

THE
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EDITED BY

WALTER E. COLLINGE, M.Sc.,

LECTURER ON ZOOLOGY AND COMPARATIVE ANATOMY IN THE UNIVERSITY
OF BIRMINGHAM, PRESIDENT OF THE MIDLAND MALACOLOGICAL
SOCIETY, AND PRESIDENT OF THE BIOLOGICAL SECTION
OF THE BIRMINGHAM NATURAL HISTORY AND
PHILOSOPHICAL SOCIETY.

WITH THE CO-OPERATION OF

DR. JOSEF F. BABOR,
The University, Prague.

II. HOWARD BLOOMER,
Birmingham.

III. REV. A. U. COOKE, M.A., F.Z.S.,
Fellow of King's College, Cambridge.

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

CHARLES HEDLEY, F.L.S.,
Australian Museum, Sydney, N.S.W.

HENRY SUTER,
The Museum, Auckland, N.Z.

I. R. SARGENT, F.Z.S., F.L.S.,
London.

H. H. WOODWARD, F.C.S., F.L.S.,
British Museum (South Kensington), London.

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Authors alone are responsible for the statements in their respective papers.

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CORRIGENDA.

(See also page 129.)

- p. 37, line 34, for it apparently altogether disappears *read*
they apparently altogether disappear.
- p. 40, line 35, right hand column, for stomach *read* siphon.
- p. 42, line 35, insert comma after *E. siliqua*, and delete the word and
before, and the comma after, *Cultellus pellucidus*.
- p. 82, line 26, for protuding *read* protruding.
- p. 102, line 17, for more conspicuous *read* less conspicuous.

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VOL. X.

MALACOLOGICAL NOTES.*

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

13.—The Value of the name *Rhodina*, de Morgan.

Recently,⁽¹⁾ I described and figured a shell from Kelantan, under the name *Rhodina* (?) *mirabilis*. I felt some doubt as to whether the form really belonged to de Morgan's genus, as the single species he referred to it⁽²⁾ was, and is, unknown to me. Dr. Moellendorff⁽³⁾ expressed the view that the form did really belong to de Morgan's genus. Whether this be so or not the name *Rhodina* cannot be used in Molluscs, having been employed by Guenée⁽⁴⁾ in 1854 for an Australian butterfly. Under these circumstances I propose the new genus

Pileaxils.

and take as the type my *Rhodina* (?) *mirabilis*. I feel but little doubt that de Morgan's *R. perakensis* also belongs here.

Dr. Moellendorff suggests that the group should be reduced to a sub-genus of *Prosopaea*, but it appears to me to be distinct from the typical Nicobar forms; it may be remarked, with regard to this last name, that *Prosopaea* and *Prosopopus* had previously been used in Zoology.

* See Vol. viii, p. 109.

⁽¹⁾ *Ann.*, vol. ix, pp. 29, 61.

⁽²⁾ *Bull. Soc. Zool. France*, 1885, vol. x, p. 990.

⁽³⁾ *Nachricht. Deutsch. Malak. Ges.*, 1902, p. 140.

⁽⁴⁾ *Holl. Nat. Insectes, Spec. Gen. Lepidoptères*, 1854, vol. viii, p. 10.

14.—Description of *Leptachatina henshawi*, n.sp.

Shell ovately-pyramidal, rimate, somewhat thin, brownish-horny in colour, longitudinally well marked with filiform striæ, which become weaker towards the base, apex blunt. Whorls $5\frac{1}{2}$, plano-convex, the protoconch being large and smooth, the others sculptured as mentioned above, the last whorl measuring $\frac{4}{7}$ of the entire length of the shell. Suture well marked. Mouth subquadrate, the straight columellar margin being slightly reflected. Plicæ small and ascending.

Alt. 7; diam. max. 3.6 millim.

Hab.—Bucholtz, Kona, 1,800 feet, Hawaii (comm. H. Henshaw).



This pretty little shell recalls somewhat in appearance *Thaanumia omphalodes*, Aney, but lacks the sculpture of the protoconch and the distinct umbilical area. The sculpture is similar in nature to that of *L. tenebrosa*, Pease, of Kauai, &c. I know no very close ally in the Hawaiian fauna. It is with much pleasure that I affix to the species the name of Prof. H. Henshaw, to whom I owe both it and many other interesting Hawaiian shells.

15.—On the name *Cataulus*.

In 1847, Gray ¹ mentioned, in the synonymy of *Brachypus*, the name *Tortulosa*, giving *Turbo tortuosus* as a type or example. Three years after ² the species appears under *Megalomastoma*, the name *Tortulosa* not being mentioned.

In 1851 Pfeiffer ³ proposed and diagnosed *Cataulus* for three species, *tortuosus*, *templemani*, and *layardi*, no type being named, and the following year he extended ⁴ the group by the addition of three more species, a course which he also adopted in the well-known "*Monographia Pneumonoporum*" (p. 136).

¹ Proc. Zool. Soc., 1847, p. 177.

² Nomencl. Moll. Brit. Mus. Part I, p. 30.

³ Zeitsehr. f. malak., vol. viii, p. 144.

⁴ Cat. Phan. Brit. Mus., p. 96.

The brothers Adams ⁽⁵⁾ in March, 1856, used the generic name *Tortulosa* in place of *Cataulus*, giving for the first time a diagnosis of *Tortulosa*.

In 1858 Pfeiffer ⁽⁶⁾ under his genus *Cataulus*, states "Species typicæ omnes ex insula Ceylon allatæ sunt, unica ex insulis Nicobaricis, characteribus aberrantibus prædita, ab illis separari potest," and divides *Cataulus* in the following way:—

- A. Abnormes (*Tortulosa*, sect. *Brachypodis*, Gray
in Proc. Zool. Soc., 1847, p. 177). § 1 Nr. 1.
B. Normales. § 2 Nr. 2-13.

and in his second supplement (p. 87) he states: Sections A. *Tortulosa*, Gray; B. *Cataulus*, Pfeiffer, a course which he equally follows in his third supplement (p. 110).

In 1897, Dr. Kobelt and Herr von Moellendorff ⁽⁷⁾ used "*Cataulus*, Blandford" for the whole group, and in the following year I carelessly stated that *Turbo tortuosus* might stand as the type.

Last year Dr. Kobelt ⁽⁸⁾ suppressed *Cataulus* altogether on the ground that it was a synonym of *Tortulosa*, and proposed a new sub-genus of *Tortulosa*, which he called *Eucataulus*, with *Cataulus templemani* as the type.

From the foregoing facts and especially considering that no type of *Cataulus* was originally named, and the sub-division of the group by Pfeiffer in the Supplements to the "Mon. Pneum.," I think that the new name is unnecessary, and that even if *Cataulus* and *Tortulosa* be not distinct as genera, still the former may well be used as a section of the latter.

⁽⁵⁾ Gen. Rec. Moll., vol. II, p. 285.

⁽⁶⁾ Mon. Pneum., Suppl. 1, p. 87.

⁽⁷⁾ Nachr. Deutsch. Malak. Ges., p. 141.

⁽⁸⁾ Die Thierwelt, Cephalopodien, p. 284.

SUPPOSED NEW SPECIES OF HELICINA AND BULIMULUS FROM COSTA RICA.

BY H. B. PRESTON, F.Z.S.

