Fischer proposed *Habropoma* for *C. mexicanum* (*sensu stricto*). The two forms are by no means easy to separate specifically and I think that they are identical generically, and that therefore *Habropoma* is unnecessary.

Returning to *Aperostoma*, we find Crosse and Fischer (Moll. Mexique, Tom. ii, p. 149) stated that the genus was "incertain et mal fixé," and they proposed *Neocyclotus*, which, if we regard *blanchetianuta* (= *inca*) as the type of *Aperostoma*, appears to be unnecessary. Acting on the principle that it is wise to save these old generic names where possible, I propose to retain it and to place *Neocyclotus* in the synonymy.

Such criticism as Crosse and Fischer applied to *Aperostoma* might equally be applied to all the Linnean genera which included species now scattered over other groups: some day, even, it might be utilised in considering *Neocyclotus*, in case that group be further subdivided.

Dr. von Martens (Biol. Centrali-Amer., p. 3) placed *Aperostoma*—regarding *Neocyclotus* as a synonym—as a section of *Cyclotus*; it appears, however, to be quite distinct from that genus.

10. Note on *Voluta beauui*, Fisch. and Bernardi.

(Pl. x, fig. 5.)

This handsome species was described¹ from Marie Galante. The authors state that only two specimens were known, and it still remains scarce in collections. A slightly smaller specimen has been figured by Sowerby.²

Having recently come into possession of a fine specimen, slightly larger than the original dimensions given, I take this opportunity of figuring it (Pl. x, fig. 5). It is slightly more attenuate than that figured in the "Journal," and the outer lip is not so much "shouldered" above, neither is it so effuse at the base. The ground-colour is also more flesh-coloured. The longitudinal ribs appear to be more obsolete than in either of the figures, and not so closely set as in the shell figured by Mr. Sowerby. Further there are, just inside the outer lip, a number of rather obsolete denticles. The protoconch appears to be of the usual form found in the *Lyria*-group.

¹ Journ. de Conchyl., 1856 [Janv. 1857], Tom. v, p. 296. Reference to plate should be to part v.

² The Conch., vol. v, pl. lxxv, fig. 16.

11. Note on *Cypraea talpa* and *C. exusta*.

(Pl. x, figs. 4, 6.)

Cypraea talpa was described by Linnaeus,³ and it is stated by Hanley⁴ that "the *Cypraea talpa* of authors is marked for this species in the Linnean Cabinet." *Cypraea exusta* made its first appearance as a variety of *C. talpa* in a list by Gray, but was duly described and figured by Sowerby in the "Conchological Illustrations." All the monographers since then appear to have regarded the two as closely allied, but distinct species.⁵ The distinction drawn may, I think, be summarised as follows: that in *C. exusta* the form is more rounded, being swollen in the middle and pinched at the ends, one extremity of the lip is more produced, and the teeth are much finer and more closely set, being also more crooked and not so produced within, and the colour of the shell is slightly darker.

In the shell I now figure (Pl. x, figs. 4, 6), the form and colour appear to be those of *C. talpa*, and the teeth to be those of *C. exusta*; indeed the shell seems to be in many respects a "missing link," and I would suggest that in all probability the true place of *C. exusta* is that which was originally given to it as a variety of *C. talpa*.

12. The value of *Murdochia*, Ancey.

In a recent paper by Mons. Ancey,⁶ when dealing with the fauna of New Zealand, he states "Les *Lagochilus* de très-petite taille, qui ont été rapportés à ce genre Indo-malais, ont un aspect particulier et doivent, à mon sens, constituer une section distincte, sinon un genre tout à fait différent. Je lui ai appliqué dans ma collection le nom de *Murdochia*." This seems a somewhat unsatisfactory method of proposing a new section, but no doubt the name must be reckoned with, and I would only point out that it seems to be an absolute synonym of *Cyrtora*, Kob. and Mlldff.⁷

EXPLANATION OF PLATE X.

- Fig. 1. *Aperostoma giganteum* (Rve.).
 Fig. 2. *Aperostoma confusum*, n. sp.
 Fig. 3. *Aperostoma fischeri* (Hidalgo).
 Figs. 4, 6. *Cypraea talpa*, L., var.
 Fig. 5. *Voluta beaulti*, Fisch. and Bern.

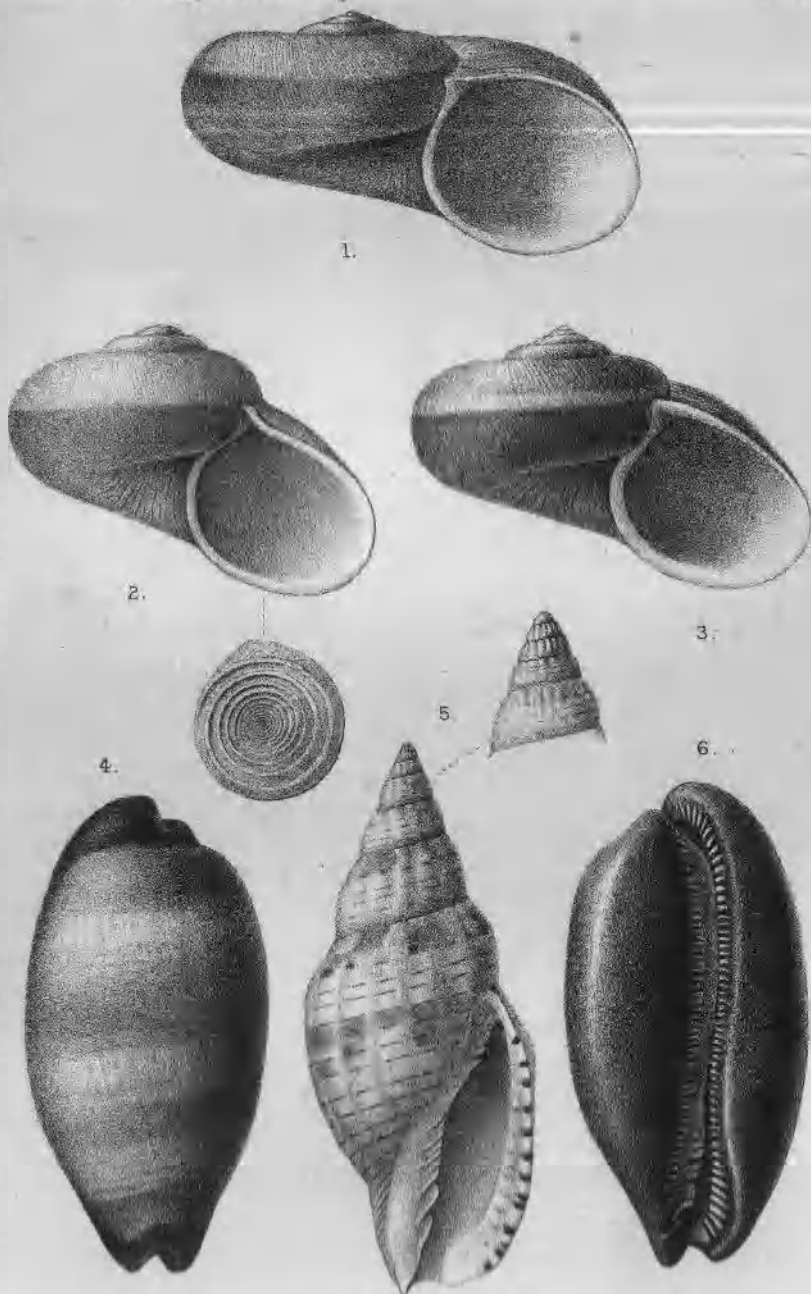
3. Syst. Nat., ed. x, p. 700.

4. Ipsa Linn. Conch., p. 182.

5. See Kierst, Cat. Viv., *Cypraea*, pp. 75-81; Reeve, Conch. Icon., vol. viii, *Cypraea*, sp. 4 and 5; Sowerby, Thes. Conch., vol. iv, *Cypraea*, p. 6; Roberts in Tryon's Manual, vol. xii, p. 167; Melvill, Mem. Manchester Soc., ser. 4, vol. i, p. 250.

6. Journ. de Conchyl., 1903, vol. xlix, p. 24.

7. Nachtr. Deutsche Malak. Gesell., 1867, p. 28.



J. Green del et lith.

A. S. Muth, imp.

ON TWO NEW AND THREE HITHERTO UNFIGURED SPECIES OF PLECTOPYLIS FROM TONKIN.

By G. K. GUDE, F.Z.S.