Helicina gemma, n.sp.

Shell conical, elevated, bright yellow, apical whorls crimson, last whorl tinged with orange-scarlet for some distance from the mouth, the outer lip being also of a vivid orange-scarlet colour. Whorls 5, convex, very finely striated with lines of growth. Peristome expanded and slightly reflexed. Aperture rather high and narrow. Operculum reddish-brown, normal.



Diam. maj. 6, alt. 7 millim. Aperture (inside measurement) diam. 2.5, alt. 3 millim.

Hab.—Costa Rica.

A very beautiful and striking shell, whose nearest ally appears to be *H. oweniana*, Pfr., from Mexico; from this, however, it differs in being more globular, in the greater convexity of the whorls and in having one less, in the narrower aperture, and in the colouration of the outer lip (otherwise similar in both species) extending further up the body whorl than it does in *H. oweniana*.

Bulimulus (Drymaeus) nublus, n.sp.

Shell elevated, conic, perforate, pale flesh-colour with a narrow dark purple band extending all round, and at about one millimetre behind the outer edge of the peristome, also with a few similar, though less marked bands (corresponding to the periodic mouths) upon the spire. Whorls 6-7, irregularly malleated, and striated with lines of growth. Apex blunt. Suture impressed. Umbilicus narrow and partly concealed by the reflexed columella. Peristome slightly reflexed at base. Aperture oval.



Diam. maj. 10.5, alt. 23 millim. Aperture (inside measurement) diam. 5, alt. 9 millim.

Hab.—Azarhar de Cartago, Costa Rica.

A CLASSIFIED LIST OF THE HELICOID LAND SHELLS OF ASIA.

(PART V*)

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

xiii. FURTHER INDIA (NOT INCLUDING BURMA).

This region is very rich in molluscan life, and although many tracts remain to be explored, our knowledge of its fauna is sufficiently advanced to warrant some generalisations. The most salient feature, perhaps, is the appearance of *Amygdromus*, whose headquarters are in the Malay Archipelago, and many of whose species are characterised by great beauty of colour and marking. Other links with the Malaysian fauna are *Chloritis* and *Xesta*. *Neocepholis*, represented by three species, is peculiar to Tonkin. *Ganesella*, which extends to India, Burma, China, and Japan on the one hand, and to the Malay and Philippine Archipelagoes on the other, here produces a number of keeled forms. *Plectopylis* is well represented in Tonkin, producing no less than twenty species, four of which belong to the section *Sinicola*, hitherto believed to be exclusively Chinese. With the exception of *Plectopylis laomontana*, Pfr., found in Laos, the genus is absent in the other divisions of this region. *Hemiplecta* has here gigantic representatives in *H. distincta*, *H. neptunus*, and the beautiful and rare *H. cambojiensis*.

Turning to the history of our knowledge of the region we find that the "Bonite," in 1837, touched at Touran, in Annam, whence Eydoux and Souleyet described a number of species in the Zoological portion of the results of the voyage in 1852. The American missionary, E. House, was the first to procure land shells of undoubted Siamese origin, and these were described by Redfield and Haines.⁽¹⁾ The French traveller Mouhot, who explored Laos and Cambodia, between 1858 and 1860, collected there a number of land shells, which were sent to London, and described by Pfeiffer; some of these were figured in Mouhot's posthumous work published in 1864. Several Siamese shells sent to the British Museum by Sir J. Bowring and Sir R. Schomburgk, were described by Professor von Martens,⁽²⁾ who himself, in 1861, visited Siam with the Prussian Expedition to Eastern Asia, and described his finds in the publication of the expedition.

* See ante, vol. ix, p. 112.
 1. Ann. Lycœum Nat. Hist., New York, 1863-66.
 2. Proc. Zool. Soc., 1860.

Great impetus to exploration was given by the successive French occupation of Cochinchina, Cambodia, Annam and Tonkin, a number of scientific expeditions traversing the newly-acquired territories. Le Mesle visited Cambodia and Cochinchina, and published his results in conjunction with Mr. Jules Mabille⁶¹. Mr. A. Morelet utilised the materials collected by Vesco, Massin and Silvestre for his Fauna. The shells obtained by Mr. Germain in Cochinchina were described by Mr. T. de Rochebrune.⁶² Mr. L. Morlet dealt with the collections made by Mr. Pavie in Cambodia⁶³, in Cambodia and Siam⁶⁴, and by Mr. Jourdy in Tonkin⁶⁵. Mr. de Morlaineourt's collections in Tonkin were published by Mr. Dautzenberg and Baron d'Hamonville⁶⁶, and Capt. Dorr's in Annam by Mr. G. Watterbled⁶⁷. Mr. Ancey described the new species acquired in Tonkin by Mr. Villedary⁶⁸, and those collected by Mr. H. Counillon in Laos⁶⁹, while Mr. Jules Mabille compiled a treatise on the materials gathered by Mr. Balansa in Tonkin⁷⁰.

More recently, Lieut.-Col. Messager and Dr. R. Bavay have collected numbers of undescribed shells in Tonkin, and these form the substance of four articles by Messrs. A. Bavay and Dautzenberg.⁷¹ The present writer has dealt with the *Plectopylis* collected by Lieut.-Col. Messager.⁷²

Finally Dr. von Müllendorff has made numerous additions to the fauna of this region from material obtained by Mr. Roebelen in Annam⁷³, and by Mr. Fruhstorfer in Annam and Siam.⁷⁴

A. SIAM.

Family Zonitidae.

Sub-family Arlophantinae.

Genus EUPLECTA, Semp.

rosamunda, Bens. Menam Pinh,
E. Laos.

danae, Pfr. Laos.

dichromatica, Morlet. Between
Srakeo and Ong-son.

Genus XESTINA, Semp.

granulosa, Mdf. Bangkok.

Genus XESTA, Alb.

siamensis, Pfr. Pechaburi.

= birnana, Pfr.

v. mouhoti, Pfr.

vallicola, Pfr.

splendens, Hutt.

Sub-family Macrochlaminae.

Genus MACROCHLAMYS, Bens.

dugasti, Morlet. Menam Pinh,
Laos.

hainesi, Pfr.

resplendens, Phil. Pechaburi,
Bang-Pra.

v. subcornea, Pfr. Menam
Pinh.

v. obesior, Mts. Pechaburi,
Bang-Pra.

pedina, Bens. Between Bangkok
and Chentabun ; between
Pasé and Chentabun.

⁶¹ Journ. de Conchyl., 1860.

⁶² Series Conchyl. Livr. IV, 1875.

⁶³ Bull. Soc. Philom. Paris, 1891.

⁶⁴ Journ. de Conchyl., 1893, 1894, 1898.

⁶⁵ Op. cit., 1890.

⁶⁶ Op. cit., 1890.

⁶⁷ Journ. de Conchyl., 1897.

⁶⁸ Op. cit., 1890.

⁶⁹ Le Naturaliste, 1888.

⁷⁰ Bull. Mus. Marseille, 1898, T. I.

⁷¹ Bull. Soc. Malac. France, 1887, T. IV.

⁷² Journ. de Conchyl., 1899, 1900.

⁷³ Op. cit., 1901.

⁷⁴ Nachr. Deutsch. Malak. Gesell., 1898.

⁷⁵ Op. cit., 1900, 1901, 1902.