THE shells which form the subject of these notes were collected by Mr. Fruhstorfer. Three new species were established on them by Dr. von Möllendorff in the *Nachrichtsblatt der Deutschen Malakozoologischen Gesellschaft* in 1901. A fourth species described at the same time, proved to be identical with one collected by Col. Messenger and placed in my hands for examination. This species *Plectopylis emigrans*, Mlldff, I have recently figured.¹ Dr. von Möllendorff obligingly lent me the types of his four species for comparison and illustration. Together with these was a form which he thought would prove to be *P. phlyaria*, Mab., but I have since received from Mr. Fruhstorfer a series of the true *P. phlyaria*, and upon comparison it is clear that Dr. von Möllendorff's shells pertain to a different and hitherto undescribed species.

Plectopylis pilsbryana, n. sp.

P. villetaryi, Pilsbry and Gude (*non* Ancey): Pilsbry, *Manual of Conch.*, 1893, viii, p. 157, pl. 43, figs. 36—39.—Gude, *Science Gossip*, 1897, N.S. iv, p. 139, figs. 602, 603. *Journ. of Malac.*, 1901, viii, p. 48, figs. 3a, 3b. *Journ. de Conchyl.*, 1901, xlix, p. 212.

Hab.—Lang-Son, Bac-Ninh (Vathelet). Isles in Along Bay (Messenger). Tonkin (Fruhstorfer).

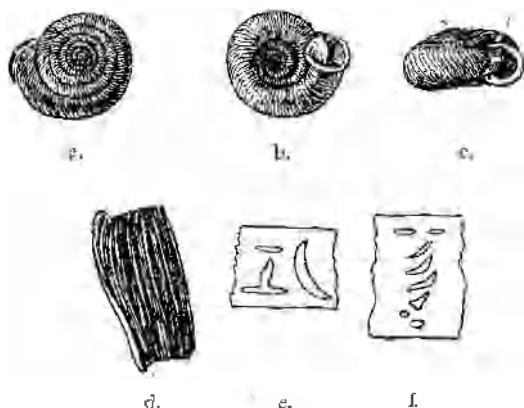
The shell which I have hitherto considered to be *P. villetaryi* (following Mr. Pilsbry's identification), has now been examined by Mr. Ancey who informs me it is not his species but a new form. It thus requires to be renamed, and I have pleasure in dedicating it to Mr. Pilsbry, who has done so much to place systematic malacology on a scientific basis.

1. *Journ. de Conchyl.*, 1901, vol. xlix, pl. 6, figs. 3a—3c.

Plectopylis (Endoplon) hirsuta, Mildf. Figs. 1a—1f.

Plectopylis (Endoplon) hirsuta, Mildf. : Nachrbl. Deutsch. Malak. Gesell., 1901, p. 115.

Shell dextral, discoid, deeply and widely umbilicated, dark corneous, finely striated, decussated with rather indistinct, minute, spiral striae, under a deciduous silky cuticle which is raised into close imbricating lamellae, parallel with the lines of growth. Apex obtuse, suture impressed. Whorls 7, a little convex above and at the side, obtusely angulated above the periphery and round the umbilicus, increasing slowly and regularly; the last a trifle dilated towards the mouth, shortly descending in front. Aperture oblique, auriculate. Peristome fuscous, thickened, and shortly reflected, the margins united by a



Figs. 1a—1f.—*Plectopylis (Endoplon) hirsuta*, Mildf.

Strong raised flexuous ridge, which gives off a longish entering, slightly ascending fold on the parietal wall. Parietal armature composed of two transverse plates, the posterior strongly raised, crescent-shaped, the lower extremity deflexed posteriorly; the anterior one shorter, flexuous, giving off a strong ridge on each side at the lower extremity and with a short, strong, free, horizontal fold above it. Palatal armature composed of five folds: the first horizontal, short but strong, with a slight denticle anteriorly in a line with it; the second longer, almost horizontal, the posterior extremity slightly descending; the third longer than the preceding, obliquely descending posteriorly; the fourth still longer, also obliquely descending posteriorly; the fifth smaller, obliquely descending posteriorly, its lower extremity bifurcated, the upper arm horizontal; below the lower arm occurs a slight elongated denticle

and below that, but more anteriorly, another stronger elongated denticle.

Major diam. 16.5, minor 14.5; alt. 8 millim.

Hab.—Island Bah-Mung.

The shell figured is Dr. von Möllendorff's type specimen.

P. hirsuta, in outward appearance resembles *P. villedaryi*, but is a trifle smaller, and differs in the umbilicus, which is not so much excavated and not carinated as in that species. The parietal fold at the aperture in *P. villedaryi* is shorter, more raised, and more oblique. The principal difference, however, is in the parietal armature, as a comparison of the figures will show. In this character *P. hirsuta* is more allied to *P. lavayi*, the posterior parietal plate of the latter, however, gives off at the upper extremity a short ridge which is wanting in *P. hirsuta*, and the anterior parietal fold in *P. lavayi* is straight, oblique, and considerably stronger and longer. In the palatal armature these two species are also closely allied, but in the present species the fifth fold has the lower extremity bifurcated, a feature not found in its ally, while the sixth fold of *P. lavayi* is in *P. hirsuta* reduced to a strong denticle. Figs. 1a—1c give three different views of the entire shell, fig. 1d shows part of the exterior behind the peristome, enlarged. In fig. 1e the parietal, and in fig. 1f the palatal armature is shown diagrammatically.

***Plectopylis (Sinicola) fruhstorferi*, Mlldff. Figs. 2a—2e.**

Plectopylis (Sinicola) fruhstorferi, Mlldff.: Tom. cit. p. 114.

Shell dextral, discoid, widely umbilicated, thin, fragile, dark conious, dull, finely striated. Spire flattened, apex obtuse, suture slightly impressed. Whorls 6, rounded, increasing slowly, the last a little dilated towards the mouth, scarcely descending in front. Aperture oblique, subrotundate. Peristome fuscous, slightly thickened and shortly reflected; margins approaching, united by a very slight flexuous ridge on the parietal callus, with a slight oblique free entering fold. Umbilicus wide, rather shallow. Parietal armature composed of a strong oblique crescent-shaped plate with two short, free, horizontal folds in front. Palatal armature composed of: first, two short elongated denticles in a line near the suture; next, four short, oblique, slightly curved folds, attenuated and slightly notched posteriorly, and finally near the lower suture a short horizontal fold with a slight denticle above its posterior extremity.

Major diam. 12.5, minor 11; alt. 5 millim.

Hab.—Kebao.

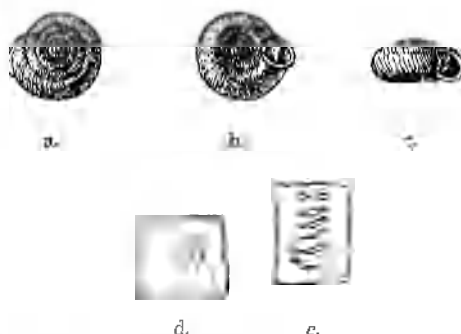


Fig. 2a.—2e.—*Plectopylis (Sinicola) fruhstorferi*, Müll. diff.

P. fruhstorferi is allied to *P. tenuis*, but the latter is thinner and more shining, and has a white peristome. More important differences are found in the parietal armature, which in *P. tenuis* consists of two vertical plates with a horizontal fold above and below the anterior plate, while *P. fruhstorferi* has only the two free horizontal folds in front of the crescent-shaped plate. In the palatal armature there are also important differences, the second fold in *P. tenuis* being much longer than the others and attenuated anteriorly, while in *P. fruhstorferi* it is short like the next three folds; in *P. tenuis* these folds are much more elevated and more oblique and the denticle above the sixth fold of *P. fruhstorferi* is absent in *P. tenuis*.

The specimen figured is Dr. von Möllendorff's type. A shell in my collection measures major diam. 12.5, minor 10.5; alt. 5 millim., and is a little paler than the type.

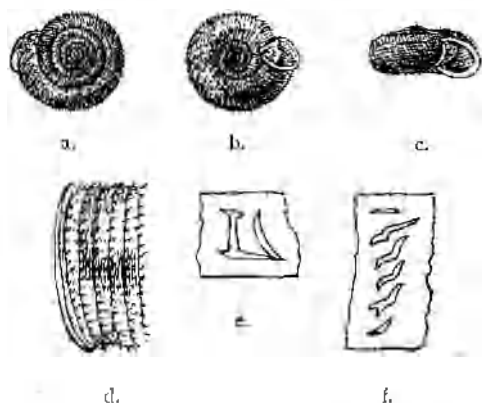
Figs. 2a—2c show the shell in three different positions, while fig. 2d illustrates the parietal, and fig. 2e the palatal armature.

Plectopylis (Endoplon) phlyaria, Mab. Figs. 3a—3f.

Helix (Plectopylis) phlyaria, Mab.: Bull. Soc. Mal. France, 1887, iv, p. 100, pl. 2, figs. 1—3.

Shell dextral, discoid, widely umbilicated, thin, subpellucid, pale corneous, finely striated and provided with numerous raised spiral ridges, under a deciduous cuticle, which is produced into short rather stiff bristles, regularly disposed on the spiral ridges and the transverse striae. Spire flattened, apex mucronate, suture impressed. Whorls 7, rounded, slightly angular round the wide but rather shallow umbilicus; increasing slowly and regularly, the last twice as wide as the penultimate, a little dilated towards the mouth, deeply and abruptly descending in front. Aperture oblique, obcordate. Peristome white,

a little thickened and shortly reflected, margins approaching, united by a thin raised flexuous ridge on the parietal callus, which gives off a thin, short, slightly ascending fold. Parietal armature composed of two transverse plates, the posterior crescent-shaped, deflected posteriorly below, thinner and slighter than the anterior one, which is vertical and gives off at the upper extremity a strong support anteriorly and a slight ridge posteriorly; at the lower extremity occurs a short support anteriorly, and a long fold posteriorly reaching to the lower extremity of the posterior plate. Palatal armature composed of six folds: the first slight, thin, horizontal; the second oblique, its anterior extremity attenuated, its posterior extremity clavate, a little reflected upwards; the third and fourth subvertical, their posterior extremities attenuated and obliquely deflected; the fifth also subvertical, the



Figs. 3a—3f.—*Plectopylis (Endoplon) phlyaria*, Mab.

posterior extremity obliquely deflected, bifurcate; the sixth oblique, sinuous, thin and shorter than the preceding four.

Major diam. 15, minor 13; alt. 6.5 millim.

Hab.—Than-Moi.

A long lost shell, apparently not found since it was described by Mr. Mabille. It was not amongst the shells collected by Col. Messager. The armature was not hitherto known and I am pleased to have this opportunity of examining and figuring these important structures.

Among the specimens with which Mr. Frubstorfer has favoured me are a number of immature shells. One of these has only 3½ whorls completed, but both armatures are already formed; the anterior parietal plate is distinctly notched at the upper and lower extremity, at the junctions with the horizontal folds; the palatal folds are very

short. One third of a whorl behind this set of barriers, occurs the remains of an earlier set; the parietal barriers have been completely absorbed, but the palatal folds are still left, although the upper ones are already in course of disintegration. At this stage the bristles do not appear to have been produced, several specimens, although quite fresh, being void of these cuticular processes. A shell with only three whorls has also two sets of armatures; of the earlier the parietal folds are still intact, while of the palatal folds the first and second have almost disappeared, and the remaining ones are very slight.

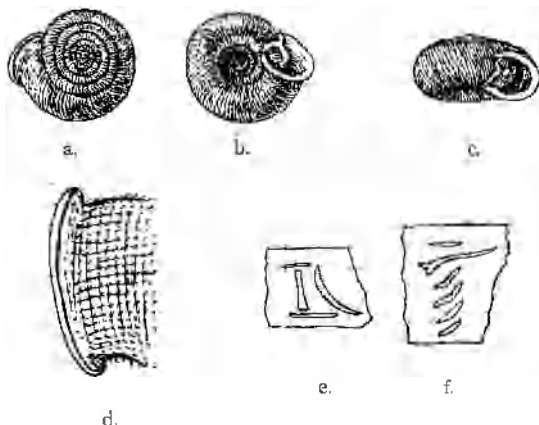
The shell figured is in my collection.

Figs. 3a—3c show the shell in three different positions, fig. 3d the exterior of the wall behind the peristome magnified, fig. 3e illustrates the parietal, and fig. 3f the palatal armature in situ.

Mr. Mabilic has obligingly compared my shell with the type in the Muséum d'Histoire Naturelle in Paris, and he informs me that it is the true *P. phlyaria*.

Plectopylis (Endoplon) moellendorffi, n. sp. Figs. 4a—4f.

Shell dextral, discoid, deeply umbilicated, whitish corneous, rather thin, the earlier whorls finely ribbed, the later ones finely striated, the cuticle produced into raised lamellae and decussated with close set,



Figs. 4a—4f.—*Plectopylis (Endoplon) moellendorffi*, n. sp.

raised, spiral ridges, provided with short bristles. Spire depressed, apex raised, suture linear. Whorls 7½, a little flattened above, rounded at the side and below, increasing slowly and regularly; the last twice as wide as the penultimate, a little dilated towards the mouth and slightly constricted behind the peristome, a little descending in front.

Aperture oblique obcordate. Peristome white, slightly thickened and reflected; the margins subparallel, united by a thin raised flexuous ridge on the parietal wall, giving off a strong curved entering fold. Parietal armature composed of two transverse plates, the posterior crescent-shaped, deflected posteriorly below, a little thinner but longer than the anterior, which is vertical, truncate above and triangularly dilated below; above its upper extremity occurs a short, free, horizontal fold and below the inferior extremity a longer, free, horizontal fold reaching close to the posterior plate. Palatal folds similar to those of *P. phlyaria*, but the second is more attenuated and elongated anteriorly, and bifurcated posteriorly; the third, fourth, and fifth folds are less curved and more elongated, while the fifth is not bifurcated posteriorly.

Major diam. 16.75, minor 14; alt. 8 millim.

Hab.—Than-Moi.

The present species is nearly allied to *P. phlyaria*, but the shell is larger and less depressed, the umbilicus deeper and more constricted, the spiral ridges closer together and consequently more numerous, and in addition it possesses half a whorl more. In the parietal armature *P. moellendorffi* differs from its ally in having the horizontal folds above and below the anterior plate quite free. The differences in the palatal armature are indicated in the diagnosis.

The type, here figured, is in the collection of Dr. von Möllendorff. Figs. 4a—4c give three different views of the shell, fig. 4d the exterior wall behind the peristome, while the parietal armature is shown in fig. 4e, and the palatal armature in fig. 4f.

***Plectopylis (Endoplon) villedaryi*, Ancey. Figs. 5a—5e.**

Plectopylis villedaryi, Ancey: Le Naturaliste, 1888, p. 71, fig. 2.

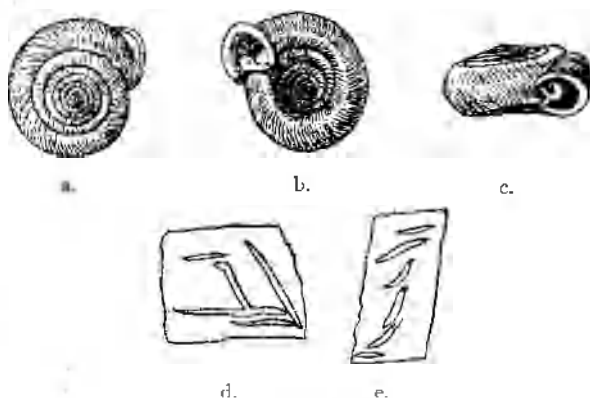
Plectopylis (Endoplon) checanophala. Möll. : Tom. cit., p. 75.

Shell dextral, discoid, solid, deeply widely umbilicated, whitish-corneous, finely striated and decussated with microscopic spiral lines. Spire flattened, apex mucronate, suture impressed. Whorls 8, a little rounded above, compressed at the sides, obsoletely angular at the periphery, angulated above and keeled around the wide perspective umbilicus; increasing slowly and regularly, the last twice as round as the penultimate, deeply and abruptly descending in front. Aperture oblique, auriculate. Peristome strongly thickened and reflected; margins united by a strongly raised flexuous ridge, which gives off a short oblique entering fold on the parietal wall. Parietal armature composed of two strong oblique plates, the upper extremities inclined towards the mouth the posterior longest; the anterior has the upper

extremity clavate, the lower extremity joined to a long horizontal flexuous fold, whose posterior termination touches the posterior plate; below this occurs a shorter flexuous horizontal fold, the posterior termination of which, also touches the posterior plate; above the anterior plate occurs a short, free, horizontal fold. Palatal armature composed of six folds: the first short, thin, and horizontal; the second longer, obliquely descending posteriorly; the third and fourth subvertical, slightly deflected posteriorly below; the fifth curved, obliquely descending backwards; the sixth short and slight, horizontal, placed below the posterior extremity of the preceding.

Major diam. 19.5, minor 16.5; alt. 9 millim.

Hab.—Than-Moi.



Figs. 5a—5e.—*Plectopylis (Endoplon) villedaryi*, Ancy.

P. villedaryi resembles *P. schlumbergeri*, both above and below, but it is smaller, and the strongly raised flexuous ridge at the aperture recalls *P. pilsbryana*. In the parietal armature the present shell has affinity with *P. dautzenbergi*, but differs from it in the anterior plate being oblique instead of horizontal, and in the upper horizontal fold being free, and, below, it has in addition a second free horizontal fold.

The shell figured is the type of *P. choanomphala* in the collection of Dr. von Möllendorff.

Figs. 5a—5c show three different aspects of the shell, the parietal armature is shown in fig. 5d, and the palatal folds in fig. 5e.