- ? malaccana, Pfr.
 mitiuscula, Mts.
 sinulabris, Mts. Between
 Bangkok and Pechaburi.
 benoiti, Crosse and Fisch. Be-
 tween Bangkok and Chen-
 tabun ; Xieng-Moi ; Lu-
 ang Prabang, Laos.
 callojuncta, Anc. Luang Pra-
 bang.
 ochtogyra, Mdff. Bangkok.
 heptagyra, Mdff. Kanburi.
 brunnea, Mdff. Bangkok ;
 Muoklek : Hualap.
 Genus EVERETHIA, G.-A.
 punicata, Morelet. Ayuthia.
 bocourti, Morelet. Battam-
 bang.
 dohrniana, Pfr. Mt. Sysophon.
 Genus BENSONIA, Pfr.
 laotica, Mdff. Laos.
 Genus MICROCYSTINA, Morch.
 bourguignatiana, Mab. and Lem.
 Banone.
 Genus HEMIPLECTA, Alb.
 weinkauffiana, Cr. and F. Va-
 tana ; Mt. Sysophon ; be-
 tween Battambang and
 Kempingson.
 crossci, Pfr. Vatana ; Mt. Syso-
 phon.
 dura, Pfr. Laos.
 euterpe, Pfr.
 zimmayensis, G.-A. Zimmé.
 distincta, Pfr. Bangkok ; Siam
 generally ; Xieng-Moi,
 Laos.
 = pernobilis, Fér.
 v. neptunus, Pfr.
 v. pluto, Pfr. Laos.
 cambojiensis, Rve.
 Genus DYAKIA, G.-A.
 hugonis, Pfr. Vatana ; between
 Bangkok and Chentabun.

Sub-family **Hellicarioninae.**

- Genus HELICARION, Fér.
 siamensis, Haines. Bangkok.
 = paviei, Morlet.
 raphiellus, Mts.
 cochinchinensis, Morelet.
 Genus DURGELLA, G.-A.
 siamensis, Mdff. Muoklek.
 Genus KALIELLA, W. T. Blanf.
 mitis, Pfr. Laos.
 Genus SESARA, Alb.
 dipledon, Bens. Laos.
 megalodon, W. T. Blanf. Pit-
 sunaloke.
 penoti, Anc. Luang Prabang,
 Laos

Sub-family **Zonitinae.**

- Genus VITRINA, Beck.
 cochinchinensis, Morelet. Mt.
 Kambo.
 Genus TROCHOMORPHA, Alb.
 benigna, Pfr. Laos.
 paviei, Morl. Luang Prabang,
 Laos.

Family **Helicidae.**

- Genus PLECTOPYLIS, Bens.
 Section CHERSAECIA, Gude.
 laomontana, Pfr. Luang Pra-
 bang, Laos.
 Group **Epiphallogona**, Pils.
 Genus CAMAENA, Alb.
 illustris, Pfr. Laos.
 dugasti, Morlet, Laos.
 Genus PLANISPIRA, Beck.
 Sub-genus TRACHIA, Alb.
 gabata, Gld. Menam-Pinh.
 Sub-genus ANGASELLA, A. Ad.
 Section TRACHIOPSIS, Pils.
 siamensis, Mdff. Muoklek ;
 Kanburi.
 (Chloritis siamensis, Mdff.)
 norodoniana, Morlet. Xieng-
 Moi, Laos.
 Genus CHLORITIS, Beck.

- Sub genus *TRICHOCHLORITIS*, Pils.
breviseta, Pfr.
tenella, Pfr. Between Bangkok and Chentabun. Pnom-san-Krean.
remoratrix, Morlet. Between Bassac and Siempang, Laos.
deliciosa, Pfr. Laos.
tanquerayi, Cr. and F. Banone.
fourst, Morlet. Between Bangkok and Chentabun ; Srakeo.
- Genus *CHALEPOTANIS*, Anc.
infantilis, Gredl. Luang Prabang, Laos.
- Genus *GANISELLA*, W. T. Blanf.
capitium, Bens. Pnom-san-Krean ; Bangkok.
hariola v. *carinella*, Mdff. Muoklek ; Kanburi.
perakensis, Cr. Between Bangkok and Chentabun.
siamensis, Redf.
 (Bulinus *siamensis*, Redf.)
rostellata, Pfr. Luang Prabang, Laos.
hyperteleia, Morlet. Laos.
ptychostyla, Mts. Between Bangkok and Chentabun Pnom-san-Krean ; Ayuthia ; Xieng-Moi, Laos
 = *goniochila*, Pfr.
styloptycta, Pfr.
 = *ptychostyla*, Pfr. non Mts.
diplogramme, Mdff. Bangkok ; Hinlap ; Muoklek.
 (Plectotropis *diplogramme*, Mdff.).
 v. *albicans*, Mdff. Kanburi.
- Genus *AMPHIDROMUS*, Alb.
aureus, Martyn v. *leucoxantha*, Mts. Between Chentabun and Srakeo.
- atricollosus*, Gld. ?
inversus, Mull. v. *curta*, Morlet.
 Battambang.
comes, Pfr. Battambang.
kobelti, Mdff. Hinlap.
glaucolarynx, Dolrn. Pechaburi.
 v. *fasciata*, Mts. Pechaburi.
 v. *albicans*, Mdff.
schomburgki, Pfr. Srakeo ; Elephant Mountains.
 v. *legitima*, Mts.
 v. *crossei*, Pfr.
 v. *fasciata*, Mts.
laosianus, Bavay.
 v. *albocaeulescens*, Bavay.
 Khone.
mouhoti, Pfr.
roseolabiatum, Fult.
sinensis, Bens.
 v. *indistincta*, Pils. Laos Mountains.
rocmeri, Pfr. Laos Mountains.
hemicyclus, Rochebr. Bangkok.
semiteasselatus, Morlet. Srakeo.
xiengensis, Morlet. Xieng-Moi Plateau ; Banks of Menam-Pinh ; Luang Prabang ; Prang.
flavus, Pfr. Luang Prabang.
areolatus, Pfr.
zebrinus, Pfr.
- Group **Belogona**, v. Iher.
BELOGONA EUADENIA, Pils.
- Genus *EULOTA*, Hartm.
similaris, Fér. Bang-Pra, etc.
tourannensis, Byd. and Soul.
 = *globula*, Lea.
 = *bolus*, Bens.
 = *clusilis*, Val.
- Genus *CATHAICA*, Mdff.
 Sub-genus *EUCATHAICA*, Andr.

- brevispira*, H. Ad. Between
Chentabun and Srakeo.
Genus **PLECTOTROPIS**, Mts.
trichotropis, Pfr. Vatana.
winteriana, Pfr. Island Kokram,
Gulf of Siam.
hupensis, Hde. Menam-Pinh.
= *orthocheilis*, Hde. emma, Pfr. Laos.
caseus, Pfr. Laos.
repanda, Pfr. Laos.
BELOGONA SIPHONADENTIA, Pils.
Genus **HELICODONTA**, Fér.
Sub genus **MOELLENDORFFIA**, Anc.
horrída, Pfr. Luang Prabang,
Laos.

DOUBTFUL AND SPURIOUS RECORDS.

- Helix dicaela*, Morelet, = *Planorbis dicaelus*, Morelet.
Helix trochiscus, Pfr.—Originally recorded for Siam, but habitat subsequently corrected to Atu Islands.
Nanina basiuton, Morelet. Mr. Sykes found this to be the same as *Medya insculpta*, Pfr. a Norfolk Island shell. The Siam habitat is probably based on a change of labels. It is, however, a curious coincidence that Professor von Martens mentions (*Ost-Asien*, p. 74) that he found in Mousson's collection a shell which the latter received from Bernardi with the habitat Siam. This shell Professor von Martens identifies as *Trichanorpha insculpta*, Pfr.

B. COCHIN CHINA.

- Family **Zonitidae**.
Sub-family **Ariophantinae**.
Genus **EUPLECTA**, Semp.
cochinchinensis, Pfr.
Genus **XESTA**, Alb.
cidaris, Lam. Preck-Scholl
Spiglumi Breithon.
Sub-family **Macrochlaminae**.
Genus **MACROCHLAMYS**, Beus.
benoiti, Cr. and F.
Genus **HEMUPLECTA**, Alb.
weinkauffiana, Cr. and F.
Saigon.
distincta, Pfr. Saigon.
v. *pluto*, Pfr.
cambojiensis, Reeve. Brehm.
- *mouhoti*, Reeve.
Sub-family **Helicarioninae**.
Genus **HELICARION**, Fér.
russeolus, Morelet.
unguiculus, Morelet.
cochinchinensis, Morelet.
Genus **KALIELLA**, W. T. Blauf.
billeheusti, Cr. and F. Amb long; Fuyen-Moth
dorri, Wattleb.
hueensis, Wattleb.
Sub-family **Zonitinae**.
Genus **TROCHOMORPHA**, Alb.
saigonensis, Cr. Saigon.
tonkinorum, Mab.
sapeca, Hde. Tay-ninh.
Family **Helicidae**.
Group **Epiphalllogona**, Pils.
Genus **CHILORITIS**, Beck.
Sub-genus **TRICHOCHLORITIS**, Pils.
rhinocerotica, Hde. Tay-ninh.
deliciosa, Pfr.
tenella, Pfr. Spiglumi-Breithon.
tanquerayi, Cr. and F. Fuyen-Moth.
Genus **AMPHIDROMUS**, Alb.
atriculcosus, Gld.
(*Bulimus eques*, Pfr.)
conus, Pfr. v. *polymorpha*, Tapp.
Saigon; Prov. Baté.
cochinchinensis, Pfr.

- cambodjensis, Rve. Brehm.
 mouhoti, Pfr. Brehm.
 fultoni, Anc.
 flavus, Pfr. Thu-Dan-Moth ;
 Ving-Long.
 v. proxima, Fult.
 Genus GANESSELLA, W. T. Blant.
 galera, Hde. Tay ninh.
 ptychostyla, Mts.
 siamensis, Redf. v. nobilis, Anc.
 Long Xuyen.
 v. obesula, Anc. Saigon.
 Group **Belogona**, v. Iber.

- BELOGONA EUADENIA**, Pils.
 Genus **EUFOTA**, Hartm.
 similaris, Fer.
 tourannensis, Eyd. and Soul.
 Fuyen-Moth ; Vinh-Long.
 Genus **PLECTOTROPIS**, Mts.
 emma, Pfr. Spiglumi-Breithon.
 paviei, Morlet.
 DOUBTFUL RECORDS.
 Amphidromus perversus, L.
 ,, sultanus, Lam.
 ,, chloris, Rve.

C. CAMBODIA.

- Family **Zonitidae**.
 Sub-family **Ariophantinae**.
 Genus **EUPLECTA**, Semp.
 hyphasma, Pfr. Kam-Chay.
 Genus **XESTINA**, Semp.
 cardiostoma, Mdf.
 Sub-family **Macrochlaminae**.
 Genus **MACROCILAMYS**, Bens.
 benoitii, Cr. and F.
 resplendens, Phil. Kbal-Rounias,
 Genus **MICROCYSTINA**, Moreh.
 ramburiana, Mab. and Lem.
 Houdoung ; Domnac-
 Tenong.
 bourguignatiana, Mab. and Lem.
 Phnum-Kretch.
 Genus **HEMIPLECTA**, Alb.
 crossei, Pfr. Pnom-Kbal ;
 Moth - Kasa ; Phnum-
 Kretch.
 weinkauffiana, Cr. and F. Moth-
 Kasa ; Phnum-Kretch.
 distincta, Pfr.
 v. neptunus.
 v. pluto, Pfr.
 Sub-family **Helicarlontinae**.
 Genus **HELICARION**, Fér.
 russeola, Mor. Chandoc Moun-
 tains.

- cochinchincusis, Mor. Moth
 Kasa ; Dien ba.
 siamensis, Haines.
 = paviei, Morlet.
 rhabdiellus, Mts.
 Sub-family **Zonitinae**.
 Genus **TROCTOMORPHA**, Alb.
 saigonensis, Crosse. Vorvong-
 lovea.
 paviei, Morlet. Between Kam-
 pot and Pnom Penh.

- Family **Helicidae**.
 Group **Eptophallogona**, Pils.
 Genus **CAMAENA**, Alb.
 illustris, Pfr. Chandoc Moun-
 tains.
 Genus **PLANISPIRA**, Beckl.
 Sub-genus **ANGASELLA**, A. Ad.
 Section **TRACHIOPSIS**, Pils.
 norodomiana, Morlet. Kamchay.
 Genus **CHLORITIS**, Beckl.
 Sub-genus **TRICHOCHLORITIS**, Pils.
 seriatisefa, Roehbr. Chandoc
 Mountains.
 deliciosa, Pfr. Chandoc Moun-
 tains.
 quinaria, Pfr.
 = guinaria, Pfr.
 fourresi, Morlet. Strang-Trong.

- Genus **AMPHIDROMUS**, Alb.
nigrofilosus, Rochebr.
inversus, Mull. v. *albuglobosa*,
 Morlet. Between Kampot
 and Pnom-Penh.
 v. *annamitica*, Cr. and F.
 Saigon; Fuyen-Moth.
comes, Pfr. Kampot; Com-
 pentra.
cambojiensis, Rve.
glaucolarynx, Dohrn. v. *per-
 rieri*, Rochebr. Prek-
 Scholl.
eruentatus, Mor.
begini, Morlet. Stung-Trang
 Plateau.
semitecellatus, Morlet. Stung-
 Trang; Kampot; Ele-
 phant Mountains.
xiengiensis, Morlet v. *multifas-
 ciata* (Fult.), Pils.
 = *contrarius* v. *multifasciata*,
 Fult.
 v. *clausa*, Pils.
 v. *tryoni*, Pils.
- Genus **GANSELLA**, W. T. Blanf.
styleptycta, Pfr. Vorvong-
 lova; Moth-Kasa;
 Phnum-Kretch.
 = *ptychiostyla*, Mts.
 Group **Belogona**, v. Iher.
BELOGONA EUADENIA, Pils.
 Genus **EULOTA**, Hartm.
cestus, Bens. Moth-Kasa; Pnom-
 Penh.
irilleyi, Cr. and Deb. Kbal-
 Khmoeh.
tourannensis, Soul. Moth-
 Kasa.
pilidion, Bens.
- Genus **PLECTOTROPIS**, Mts.
repanda, Pfr.
caesus, Pfr.
BELOGONA SIPHONADENIA, Pils.
 Genus **HYALODONIA**, Fér.
 Sub-genus **MOELLENDORFFIA**, Anc.
horrida, Pfr.
- DOUBTFUL RECORDS.
Amphidromus furcillatus,
 Mouss.
 „ *laevus*, Mull.
 „ *adamsii*, Rve.
 „ *contrarius*,
 Mull.