Mr. Ancy has been kind enough to forward the type of *P. villedaryi* for comparison. Upon examination it proves to be identical with *P. choanomphala*, Mlldff., which name therefore must be consigned to the synonymy of *P. villedaryi*.

DESCRIPTION OF SOME NEW SPECIES OF SLUGS COLLECTED BY MR. H. FRUHSTORFER.

By WALTER E. COLLINGE.

I HAVE recently received from Mr. H. Fruhstorfer of Berlin an interesting collection of slugs made by him in Japan, Tonkin, and Annam, and as it will be some time before I can complete the descriptions and figures of their internal anatomy, at his request I am now describing the new species. A detailed account of the anatomy together with coloured figures of the animals is in active preparation.

MYOTESTA, n. gen.

Animal slug-like, with the mantle conspicuously elevated into a non-spiral visceral hump, and completely enclosing a flat, non-spiral, plate-like shell. Dorsum posteriorly sharply keeled. Respiratory orifice in front of the middle of right margin of mantle. Generative orifice below and immediately behind the right upper tentacle. The foot-fringe is continued posteriorly to form the overhanging caudal lobe. Caudal mucous pore. Foot-sole narrow, divided into median and lateral planes. Viscera elevated into a non-spiral dorsal hump, and posteriorly lying in a triangular depression of the dorsum. Body cavity not extending into the tail-portion, which is solid.

Jaw crescentic, with 10 broad ribs, slightly denticulating the basal margin.

Generative system with well developed penis, passing into an epiphallus. Receptacular duct long. No dart-gland or dart-sac.

Myotesta fruhstorferi, n. sp.

Animal yellowish-brown, with blue mottling; head and tentacles blue; mantle, ground colour same as the body with faint, net-like, brown markings. Caudal mucous pore small. Peripodial groove very distinct. Foot-fringe deep yellow, with broad irregular dark line on it. Foot-sole dirty yellow.

Length (in alcohol) 39 millim, breadth of foot sole 3 millim.

Hab.—Mt. Maussion, 2—3000 ft., Tonkin (H. Fruhstorfer).

Type in my collection.

Myotesta punetata, n. sp.

Animal a deep brown with a few yellowish, somewhat stellate spots; head and tentacles dark blue; mantle brown, spotted with yellow. Peripodial groove ill defined. Foot-fringe yellowish-brown with closely set lineoles. Foot-sole, lateral planes brownish with yellow maculations, median plane dirty brown and smooth.

Length (in alcohol) 34 millim., breadth of foot sole 4 millim.

Hab.—Mt. Maussion, 2—3000 ft., Tonkin (H. Fruhstorfer).

Type in my collection.

PHILOMYCUS, Rat.**Philomycus fruhstorferi**, n. sp.

Animal yellowish-brown with broad black irregular lateral bands, and irregular median dorsal band, cloudy blackish mottling over the whole of the mantle, colour subject to some variation. Peripodial groove distinct. Foot-fringe dark brown and yellowish, with closely set, dark lineoles. Foot-sole yellowish brown, divided into median and lateral planes, median plane papillated, lateral planes transversely striated.

Shell, when present, a very small, thin, calcareous disc at the extreme anterior border of the greatly extended shell-sac.

Jaw smooth, laterally produced into a large tooth.

Length (in alcohol) 75 millim., breadth of foot-sole 9 millim.

Hab.—Nagasaki, Japan (H. Fruhstorfer). *Type* in my collection.

A very variable species, so far as external colouring goes. I have examined a large series of specimens, amongst which the following variety seems fairly common.

P. fruhstorferi var. **punetatus**, n. v.

Ground colour lighter and lateral bands fainter than in the type, median portion of the dorsum without band, but spotted with irregular blackish markings.

Hab.—Tsushima, Japan (H. Fruhstorfer). *Type* in my collection.

It is of interest to note that, so far, in one specimen a very small shell was found.

Philomycus dendriticus, n. sp.

Animal yellowish, with three dark brown, irregular branching bands. Peripodial groove distinct. Foot-fringe yellowish-brown, with few, faint, imperfect lineoles. Foot-sole yellow, not divided into median and lateral planes.

Length (in alcohol) 43 millim., breadth of foot-sole 5.5 millim. Jaw arcuate, with numerous ribs.

Hab.—Mt. Maussion, 2—3000 ft., Tonkin (H. Fruhstorfer). *Type* in my collection.

MICROPARMARION, Simr.

Microparmarion bruneopalleseens, n. sp.

Animal anteriorly and posteriorly light brown, medio-lateral portions pale yellow, posteriorly there is a latero-dorsal brown band running from the visceral mass to the overhanging caudal lobe, while ventrally are brown blotches and spots, behind the head the dorsum is blue flanked on each side by a broad dark blue band; head and tentacles yellowish; mantle, light brown with irregular darker brown blotches, surrounding the shell on all sides. Keel prominent. Caudal mucous pore small and hidden by the overhanging caudal lobe. Peripodial groove distinct. Foot-fringe light brown, with short, dark brown lineoles. Foot-sole not divided into median and lateral planes.

Length (in alcohol) 28.5 millim.

Hab.—Annam (H. Fruhstorfer). *Type* in my collection.

Microparmarion annamica, n. nom.

Microparmarion andamanica, Collg.: Journ. of Malac., 1891, vol. viii, p. 17, pl. i, figs. 7—10.

When this species was described I was under the impression that it came from the Andaman Isles, later, however, I found that it was collected in the Mekong Valley, Annam (Journ. of Malac., 1891, p. 52).

It has been pointed out to me that bearing a geographical name, it is very likely to lead to error, I therefore propose the name *annamica* for it.

VERONICELLA, Blain.

Veronicella fruhstorferi, n. sp.

Ground colour a greenish-brown, finely granulated; perinotum, hyponotum, and foot-sole ochreous. Foot-sole marked by a series of fine, regular, transverse lines.

Length (in alcohol) 39, breadth 13 millim.; foot-sole 4; hyponotum 5 millim. broad. Female generative orifice situated on the right side 2.5 millim. from the foot-sole, 20 from the right lower tentacle, and 17 from the posterior end of the body.

Hab.—Mt. Maussion, 2—3000 ft., Tonkin (H. Fruhstorfer). *Type* in my collection.

Veronicella himerta, n. sp.

Ground colour ochreous, with fine and closely-set black reticulations; perinotum light brown; hyponotum drab colour, with small, irregular, black markings; foot-sole yellow, with exceedingly fine, transverse lines.

Length (in alcohol) 51, breadth 20 millim.; foot-sole 3; hyponotum 9 millim. broad. Female generative orifice situated on the right side 2.5 millim. from the foot-sole, 22.5 from the right lower tentacle, and 25 from the posterior end of the body.

Hab.—Mt. Maussion, 2—3000 feet, Tonkin (H. Fruhstorfer).
Type in my collection.

NOTES ON TWO CALIFORNIAN NUDIBRANCHS.

By T. D. A. COCKERELL.

Coryphella iodina (Cooper).

Aeolis iodinea, Cooper, Proc. Cal. Ac. Sci., 1862.

THIS beautiful animal is found on the mud-flats at San Pedro, Cal., in some numbers. By some misfortune, I did not succeed in finding any myself, but Mrs. Bancroft gave me one which she obtained at Dead Man's Island, San Pedro, July 19. This example was 32 millim. long, the body brilliant purple (this colour is changed to bright crimson by caustic potash); the branchial papillae pale salmon colour, very numerous, the separate tufts not obvious. Genital orifice on the right side about 7 millim. from anterior end (dead specimen). True tentacles deep salmon red, purple only at base; oral and foot-tentacles purple, oral tentacles with the apical half (at least) white.

By its striking and peculiar colours, this is clearly the Californian representative of the European *C. landsburgii*. However, *landsburgii* is a smaller animal, with the papillae in obvious tufts; the dorsal tentacles are coloured like the oral, and about the apical fourth is white.

Cooper says nothing about the dentition. The teeth are in about 19 rows, three in a row, as usual in *Coryphella*. The median teeth have a large central denticle, and 11 to 14 denticles on each side. Lateral teeth with small slender denticles (19 to 21) crowded on the lower two-thirds of inner face.

This differs from *landsburgii* by the broader median denticles and much more numerous lateral denticles, of median tooth; also the much more numerous denticles, and much longer outer basal process, of lateral teeth.

Hermisenda opalescens (Cooper).*Aeolis opalescens*, Cooper, Proc. Cal. Ac. Sci., 1862.