D. PULO CONDORE.

- Family **Zonitidae**.
 Sub-family **Macrochlaminae**.
 Genus **MICROCYSTINA**, Moreh.
annamitica, Cr. and F.
 Genus **HEMPLECTA**, Alb.
weinkauffiana, Cr. and F.
rossci, Pfr.
striata, Gray.
 = *naninoides*, Bens.
distincta, Pfr.
pornobilis, Fér.
- Sub-family **Helicariolinae**.
 Genus **KALIELLA**, W. T. Blanf.
lamyseti, Cr. and F.
- Sub-family **Zonitinae**.
 Genus **TROCHOMORPHIA**, Alb.
saigonensis, Crosse.
- Family **Helicidae**.
 Group **Eptphallogona**, Pils.
 Genus **CHLORITIS**, Beck.
 Sub-genus **TRICHOCHELORITIS**, Pils.
condoriana, Cr. and F.
 Genus **AMPHIDROMUS**, Alb.
dohrni, Pfr.
 Genus **GANSELLA**, W. T. Blanf.
siamensis, Redf.
 (*Bulinus siamensis*, Redf.).
 Group **Belogona**, v. Iher.

BELOCONA EUADENIA, Pils.

Genus PLECTOTROPIS, Pfr.

repanda, Pfr.

DOUETFUL RECORDS.

Amphidromus sultanus, Lam.

Amphidromus chloris, Rve.

E. ANNAM.

Family Zonitidae.

Sub-family Arlophantinae.

Genus CONEUPLECTA, Mdff.

annamitica, Mdff. Touran ;

Non-njuk.

globulosa, Mdff. Touran.

Genus XESTINA, Semp.

promiscua, Smith. Prov. Binh-

Dinh.

denserugata, Mdff. Mt. Dran ;

Hong-gong.

tenera, Mdff. Ballach.

pharangensis, Mdff. Pharang.

Sub-family Macrochlaminae.

Genus MACROCHLAMYS, Bens.

tecta, Soul. Touran ; Boloven.

promiscua, Smith. Binh-Dinh.

Genus BENSONIA,

prionotropis, Mdff. Boloven.

Genus MICROCYSTINA, Moreh.

annamitica, Mdff. Boloven.

v. subrubella, Mdff. Nha-

Trang, Is. Baimin.

Genus HEMIPLECTA, Alb.

crossei, Pfr. Boloven.

danae, Pfr. Boloven.

Genus RHYSOTA, Alb.

platytaenia, Mdff. Touran.

pergrandis, Smith. Binh-Dinh.

Sub-family Helicarioninae.

Genus KALIELLA, W. T. Blanf.

dorri, Wattebl. Hué.

difficilis, Mdff. Touran.

Family Helicidae.

Group Epiphallogona, Pils.

Genus CAMAENA, Alb.

pachychilus, Smith. Binh-Dinh.

suprafusca, Mdff. Boloven.

Genus CAMAENELLA, Pils.

fruhstorferi, Mdff. Touran ;

Non-njuk,

nigricans, Mdff. Phuc-son.

Genus CHLORITIS, Beck.

microtricha, Mdff. Boloven.

diplochone, Mdff. Boloven.

Sub-genus TRICHOCHLORITIS, Pils.

tenella, Pfr. Boloven.

Genus GANSELLA, W. T. Blanf.

siamensis, Redf. Pharang ;

Ballach.

(Bulinus siamensis, Redf.)

v. zonifera, Anc.

v. maxima, Anc.

chondroderma, Mdff. Phuc-

son.

(Plectotropis chondroderma,

Mdff.)

Genus AMPHIDROMUS, Alb.

inversus, Müll. v. annamitica,

Cr. and F. Boloven Pla-

teau.

metabletus, Mdff. Mother and

Child Mountain ; Baimin

Island.

v. pachychila, Mdff. Nha-

trang.

(and forms flava, alba, tritaen-

iata, trizona, interr-

upta, confluentis, fusca,

Mdff.)

v. insularis, Mdff. Baimin

Island.

ingens, Mdff.

costifer, Smith. Prov. Binh-

Dinh.

placostylus, Mdff. Phuc-son.

haematostoma, Mdff. Boloven

Plateau.

- smithi, Fult.
 v. ventrosula, Mdff. Phuc-son.
- zebrinus, Pfr. v. eudeli, Anc. Binh-Dinh.
- rhodostylus, Mdff. Pharang.
 v. simplex, Mdff.
 (and forms roseolineata, nigro-lineata, ignea, rhabdota, bipartita, subconfluens, Mdff.)
- Group **Belogona**, v. Iher.
BEOGONA EUADENIA, Pils.
- Genus **EULORA**, Hartm.
 tourannensis, Eyd. and Soul. Touran; Pha-rang.
 v. robusta, Mdff. Phuc-son.
- Genus **PUPISOMA**, Stol.
 hueense, Watebl. Hué.
 F. TONKIN.
- Family **Zonitidae**.
 Sub-family **Arlophantinae**.
 Genus **CONEOPLECTA**, Mdff.
 confinis, Mdff. Than-moi.
 subangulata, Mdff. Than-moi.
 ochthogyra, Mdff. Island Bah Mun.
 globulosa, Mdff. Island Ke-Bao.
 sculptilis, Mdff. Island Ke-Bao.
- Genus **XESTINA**, Semp.
 tongkinensis, Mdff. Tuyen-Kwan.
- Sub-family **Macrochlaminae**.
 Genus **MACROCHLAMYS**, Bens.
 tenuigranosa, Dautz. Between Bien-Dong and An-Chau.
 alluadi, Bav. and Dautz. Bac-Kau; That-Khé.
 stonogyra, Mdff. Manson Mountains.
 glyptoraphe, Mdff. Manson Mountains.
 cuspira, Mdff. Island Bah-Mun.
 declivis, Mdff. Than-moi.
- Genus **MICROCYSTINA**, Moreh.
 mirmido, Dautz. Haiphong.
 tonkinensis, Mdff. Than-moi.
 leucocystis, Mdff. Than-moi.
 v. angigyra, Mdff. Than-moi.
 mansonensis, Mdff. Manson Mountains.
 ? opaca, Mdff. Island Ke-Bao.
- Genus **HEMIPLECTA**, Alb.
 weinkauffiana, Cr. Elephant Mountains.
 distincta, Pfr.
 v. funerea, Smith. Vanbu.
 v. pallidior, Smith. Vanbu.
 despecta, Mab.
- Sub-family **Hellearioninae**.
 Genus **CRYPTOSOMA**, G.-A.
 imperator v. brunnea, Mdff. Island Bah-Mun.
 maleficus, Mab.
 fragile, Mdff. Manson Mountains.
- Genus **HELICARION**, Fér.
 roudouyi, Fisch. Yen-Rai; Quang-Uyen.
 tongkinensis, Mdff. Than-moi.
 siamensis, Jlaines. Vanbu.
 = paviei, Morlet.
- Genus **SITALA**, H. Ad.
 striolata, Mdff. Lang-son.
- Genus **KATJELLA**, W. T. Blanch.
 regularis, Mdff. Lang-son.
 delichoconus, Mdff. Than-moi.
 tongkinensis, Mdff. Than-moi.
 gradata, Mdff. Than-moi.
- Sub-family **Zonitinae**.
 Genus **TROCHOMORPHA**, Alb.
 bicolor, Mts. Halong Bay.
 subtricolor, Mab.
 tonkinorum, Mab.
 montana, Mdff. Long-ma :
 Manson Mountains.
- OF UNCERTAIN AFFINITY.