Hermisenda is virtually a *Facelina* with simple tentacles. This delicately tinted animal is common at San Pedro, Cal., and my wife found one at La Jolla. At San Pedro it abounds on the mud-flats, growing to a length of about 42 millim., there are two opal-blue lines extending along the back, diverging at two or more points (*e. g.* on the head, just behind it, and at the middle of the back) to admit a bright orange streak; otherwise close together, practically forming one blue stripe. There is a broad orange stripe on each side of the head, passing backwards from the oral tentacles. Oral tentacles a beautiful opalescent blue. Papillae easily deciduous, their central part from dark brown to very pale brown, the latter colour more common; their ends white, with an orange subterminal ring.

These characters are recorded, because Cooper's description does not do them justice.

My wife found a variety at San Pedro, in a kelp root washed up by the sea. This form, from below the tides, is coloured much like the kelp; the branchial papillae are brownish-orange, broadly tipped with white, without the orange subterminal ring. When first found, the animal had hardly any of the opalescent blue colour, but after a time it became as blue as those from the mud-flats.

The teeth are in a single row; a long lanceolate middle denticle, and about four pointed denticles on each side, the lowest very small. All this is very similar to *Facelina elegans*, A. and H., but (a.) the median denticle extends far beyond the lateral ones, in *elegans* it extends only a little beyond; (b.) the lateral denticles are only three or four, in *elegans* they are six.

OBITUARY.

MARTIN F. WOODWARD.

Born November 5, 1865, Died September 15, 1901.

By the sad accident which caused the death of Mr. Martin F. Woodward on September 15th, malacology and science in general have to mourn the loss of a brilliant and devoted investigator.

The deceased was the younger son of Dr. Henry Woodward, F.R.S., and was born in London on November 5th, 1865, and educated at the Kensington Grammar School. In 1883 he entered the Royal College of Science, and after a brilliant career he was appointed by Huxley as assistant and, later, demonstrator of Zoology.

Of his general work in zoology or his gifts as a teacher, it is not our intention to speak, others more competent to judge have already testified to his care, patience, and enthusiasm for all pertaining to zoology.

Comparatively speaking it is only recently that Mr. Woodward turned his attention to the study of the Mollusca, but in the short time of seven or eight years, amid multifarious duties, he gave to science a series of papers on the anatomy of the Prosobranchia, which undoubtedly gave him the position of the leading living investigator on this particular order, in this country, and foreshadowed a brilliant and distinguished career. Most of these papers were published in the Proceedings of the Malacological Society of London, of which Society he had been Secretary since February, 1898.

His work is characterised by force and clearness of exposition, a wonderful grasp of the particular order in which he was interested, a critical capacity of exceptional order and a ready acknowledgment of the work of others.

Ever ready to advise and help others, his decease leaves a gap in the ranks of British zoologists which will long remain.

W.F.C.

NOTES.

***Physa heterostropha*, Say, in South Staffordshire.**—In 1899 Mr. J. Madison recorded this species as having been taken by him in July 1898, in a pool at the west side of Birmingham (Journ. of Conchy., vol. 9, p. 152). I am now able to add a further locality for this interesting species, viz. a mill pool near Wednesbury, South Staffordshire. I am of opinion that it has been here for some length of time, as it is well established and almost as abundant as its companion *Linnæa pereger*. I may mention that the pool is supplied by the River Tame, which probably accounts for its presence here.—J. LINTON.

***Amalia gagates*, Drp., at Sutton Coldfield.**—Although this district has been well worked during the past few years, no previous record exists of the occurrence of *Amalia gagates*, Drp. It may therefore be of interest to note that I have recently collected this species on two separate occasions. The identification has been verified by Mr. Walter E. Collinge.—H. OVERTON.

***Limax maximus*, L., at Los Angeles, California.**—When at Los Angeles last summer, I had some very enjoyable visits at the house of Dr. R. E. C. Stearns. On one of these occasions he took me out to see the *Limax maximus* in his garden, and kindly gave me several specimens. The purpose of this note is to record their variation, which is always of interest. Two forms were found, as follows:

(1.) Mantle dark grey; its anterior and lateral margins pale, spotted with black. Body above dark grey with three light bands, which are more or less edged with black spots or interrupted stripes. Sides pale, mottled with grey.

(2.) Mantle grey with a few black spots. Body dark grey with obscure black spots, and a pale dorsal stripe on posterior two-thirds.—T. D. A. COCKERELL.

PROCEEDINGS OF THE MIDLAND MALACOLOGICAL SOCIETY.

31ST MEETING, OCTOBER 11TH, 1901.

The President in the Chair.

Various donations to the Library were announced, and thanks voted to the donors.

PAPERS READ.

“On the Dart-gland, Dart-sac, and Dart of certain Asiatic Molluscs.

By Walter E. Collinge.

“*Physa heterostropha*, Say, in South Staffordshire.”

By Mr. J. Linton.

EXHIBITS.

By the President: Microscopical slides and drawings in illustration of his paper, also a series of shells of *Vitrina pellucida* from Adel, near Leeds, and Wetherby; *Helix obsoleta* from Hampshire, and *H. pisana* from Stonesfield, Oxford.

By Mr. H. Overton: *Unio margaritifera* from Ireland, *U. tumidus* from Olton and Willenhall, *U. pictorum* from Sutton Coldfield and Willenhall, also *U. tumidus* with *Dreissensia polymorpha* attached, from the river Avon, near Welford.

32ND MEETING, NOVEMBER 8TH, 1901.

The President in the Chair.

Various donations to the Library were announced, and thanks voted to the donors.

Mr. Hugh McClelland was nominated for membership.

EXHIBITS.

By Mr. H. Overton: *Anodonta cygnea* from Willenhall, and six localities at or near Sutton Coldfield, *A. anatina* from the river Avon, near Welford, Lichfield, and five localities at or near Sutton Coldfield, *A. anatina* var. *complanata* from Tenby; also a darkly coloured form of *Limnaea murina* from Sutton Coldfield, and *Amulius gagates* from Falmouth.

By the President: Specimens of *Philomysus bilineatus*, Bens., *P. fruhstorferi*, Clige., *P. dendriticus*, Clige., *Veronicella putridiana*, Heude, *V. fruhstorferi*, Clige., *V. himerta*, Clige., and shells of *Helix itala*, *H. cantianus*, and *H. pisum* from Tenby, and *H. obsoleta* from Jena.

The members then had the privilege of inspecting a fine collection of American and Asiatic Unios.

CURRENT LITERATURE.

Pilsbry, Henry A.—Tryon's Manual of Conchology, ser. II, vol. xiv (pt. 54), pp. 65—128, pls. 16—21. Philadelphia: Academy of Natural Sciences.

The genus *Odontostomus*, Beck, is concluded in the present part. In the subgenus *Spaxia*, Pils. and Van., *O. pyriformis* is a new name for *O. doeringii*, Kobelt, 1882, non *O. doeringii*, Kobelt, 1878. *Hyperautax*, Pils., *Tomigerus*, Spix, and the interesting and peculiar genus *Anostoma*, F. de Wald., are next dealt with.

The part concludes with an "Appendix to Bulimoid Snails." Here under *Strophochilus*, Spix, *S. milleri* v. *kroneri*, v. Iher., and v. *iguapensis*, Pils., both from Brazil, are new, as also *S. calus*, from Brazil. Under the subgenus *Eurus*, Alb., the following are new: *S. yporangaensis*, v. Iher. and Pils., a species allied to *S. granulatus*; *S. bronni*, Pfe. v. *pergranulatus*; *S. fragilis*, v. Iher., all from Brazil. Under the subgenus *Thaumatostoma*, Alb., *S. granulatus* is a new name for the *Bulimus* (*Dryptus*) *filocinctus*, Rolle, 1901, non *Bulimus filocinctus*, Reuss, 1861.

Beutler, Bruno.—Die Anatomie von *Paryphanta hochstetteri*, Pfe. Zool. Jahrb. (Abth. f. Morph.), 1901, Bd. 14, pp. 369—416, T. 26—29.

Dr. Beutler has investigated the anatomy of *Paryphanta hochstetteri*, which he describes in some detail. The pharynx is a long, muscular sac whose internal structure is similar to that in *Testacella*. The oesophagus arises from the middle of the pharynx. It is a long tube widening to form the stomach. From the contents it would seem that the food consists partly of animal and partly of vegetable matter. The description of the generative organs is far from correct, the terminology used ancient, and the figure poor. The lung is a small, thin-walled sac. The central nervous system consists of paired cerebral, buccal, and pedal ganglia, and a visceral group of five ganglia, viz. paired pleural and parietal, and a single abdominal ganglion. The cerebral ganglia have accessory lobes which each send off a strand, the well-known cerebral tubes of the embryo. The pedal ganglia are joined together by two commissures and with them is a network of nerve fibres imbedded in the pedal muscles; numerous small ganglia are present in the network.

Comparing *Paryphanta* with *Testacella*, they are regarded as nearly related, the former being nearer *Testacella* than *Daudebardia*. The relative large shell comes first in the phylogenetic development of the Pulmonata, whereas a relatively small

shell is to be regarded as a secondary phenomenon. The author therefore concludes that *Testacella* arose from a mollusc similar to *Paryphanta*, and that in any division of the Agnatha the genus *Paryphanta* must come before *Testacella*.

Bouvier, E. L. et Fischer, H.—Observations nouvelles sur l'organisation des Pleurotomaires. *Compt. Rendus*, 1901, vol. cxxxi, pp. 583—585.

The authors give a short account of some parts of the internal structure of *P. beyrichi*, Hilg. The operculum is very reduced. The gills are symmetrically arranged in a branchial chamber, both are small, the right being a little smaller and shorter than the left. The feeble development of the gills in *Pleurotomaria* and their localisation in the anterior half of the pallial chamber, in the authors' opinion, completely justifies Bütschli's view that the respiratory organs of the primitive Diotocard are formed by the forward displacement of two gills which originally were situated behind, to the right and left of the rectum. Between the two gills, the roof of the pallial chamber is richly vasculated, and apparently is homologous with the lung of *Helix*. The respiratory process appears to be equally shared by the two sets of organs, and this the authors are of opinion is the primitive condition.

Vayssière, A.—Étude comparée des Opisthobranches des côtes Françaises de l'Océan Atlantique et de la Manche avec ceux de nos côtes Méditerranéennes. *Bull. Sci. France et Belg.*, 1901, T. xxxiv, pp. 281—315.

Professor Vayssière's interesting paper gives a list of the Opisthobranchs found on the Channel and Atlantic Ocean coasts of France, and a comparison with those found on the French Mediterranean coast. The list comprises 126 species. A remarkable difference exists between the two faunas, thus 16 genera of the Ocean are not found in the Mediterranean, while 14 genera of the latter are not found on the Ocean coast.

Bergh, R.—Beitrag zur Kenntniss der Gattung *Harpa*. *Zool. Jahrb. (Abth. I. Morph.)*, 1901, Bd. 14, pp. 609—629, T. 47.

Dr. Bergh's interesting study on the structure of *H. ventricosa*, Lam., *H. rosacea*, Mts., *H. nabilum*, Mts., and *H. minor*, Mts., shows that the *Harpidæ* are probably allied to the *Oliviidae*, although many points yet remain obscure, while in some features resemblances to molluscs widely separated are indicated.

Externally we note that the large, flattened foot is incapable of being withdrawn into the shell, and is devoid of an operculum. The tentacles, which proximally are close together, exhibit towards the proximal end a well-developed, external optic prominence. There is a long respiratory tube. The alimentary system commencing at the mouth, which is a very narrow opening, has a long proboscis; the gullet is very small, and the intestine short. The salivary glands are well developed and the digestive gland small. The nervous system is characterised by the concentrated ganglia, resembling in this and other features the condition which obtains in the *Buccinidae*. The penis is unarmed and the seminal duct either traverses this organ as an open groove, or passes subcutaneously on and through it. The kidney, pericardium and other parts are also briefly dealt with.

Baker, F. C.—The Molluscan Fauna of the Genesee River. *Amer. Nat.*, 1901, vol. xxxv, pp. 659—664.

The Genesee River rises in Potter Co., Penn., and flows in a northerly direction for nearly 120 miles, emptying in Lake Ontario, 7 miles north of Rochester, N.Y. At Rochester the river drops to the valley below in three series of falls of considerable magnitude. A study of the Mollusca of the river leads the author to the following conclusions: that a series of falls like these prove an effective barrier to the distribution of some molluscs, such as pelecypods with mud-burrowing habits and the stenobranths, which cling to the rocks and do not come to the surface, while to the freshwater pulmonates, which frequently come to the surface and can be swept over the falls, it is not a barrier. A table showing the comparative distribution of the various species accompanies the paper.

Dall, W. H.—Synopsis of the *Lucinacea* and of the American species. Proc. U. S. Nat. Mus., 1901, pp. 779—883, pls. xxxix—xlii.

Continuing the series of valuable synopses of various groups of marine bivalves, Dr. Dall here reviews the *Lucinacea*, which includes the following 5 families *Thyasiridae*, *Diplodontidae*, *Lucinidae*, *Corbidae*, and *Cyrenellidae*. Many radical changes have been made by the author and the revision marks a considerable advance. Seventeen new species are described and figured together with figures of other species. For the reception of *Cryptodon muscleyi* and *Izonicus*, E. A. Sm., the author proposes a new genus under the name of *Tatirinaria*.

Mitra, S. B.—The Crystalline Style of Lamellibranchia. Quart. Journ. Micro. Sci., 1901, vol. 44, pp. 591—602, pl. 42.

After careful experiment and study, the author has arrived at the following conclusions respecting the origin and function of the crystalline style. That it is an active amylolytic ferment, secreted as a viscous liquid, most probably by the so-called liver; that it is stored up as a flexible solid either in the caecum, or in some compartment of the alimentary canal; that the end projecting into the stomach is slowly and gradually dissolved there, and mixed up with food-particles, transforming the starchy portion into a reducible sugar.

Sykes, E. R.—Conchology at the Dawn and Close of the Nineteenth Century. Journ. Conch., 1901, vol. 10, pp. 35—42.

This interesting address formed the Presidential Address to the Conchological Society of Great Britain and Ireland, at their Annual Meeting, October, 1900.

Sykes, E. R.—Notes on the Genus *Tenesta*, II., and A. Ad., with descriptions of two new land-shells (*Tenesta* and *Clausilia*) from South America. Proc. Mar. Soc. Lond., 1901, vol. iv, pp. 220—222, fgs. i—iii.

The *Echatala peruviana*, Philippi, is regarded as a synonym of *T. chusiloides*, Rye. *T. magnifica* from Bolivia, and *Clausilia pilsbryi* from Peru, are described as new.

Sykes, E. R.—The Zoological Record, 1900, vol. xxxvii. Record vii, Mollusca. pp. 1—92, London, 1901.

In view of the preparation of an index-volume to the 'Record,' the present opportunity has been taken to include such genera, sections, etc., as have been omitted in past years. Further the somewhat lengthy paragraphs which now appear under the heading 'Geological,' have been under consideration, with a view to breaking them up; tentatively the large group of 'Tertiary' has been divided geographically by continents.

Record vii maintains the high standard to which the present Recorder, his associates, and predecessor have brought this invaluable work.

Prowazek, S.—Spermatologische Studien. I. Spermatogenese der Weinbergschnecke (*Helix pomatia*, L.). Arbeit. Zool. Inst. Wien., 1901, T. xiii, pp. 197—222, Taf. xi u. 2 textfiguren.

The author describes and figures in great detail the various stages in the development of the spermatozoa of this species.

Cockerell, T. D. A.—On a slug of the genus *Veronicella* from Tahiti. Proc. U. S. Nat. Mus., 1901, vol. xxiii, pp. 835, 836.

Veronicella ugassizi, n. sp. "Length, about 21 mm.; breadth 9½; breadth of sole 3; female orifice from sole 2, from margin, scarcely 2, from anterior end about 11 mm.; these measurements all from a dried individual. Dorsal surface granular with small warts; colour, coffee-brown marbled with black; no dorsal band. Under surface whitish. Anatomy not determinable from the material available."

Hab.—Tahiti, Tipaerui Valley.

This species is apparently nearly related to *V. gilsoni*, Cltge., from the Fiji Islands, differing in the broader sole and position of the female generative orifice.

Jameson, H. L.—On the Identity and Distribution of the Mother-of-Pearl Oysters. *Proc. Zool. Soc. Lond.*, 1901, pp. 372—394, 4 figs.

Blanford, W. T.—Note on *Bensonella* and on an apparently undescribed species, *B. minela*. *Proc. Malac. Soc. Lond.*, 1901, vol. iv, pp. 178, 179, figs.

The author gives a list of the known species of *Bensonella*, with their localities; and describes *B. minela*, n. sp., from Narkander. E. N. E. of Simla, the type of which has been presented to the British Museum.

Blanford, W. T.—Note on *Bensonella mainwaringi* and *Macrochlamys dalingsensis*. *Ibid.*, pp. 180—182, figs.

Dr. Blanford concludes that these two species are closely allied, or sub-specific races of the same species, which would in that case bear the name *M. mainwaringi*, Nev. The animal has not yet been seen, and so it is thought best to keep the two distinct. A description of the shell of *M. mainwaringi* is given together with the synonymy.

Blanford, W. T.—Notes on *Ariophanta*, *Xestina*, *Nilgiria*, and *Euplecta*, with lists of species. *Ibid.*, pp. 241—253, pl. xxv, and figs.