- Ariophanta vernacula*, Mab.
Near Aurea Mountains
" *excepta*, Mab.
" *infima*, Mab.
" *zero*, Mab.
- Family **Helicidae**.
Genus **PLECTOPYLIS**, Bens.
Section **CHERSATCIA**, Gude.
laomontana, Pfr. Cho-bo.
Section **ENDOPLON**, Gude.
anceyi, Gude. Bac-Kan ; Nae-Ri ; between Cho-moi and That-Khé.
giardi, H. Fisch. Cao-Bang.
bavayi, Gude. That-Khé ; Nae-Ri.
persimilis, Gude. That-Khé.
lepida, Gude. Tinh-Tuc.
congesta, Gude. Bac-Kan ; Nae-Ri ; That-Khé.
francoisi, H. Fisch. Deo-ma-Phuc.
dautzenbergi, Gude. That-Khé ; between Cho-moi ; between Bac-Kan and Nae-Ri.
pilsbryana, Gude. Islets in Halong Bay.
= *villedaryi*, Pils. and Gude non Ancey.
schlumbergeri, Morlet. Nuy-Dong-Nay ; Halong Bay ; Elephant Mountains.
villedaryi, Anc. Lang-son ; Bach-Ninh ; Than-moi.
= *choanomphala*, Mdff.
jovia, Mab. Halong.
moellendorffi, Gude. Than-moi.
phlyaria, Mab.
hirsuta, Mdff. Island Bah-Mun.
- Section **SINICOLA**, Gude.
tenuis, Gude. Cho-Ra ; Bac-Kan ; Cho-moi.
- fruhstorferi*, Mdff.
fischeri, Gude. Bac-Kan.
emigrans, Mdff. Manson Mountains ; Bac-Kan ; Nae-Ra ; Halong Bay.
- Group **Epiphallagona**, Pils.
Genus **CAMAENA**, Alb.
caiatricosa, Müll. Lang-son.
v. *inflata*, Mdff. Between Lang-son and Than-moi.
v. *obtecta*, Fisch. Luc-Khu ; Cao-Bang.
longsonensis, Morlet. Long-son.
jaoulata, Mab.
bahni, Mab. Nuy-Dong-Nay.
= *broti*, Dautz. and D'Ham.
subgibbera, Mdff. Between Lang-son and Than-moi.
gabriellae, Dautz. and D'Ham. Between Bac-ninh and Lang-son.
= *bathmophora*, Mab.
= *bathymorpha*, Pils.
v. *subhainanensis*, Pils.
hainanensis, H. Ad. Halong Bay ; Elephant Mountains.
xanthoderma, Mdff.
v. *ingens*, Mdff. Manson Mountains.
illustris, Pfr.
v. *tonkinensis*, Smith.
vanbuensis, Smith.
billeti, H. Fisch. Cao-Bang.
lavezzari, Bav. and Dautz. Bac-Kan ; That-Khé.
vorvonga, Bav. and Dautz. Pih-mi ; Bac-Kan ; That-Khé.
fauveli, Bav. and Dautz. Pih-mi ; Bac-Kan.
- Genus **NEOCEPOLIS**, Pils.

- morarcha*, Mab.
mercatorina, Mab. Between Lang-son and Than-moi.
 = *morleti*, Dautz. and D^l-Hamon.
langsonensis, Bav. and Dautz. Between Lang-son and That-Khé.
- Genus *PLANISPIRA*, Beck.
 Sub-genus *ANGASELLA*, A. Ad.
 Section *TRACHIOPSIS*, Pils.
lambincti, Bav. and Dautz. Bac-Kan ; That-Khé.
- Genus *CHLORITIS*, Beck.
marimberti, Bav. and Dautz. Cho-Ra.
durandi, Bav. and Dautz. Bac-Kan.
gereti, Bav. and Dautz. Bac-Kan ; Phi-mi.
athrix, Mdff. Manson Mountains.
insularis, Mdff. Isle des Merveilles.
- Sub-genus *TRICHOCHLORITIS*, Pils.
miara, Mab.
lemeslei, Morlet. Song-ma.
balansai, Morlet. Nuy-Dong-Nay ; Song-ma ; Lang-son ; Halong Bay ; Elephant Mountains.
- Genus *AMPHIDROMUS*, Alb.
dautzenbergi, Fult.
- Genus *CHALEPOTAXIS*, Anc.
infantilis, Gredl. Haiphong ; Deo-ma-phuc.
 = *Xesta unilineata*, Dautz.
 = *Kaliella haiphongensis*, Dautz.
- Genus *GANESELLA*, W. T. Blauf.
perakensis, Crosse. Halong Bay ; Elephant Mountains.
v. subperakensis, Pils.
- phonica*, Mab.
procera, Gude. Than-moi.
eximia, Mdff. Manson Mountains.
concavospira, Mdff. Than-moi.
onestera, Mab.
rostrella, var. Vanbu.
straminea, Mdff. Than-moi.
oxytropis, Mdff. Island Ke-Bao.
platyconus, Mdff.
pulchella, Mdff. Manson Mountains.
vatheleti, Bav. and Dautz. Halong Bay.
saurivonga, Bav. and Dautz. Bac-Kan ; That-Khé.
v. concolor, B. and D.
coudcini, Bav. and Dautz. Bac-Kan.
- Group **BELOGONA**, v. Iher.
BELOGONA EUADENIA, Pils.
- Genus *EULOTA*, Hartm.
jourdyi, Morlet. Than-moi ; Lang-son ; Dang-son ; Chu.
 = *vorticellina*, Hde.
v. monticola, Mdff. Manson Mountains.
mabillei, Crosse. Chu.
signalis, Bav. and Dautz. That-Khe.
- Genus *EUHADRA*, Pils.
massiei, Morlet. Song-ma.
pseudopapuina, Mdff. Manson Mountains.
- Genus *PLECTOTROPIS*, Mts.
bonnieri, H. Fisch. Deo-ma-phuc.
- Genus *AEGISTA*, Alb.
mensalis, Hde. Song-ma.
- BELOGONA SIPHONADENIA*, Pils.
- Genus *MOELLENDORFFIA*, Anc.
loxotata, Mab.

spurca, Bav. and Dautz. Bac-	SPECIES OF UNCERTAIN AFFINITY.
Kan.	<i>Helix chytrophora</i> , Mab.
v. deflexa, Mdff. Manson	„ <i>struposa</i> , Mab.
Mountains.	„ <i>tenellula</i> , Mab.
messengeri, Bav. and Dautz.	„ <i>amphicora</i> , Mab.
Between Lang-son and	„ <i>elopica</i> , Mab.
That-Khe.	„ <i>ruelanotrica</i> , Mab.
callitricha, Bav. and Dautz.	„ <i>dectica</i> , Mab.
That-Khe.	„ <i>baphica</i> , Mab.