The terrestrial Pulmonata of the Indo-Malay region are from various points of view of exceptional interest, but unfortunately widely differing opinions exist as to their classification and affinities. This is no doubt largely due to our present inaccurate knowledge of their internal structure, and also in part to their having been classed in genera, sub-genera, and sections upon the form of the shell, jaw and lingual ribbon.

The four genera treated of by Dr. Blanford are by some writers supposed to be members of the *Zonitidae*, while others regard them as belonging to the *Helicidae* or *Limacidae*.

Dr. Blanford accepts Col. Godwin-Austen's view that in certain areas of the Indo-Malay region, certain molluscs, "having shells so diverse that they were formerly classed in distinct genera, or even in some cases different families or sub-families, agree amongst themselves in each area, and differ from those in other areas by characteristic details in the anatomy."

The history of the names *Xestina* and *Nilgiria* is then explained, and the author arrives at the conclusion "that *Xestina* and *Nilgiria* are identical. . . . The group to which these names have been applied is neither a genus or sub-genus, but merely a section of *Ariophanta*, distinguished by a character which is not of generic importance." Then follows a list of 26 species referred to *Ariophanta*, followed by a similar one of *Euplecta* containing 31 species. The following are new: *A. canarica*, *A. heteroca*, *A. gassii*, *E. transretata*, *E. agastyne*, *E. malabarica*, *E. laevis*, *E. ducitosa*, *E. granuliferu*, *E. (?) mucronifera*, and *oribates*.

This re-classification is undoubtedly a step in the right direction; far too many genera and sub-genera have been made from closely allied forms of Indian molluscs, and we regret to say this process of making a new sub-genus for every supposed difference from the normal, still flourishes.

Dautzenberg, Ph.—Description de trois Mollusques nouveaux provenant de l'état indépendant du Congo. *Ann. Soc. Roy. Malac. Belgique*, 1901, T. xxxvi, pp. 3—7, pl. i.

The new forms are *Achatina martoli* and var. *pallensens*, *Melania liebrechtsi* and *Umbonia briarti*. *Cleopatra johnstoni*, E. A. Sm., is also recorded and figured.

Pilsbry, Henry A.—New Land Mollusca from Japan and the Loo Choo Islands. *Proc. Acad. Nat. Sci. Phila.*, 1901, pp. 344—353. New Japanese Marine, Land and Fresh-water Mollusca. *Ibid.*, pp. 385—408, pls. xix—xxi.

The flow of new species of Japanese molluscs continues unabated. In the first paper Dr. Pilsbry describes the following: *Trochomorphna gouldiana*, *Macrochlamys porphygialis*, *M. gudei*, *Katiella borealis*, *Eulota (Euhadra) oshimae*, *Chloritis*

eucharistus ("One day prior to *Ch. ushinana*, Gude, which is the same species" H. A. P. in litt.), *Succinea hirasei*, *Cyclophorus hirasei*, *Papinella oshimae*, *Diplommatina turris*, *D. sayinatu*, *D. oshimae*, *D. tsushima* and *D. septentrionalis*.

In the second paper, in which illustrations of some former species are given in addition to those enumerated below, the following new species and varieties are described: *Daphnella fragilis* v. *articulata*, *Mitra* (*Chedoffuria*) *tsuzumensis* and *canattai*, *Tritonidea subinermis*, *Euthria hokkaidonis*, *Buccinum hirasei*, *Cerithium chemnitzianum*, *Syrnula bacillum*, *Eulima dunkeriana* and *tsushima*, *Assininea angustata*, *Nerita marteniana*, *N. helicinoides* v. *tristis*, *Leptothyra rubra* v. *laevicostata*, *Solca roseomaculatus*, *Tellina* (*Merisa*) *pristiformis*, *Bulinus reinianus* v. *hokkaidonis*, *Mandarina mandarina*, v. *ponderosa*, *Trishoplita darosae* v. *awajensis*, *T. goodiini* v. *strigata*, *Kaliella suberulata*, *Ioderna* and *harinensis*, *Umpalotropis japonicus*, *Bithynia striatula* v. *japonica*, *Sphaerium inutile*, *Corbicula sadoensis* and *awajensis*.

Pilsbry, Henry A.—The Land Mollusks of the Loo Choo Islands: *Clausiliidae*. Ibid., pp. 409–424. pls. xxii, xxiii.

The Loo Chooan *Clausilia* fall into five subgenera or sections, of which the *Luchaphaedusa*, nov., has been found nowhere else. The following new forms are now very fully described: Under the section *Stereophaedusa*, *C. valida*, Pfr. v. *perfasciata*; under *Luchaphaedusa*, *C. callistochila*, *nesiotharua*, *oshimae*, *pseudoshimae*, and *mima*; under *Hemiphaedusa*, *C. crenilabium* and *munus*.

Smith, Edgar A.—On South African Marine Shells, with descriptions of new species. Journ. of Conch., 1901, vol. x, pp. 104–116, pl. i.

Smith, Edgar A.—A list of the *Volutidae* of South Africa, with descriptions of two new species of *Voluta* from Natal. Proc. Malac. Soc. Lond., 1901, vol. iv, pp. 231–235. 2 figs.

The new species are *V. (Aloithoe) ponsonbyi*, and *V. (Lyria) quckettii*.

Lillie, F. R.—The Organization of the Egg of *Unio*, based on a study of its Maturation, Fertilization, and Cleavage. Journ. Morph., 1901, vol. xvii, pp. 227–292, pls. xxiv–xxvii.

It is only possible in the brief space at our disposal to call attention to the leading points in this valuable paper. After the entrance of the spermatozoon a spermophaster is formed, which moves towards a definite zone and comes to rest. Gradually this disappears, and at the same time the sperm-nucleus contracts. The first maturation spindle is now entering on its metaphase. The second maturation division having taken place, the sperm-nucleus grows in size synchronously with the egg-nucleus and begins to describe its complicated copulation path, ultimately the two nuclei come into contact at or near the centre of the egg. The first cleavage spindle is then formed and moves axially to one end of the egg. All of these points are discussed in great detail and beautifully illustrated; in addition to the author's own observations, the literature and theories bearing upon the subject are dealt with in a critical, yet careful manner.

Godwin-Austen, H. H.—On the Anatomy of the *Helix ampulla* of Benson, and its generic position in the *Ariophantinae*. Proc. Malac. Soc. Lond., 1901, vol. iv, pp. 187–190, pl. xviii.

The author describes the external appearance of this interesting mollusc, also the generative organs, free muscles, jaw, and radula. In its main characters he regards it as agreeing with *Nigiria* and *Ariophanta*. Certain characters, such as the jaw, form of the central teeth, smooth foot-sole, pallial margin, and the shell, it does not share with these genera, and they appear to the author sufficient data on which to found a new sub-genus of the *Ariophantinae*, to which he gives the name of *Antretia*.

Godwin-Austen, H. H.—On the Anatomy of *Helix politissima*, Pfeiffer, of Ceylon and on its position in the *Ariophantinae*. Ibid., p. 261–263, pl. xxvi.

Judging from the figures we should not have hesitated to place this species in the genus *Balnadvipia* or *Nilgiria*, the author however proposes a new sub-genus for its reception to which the name *Ruzana* is given. The malacologist of the future who is bold enough to describe the anatomy of the Indian land mollusca, will have a formidable and perplexing nomenclature to deal with and unravel, to say nothing of the synonyms.

Melville, J. Cosmo. and Standen R.—The Mollusca of the Persian Gulf, Gulf of Oman, and Arabian Sea, as evidenced mainly through the collections of Mr. J. W. Townsend, 1893—1900; with Descriptions of new species. Proc. Zool. Soc. Lond., 1901, pp. 327—460, pls. xxi—xxiv.

The title sufficiently explains the scope of the present work, which forms a valuable and comprehensive survey of the Mollusca of the Persian Gulf and Arabian Sea. The present part treats of the Cephalopoda, Gastropoda, and Scaphopoda, and of these the authors enumerate 935 species of which 77 are new, contained in 171 genera, one of which is new.

It is impossible here to do more than point out some of the many interesting peculiarities of this fauna. A single species, *Argonauta hians*, Soland. represents the Cephalopoda. There are no Amphineura mentioned. Few *Patellae*, *Fissurellae*, or *Haliotis* occur. Amongst the *Trochidae* many endemic species are found. *Natica* abounds; so do the *Littorinidae*, and allied small families, the *Rissoidae* being especially interesting; the *Cerithiidae* are also plentiful. *Murex* is not here represented by any of the larger species, the same may be said of *Fusus*, *Litorium*, and *Purpura*. *Murex* (*Ocenebra*) *bombayanus*, Melv., is interesting as the Indian analogue of *M. cristatus*, Brocchi, from the Mediterranean. Many *Columbellidae*, *Enginae*, and *Ricimulae* seem peculiar, as also many *Nassae* and *Mitreae*,—while the *Bullidae* are especially interesting. *Terebra* is represented by 23 small species, mostly endemic. The *Lepidocentrus* section of *Conus* here attains its maximum development; while the *Planorbis* family are by far the most numerous distributed family. *Oliva* hardly occurs, and *Voluta* is absent. Beautiful and peculiar forms of *Scapharionae*, *Cantharionae*, and *Trichotropis* are especially noteworthy.

The *Tectibranchia* are represented by 41 species of which 5 are new. Two species of *Siphonuria* from the coasts of India are peculiar. Among the Scaphopoda, *Cadulus* is represented by *C. euloides*, n. sp., and *C. gadus*, Sby., and 11 species of *Dentalium*.

The authors hope, at no very distant date, to publish a second part treating of the Pelecypoda.

Gude, G. K.—Sur une collection de Plectopylis du Tonkin, avec la description de six espèces nouvelles. Journ. de Conchyl., 1901, vol. xlix, pp. 197—212, pl. vi, et 7 figs.

The new species are *P. dautzenbergi*, *P. barayi*, *P. tenuis*, *P. fisheri*, *P. anceyi*, and *P. parvinitis*. Coloured figures of all the species are given, in addition to figures of the parietal and palatal armature. Figures of *P. emigrans*, Mliff., are also given.

Dautzenberg, Ph.—Description de deux Bulimulidés nouveaux provenant du Pérou. Ibid., pp. 213, 214, pl. vii, figs. 1—4.

The author describes and figures two species of *Peruana*, *iocosensis* and *baeri*, previously diagnosed (J. de C., p. 131).

Dautzenberg, Ph. et Bernier, J.—Description d'un Bulimidé nouveau, provenant de la Nouvelle-Calédonie. Ibid., pp. 215, 216, pl. vii, figs. 5, 6.

Leucocharis porphyrochila, n. sp.

Dautzenberg, Ph.—Sur deux déformations observées chez des *Placostylus* de la Nouvelle-Calédonie. Ibid., pp. 217, 218, pl. vii, figs. 7, 8.

Henderson, J. B. Jr.—A new Jamaican *Adamsiella*. Naut., 1901, vol. xx, pp. 49, 50, 2 figs.

A. jarvisi from near Ewarton, Jamaica.

Pilsbry, Henry A.—Land Mollusks of the Northeastern group of the Loo Choo Islands. *Ibid.*, pp. 61–65.

The new species are *Ganesella tauregashimae*, *Diplommatina yakushimae*, and *Eanea iwakura* var. *yakushimae*.

Walker, Bryant.—A new species of *Strophitus*. *Ibid.*, pp. 65, 66, pl. iii.

S. wrightianus from Flint river, Baker Co., Ga., is most nearly related to *S. tombigbeensis*.

Sterki, V.—New *Psidia*. *Ibid.*, pp. 66–69.

Two interesting species are described, viz. *P. affine*, and *P. sargentii*, as usual they are not figured.

Suter, H.—Further Contributions to the Geographical Distribution of the New Zealand non-marine Mollusca. *Trans. N. Z. Inst.*, 1900, vol. xxxiii, pp. 151, 152.

Hoyle, W. E.—Note on d'Orbigny's figure of *Onychotenthis dussumieri*. *Mem. and Proc. Manchester Lit. Philo. Soc.*, 1901, vol. xlv, pp. 1–3.

Yoshiwara, S.—On an apparently New Species of *Argonauta* from the Tertiary of Izumo. *Annot. Zool. Japon.*, 1901, vol. iii, pp. 174–176, 1 pl.

Thompson, W. D'Arcy.—On a rare Cuttlefish, *Ancistroteuthis robusta* (Dall). *Proc. Zool. Soc. Lond.*, 1900, pp. 992–998, 3 figs.

Luther, A.—Verzeichnis der Land- und Süßwassermollusken der Umgebungen Revels. *Acta Soc. F. et Fl. Fennica*, 1901, xx, no. 2, pp. 1–16.

Luther, A.—Bidrag till kännedom om Land- och Sötvattengastropodernas utbredning i Finland. *Acta Soc. F. et Fl. Fennica*, 1901, xx, no. 3, pp. 1–125, and map.

Hesse, R.—Die Augen einiger Mollusken. *Zeit. f. wiss. Zool.*, 1900, Bd. lxxviii, pp. 379–477, T. xxv–xxxii.

Godwin Austen, H. H.—On the Anatomy of certain Agnathous Pulmonate Mollusks. *Ann. Mag. N. H.*, 1901 (s. 7), vol. vii, p. 488.

Smidt, H.—Weitere Untersuchungen über die Glia von *Helix*. *Anat. Anz.*, 1901, Bd. xix, pp. 267–271, 5 Abbildgn.

Conklin, E. G.—Centrosome and Sphere in the Maturation, Fertilization, and Cleavage of *Crepidula*. *Anat. Anz.*, 1901, Bd. xix, pp. 280–287, 8 figs.

Smidt, H.—Ganglienzellen in der Schlundmuskulatur von Pulmonaten. *Arch. f. mikr. Anat.*, 1901, Bd. lvii, pp. 622–631, 1 Taf.

Pace, S.—On the Rediscovery of *Euselenops* [= *Neda*] *luniceps*, Cuv. *Proc. Malac. Soc. Lond.*, 1901, vol. iv, pp. 202–204, fig.

Pace, S.—Note on the Anatomy of *Thersites* (*Hadra*) *bipartita*, Fér. *Ibid.*, pp. 205–207, figs. i, ii.

Drew, Gilman A.—The Life-History of *Nucula delphinodontia* (Mighels). *Quart. Journ. Micro. Sci.*, 1901, vol. 44, pp. 313–391, pls. 20–25, and 24 figs. in text.

Jordan, H.—Die Physiologie der Locomotion bei *Aplysia limacina*. *Zeit. f. Biol.*, 1901, Bd. 41, pp. 169–238, 1 Taf.

Weldon, W. F. R.—A First Study of Natural Selection in *Chusidila luminata* (Montagu). *Biometrika*, 1901, vol. i, pp. 169–174, tables i–v.

- Heseheler, K.**—Ueber die Gattung *Pleurotomaria*. Biol. Centralbl., 1901, Bd. xxi, pp. 569—582.
- Ihering, H. von.**—The *Unionidae* of North America. Naut., 1901, vol. xv, pp. 37—39, 50—53.
- Simpson, C. T.**—On the Classification of the *Unionidae*. Ibid., pp. 77—82.
- Simroth, H.**—Ueber die Abhängigkeit der Nacktschneckenbildung vom Klima. Biol. Centralbl., 1901, Bd. xxi, pp. 503—512.
- Kerr, J. G.**—Phylogenetic Relationship between Amphineura and Cephalopoda. Zool. Anz., 1901, Bd. xxiv, pp. 437, 438.

GENERAL REVIEWS.

- A Treatise on Zoology.**—Edited by F. Ray Lankester.—Pt. iv. The Platyhelminia, Mesozoa, and Nemertini. By W. Blaxland Benham. 8vo, pp. viii+204. London, 1901. Adam and Charles Black.

A further volume of this invaluable treatise has been issued forming Part iv. It deals with the Platyhelminia, the Mesozoa, and the Nemertini, and Professor Benham is responsible for the whole of the work. Unfortunately, as the Editor points out, the work was in print three years ago, when the author left England for New Zealand, but the Editor is satisfied that no important omissions due to this fact occur in the book, the proofs of which have been revised and some additions made during the present year. Further Mr. R. C. Funnell has added some notes to the section on the Nemertina, practically bringing the work up to date, a few omissions, however, do occur, but these do not generally affect the value of the work.

The volume before us forms the most complete and up-to-date account of the particular phyla of which it treats, and cannot fail to prove of great service to zoologists.

A word must be said in praise of the illustrations, of which many are new, some of the semi-diagrammatic figures are capital, such for instance as fig. xifi, p. 29, illustrating the various relations of the uterus in Aquatic Triclad, fig. 1, p. 51, anatomy of a schematic Heterocotylean, fig. xxxii, p. 141, life-history of a *Cysticercus*, and many others.

EDITOR'S NOTES.

A large number of Subscribers having expressed the wish that the volumes of the Journal should be annual ones, we have brought volume viii to a close with the end of 1901. It will be noticed however, that the actual number of plates exceeds what we have previously issued in two years, while the printed matter remains almost the same.

In order not to delay the publication of the different parts, the Editor requests that contributors requiring illustrations, will kindly forward their drawings as early as possible.

To Contributors, Subscribers, and all who have in any way furthered the interests of the Journal during 1901, the Editor tenders his grateful acknowledgement.

At the Anniversary meeting of the Royal Society, held on November 30th, 1901, William Thomas Blanford was elected as a member of the Council, and was also the recipient of a Royal Medal, for his work in connection with the geographical distribution of animals.

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