ON SOME SPECIES OF SLUGS COLLECTED BY MR. H. FRUHSTORFER.

By WALTER E. COLLINGE, B Sc.

(Plate i.)

In the latter part of 1901¹⁾, I described a series of slugs collected by Mr. H. Fruhstorfer, of Berlin. One genus belonging to this collection has already been dealt with in detail²⁾, viz., *Myolesta*, and there yet remain two species of *Philomyces*, one of *Microparmarion* and two of *Veronicella*.

Just as the work upon the above mentioned species had been completed, I received from Dr. Simroth, a copy of the note, published in the *Zoologischen Anzeiger*³⁾, and from it I gather that Mr. Fruhstorfer after inviting me to describe the collection and sending me all (?) the examples, has made a similar request to Dr. Simroth, a proceeding, to say the least, unfair and most reprehensible.

As Dr. Simroth has in preparation a work upon the genus *Philomyces* which includes the two species above mentioned, I have thought it only fair to at present withhold my description of the anatomy, but as the figures of the externals were already drawn, I publish those only. I have written Dr. Simroth to this effect.

Microparmarion bruneopallescens, Clige.

Pl. i, figs 1, 2.

Microparmarion bruneopallescens, Clige.: Journ. of Malac., 1901, vol. viii, p. 120.

Hab.—Annam (H. Fruhstorfer).

Philomyces fruhstorferi, Clige.

Pl. i, figs. 3, 4.

Philomyces fruhstorferi, Clige.: Journ. of Malac., 1901, vol. viii, p. 119.

¹⁾ Journ. Malac., 1901, vol. viii, p. 118-121.

²⁾ *Op. cit.*, 1902, vol. ix, p. 11-16, pl. 1.

³⁾ *Zool. Anz.*, 1902, Bd. xxv, p. 355-357.

Hab.—Nagasaki, Japan (H. Fruhstorfer).

A figure of the animal is now given, also one of the anterior portion of the foot-sole.

Philomyeus dendriticus, Clge.

Pl. i, figs. 5, 6.

Philomyeus dendriticus, Clge.: Journ. of Malac., 1901, vol. viii, p. 119.

Hab.—Mt. Maussion, 2-3000 ft., Tonkin (H. Fruhstorfer).

Veronicella fruhstorferi, Clge.

Pl. i, figs. 7, 8.

Veronicella fruhstorferi, Clge.: Journ. of Malac., 1901, vol. viii, p. 120.

Hab.—Mt. Maussion, 2-3000 ft., Tonkin (H. Fruhstorfer).

Veronicella himerta, Clge.

Pl. i, figs. 9, 10.

Veronicella himerta, Clge.: Journ. of Malac., 1901, vol. viii, p. 120.

Hab.—Mt. Maussion, 2-3000 ft., Tonkin (H. Fruhstorfer).

EXPLANATION OF PLATE I.

Fig. 1.	<i>Microparmarion brunneopallescens</i> , Clge.	Right lateral view. × 2.
Fig. 2.	" " " "	Dorsal view. × 2.
Fig. 3.	<i>Philomyeus fruhstorferi</i> , Clge.	Right lateral view. × 1.
Fig. 4.	" " " "	Portion of anterior region of foot-sole.
Fig. 5.	<i>Philomyeus dendriticus</i> , Clge.	Right lateral view. × 1.
Fig. 6.	" " " "	Dorsal view. × 1.
Fig. 7.	<i>Veronicella fruhstorferi</i> , Clge.	Dorsal view. × 1.
Fig. 8.	" " " "	Ventral view.
Fig. 9.	<i>Veronicella himerta</i> , Clge.	Dorsal view. × 1.
Fig. 10.	" " " "	Ventral view. × 1.

NOTES ON SLUGS AND SLUG-LIKE MOLLUSCS.

By WALTER E. COLLINGS, B.Sc.

1.—On the *Limax umbrosus* of Philippi.

Through the kindness of Dr. Ad. S. Jensen, I have recently had an opportunity of examining a specimen of a slug in the Zoological Museum of the University of Copenhagen, described by Philippi in 1844¹⁾ under the name of *Limax umbrosus*.

Considerable doubt has existed in the minds of malacologists as to the generic and specific identity of this mollusc. Lessona and Pollonera, in their well-known work on the Italian slugs²⁾, classed it as a synonym of *Limax flavus*, L., whilst others have regarded it as a variety of that species.

¹⁾ Enum. Moll. Sicil. ae, 1844, ii, p. 102.

²⁾ Monog. dei Limacidi Ital., 1882, p. 43.



1. x2.



5. x1.



2. x2.



6. x1.



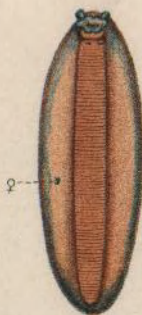
3. x1.



4.



7. x1.



8. x1.



9. x1.



10. x1.

Fig^s 1-4, F. J. H. del. ad nat.

Fig^s 5-10, A. H. B. del. ad nat.

Hughes, Lith^r London.

ASIATIC SLUGS.

The specimen I have examined has a label attached bearing the following particulars: "*Limax (Milax) umbrosus*, Phil. Sicilien.—H. F."

It was at once evident on first examination that this specimen was very distinct from *L. flavus*, and on dissecting it I had no hesitation in referring it to the genus *Amalia*, Moq., as evidently was the opinion of "H. F.," the writer of the label. I would further point out the very peculiar foot-sole which this species has, viz., two narrow lateral planes marked with fine transverse lines, and two median planes, separated by a zig-zag line thus VVVV, and differing from that of any other species of *Amalia* with which I am acquainted.

2.—On a species of *Arion* from New Zealand.

Towards the end of 1899, Mr. Henry Suter forwarded to me a small collection of slugs from New Zealand, consisting chiefly of specimens of the common species of *Limax*, *Agriolimax*, and *Amalia*, and a single example of a species of *Arion* from Auckland. So far as I am aware *Arion fuscus*, O. F. Müll., is the only member of this genus which has been found in New Zealand, and in spite of careful inquiry, I have as yet been unable to refer the Auckland specimen to any known species. From the external features I should say that it belongs to the *subfuscus* group, although the mantle is small. The specimen (in alcohol) measures 13.5 millim. in length, and is of a uniform light chocolate-brown colour; foot-sole slightly lighter in colour and smooth.

3.—On the dispersal of *Microparmarion*, sp.

I have recently received from Mr. Arthur E. Shipley, three examples of a new species of *Microparmarion*, which were sent to him from Kew, having been received there in some plants forwarded by Mr. R. Shelford, of Sarawak, N.W. Borneo.

In addition to affording a good example of the artificial distribution of such animals, these particular slugs offer a further point of interest. On teasing out the contents of the stomach of a specimen which had been cut open, I found numerous bits of vegetable tissue, hyphae and spores of fungi, bits of chitin and many chitinous hairs, and finally, an almost perfect specimen of an ant. The latter, I sent to Mr. W. F. Kirby, of the British Museum, who very kindly asked Col. C. T. Bingham to identify it for me, and he writes that it is a specimen of *Cremaslogaster miri*, Forel, and that it is common in Borneo.

The numerous hairs and bits of chitin in the stomach would lead one to suppose, that these insects form a considerable item in the food of this particular species. Whether they are eaten dead or alive, I cannot say.

I had previously received examples of this slug from Mr. Shelford, which I hope to describe in detail later.

4.—Variations in the Foot-fringe of *Arion empiricorum*.

For some years I have made careful notes upon the variations in the colour of the foot-fringe of our common *Arion*. The observations have extended over nearly five years, during which time many hundreds of specimens have been examined, with the result that 228 specimens out of just over 1,000 have been noted to possess variously coloured foot-fringes. The percentages of these is rather interesting.

Of the white there were 12, grey 14, fawn 10, light brown 13, chocolate-brown 16, steel-blue 10, greyish-violet 5, pale yellow 29, deep yellow 56, brick-red 7, salmon-pink 6, orange-red 42, sepia 8. In fourteen of these specimens, there were no lineoles.

Excepting fourteen, all the 228 specimens differed from the type, *i.e.*, were colour variations, and ten were albinos.

A few attempts were made to keep some of the most brilliantly coloured varieties under observation, and it was noticed that those specimens with yellow, light brown, or fawn-coloured foot-fringes, soon underwent a change, whilst all the red coloured ones seemed much more permanent.

NOTES.

The Molluscan Fauna of Warwickshire.—The council of the Midland Malacological Society have in preparation a Fauna of the Mollusca of Warwickshire in which it is proposed to give all possible information on the species occurring in the County, *viz.* :—Localities, Food Habits, General Distribution, Geological Formation of District, and other interesting details. They will be pleased to receive the co-operation of all interested, so that the work may not only be a list, but complete, and a valuable one of reference.

In submitting Molluscs, Shells, etc., or information respecting them, workers are requested to give as full details as possible as to :—

1. Locality.
2. Date when collected or observed.
3. Name of the plant on which feeding or where resting.
4. Whether the animal gives off any particular odour.
5. Position, aspect, and general features of locality, *viz.* :—marsh, wood, ditch, etc., etc.
6. Geological formation of ground.
7. General distribution.
8. Whether plentiful.
9. Other particulars, such as size, colour, texture, preponderance of any special form, or other points of interest. Due recognition will be accorded to all such observation.

It is proposed to issue from time to time a summary as to how the work is progressing, which will be duly forwarded to all who have contributed.—
H. OVERTON, Clifton Road, Sutton Coldfield.

CURRENT LITERATURE.

Pilsbry, Henry A.—Tryon's Manual of Conchology, ser. ii, vol. xv. (pt. 58), pp. 40-128, pls. 16-31. Philadelphia: Academy of Natural Sciences.

Continuing the genus *Coelocentrum*, a further new species, *C. edax*, is described and figured. The genus *Holospira*, Martz., is next dealt with. Dr. Pilsbry remarks that these snails are capable of enduring great heat. Living examples of *H. strebeliana* and *H. nelsoni* survived immersion in actually boiling water for some minutes, and, unlike other snails, they did not retract in the water. Some account of the anatomy of the genus is given and illustrated. The kidney is long and narrow, being slightly longer than the pericardium. Apparently there is no secondary ureter. The generative organs are characterised by the short penis, long vas deferens, the great length of the oviduct and (in *H. nelsoni*) the receptacular duct also and the absence of accessory organs. The free retractor muscles are excessively long, attached proximally to the axis at about the junction of the cone with the cylindrical portion of the shell. The following species are new: *H. tetrelasmus* (Mexico); *H. nelsoni* (Sierra Guadalupe, Mexico), a species resembling *H. tersa*, Mke.; *H. dalti*, from the same locality, is an extraordinary species, in which the internal column is wider than in any other known form of the genus, and *H. strebeliana*, a species chiefly remarkable for its long, cylindrical, many-whorled shell, very blunt at the ends.

Passing next to the *Urocoptinae*, a short summary of the leading anatomical features of the genus *Urocoptis*, Beck, is given, while the following species, etc., are new: *U. lata*, C.B.Ad., var. *antonionis*, var. *manchioneu-lensis*, subsp. *ichnostele*; *U. ovata*, Deshayes, var. *sanctueannae*, and *U. hendersoni*.

A word of praise must be given to the illustrations, which are certainly above the average.

Ortmann, A. E.—Reports of the Princeton University Expeditions to Patagonia, 1896-1899; vol. iv, Palaeontology—Part II. Tertiary Invertebrates. 1902, pp. 45-332, pls. xi-xxxiv.

To most readers the associations of the name of J. Pierpont Morgan lie "in the steamship in the railway, in the thoughts that shake mankind," rather "than in the marsh of mind." We remark with pleasure and gratitude the notification on the title-page of the bulky volume before us that this millionaire defrayed all charges.

Dr. Ortmann's report is framed on broad lines. Instead of the usual list of species collected and diagnoses of novelties, we have received a complete monograph of the subject. The history of the Tertiary mollusca of South America commenced with Darwin's visit in the "Beagle," and concludes with Hatcher's investigations. From the Patagonian beds are enumerated 132 molluscs and brachiopods. All the species, new and old, are described

and illustrated, giving the memoir especial value as a work of reference. The fauna as a whole is discussed with the same thoroughness and the species in detail. An analysis of the data collected leads Dr. Ortmann and Mr. Hatcher to dispute many of the conclusions arrived at by Ameghino and von Ihering.

The fauna dealt with is regarded as homogeneous, from shallow water, of Miocene date and Antarctic origin. A comparison of such with similar beds in another hemisphere may be expected to be fruitful of results. The conclusion here adopted is that in late Mesozoic or early Tertiary times, Antarctica enjoyed a milder climate than at present, and extended north to America, New Zealand, Australia, and perhaps Africa. Through the warm and shallow seas that washed the Antarctic Continent, or Archipelago, a fauna ranged from Tasmania to Patagonia.

The Antarctic molluscan fauna entombed at Muddy Creek is the richest, according to the late Professor Tate, known to Paleontology. In comparison with it, the Patagonian fauna is a scanty one. We anticipate that the South American deposits are not yet exhausted. Mr. Hatcher's collection mainly consists of large conspicuous shells, and in all probability, the usual complement of small species, measured by millimetres rather than by inches, yet remain to be discovered.—C. HEDDLY.

Jameson, H. Lyster.—On the Origin of Pearls. Proc. Zool. Soc., 1902, pp. 140-166, pls. xiv-xvii.

Dr. Jameson has investigated the origin of Pearls in *Mytilus edulis*. After a very brief reference to the work of other investigators, he describes the structure of the mantle and shell, and defines the meaning of the terms "pearls," "blisters," and "concretions." As the three terms have been very loosely used in the past, it is important to note that they have each a totally different mode of origin, and should not be confused or regarded as synonyms. A pearl is formed in a closed epithelial sac embedded in the tissues, and formed around a parasite (in *Mytilus* a larval Trematode), which probably causes a specific stimulation. It consists of one or more layers of shell-substance, enclosing a central nucleus. Thus there are nacreous pearls, prismatic pearls, periostracum pearls, and hinge pearls. The parasite does not necessarily become the nucleus of the pearl, it may escape before calcification, leaving behind a granular substance, which serves as "nucleus" for a pearl.

Blisters are caused by the intrusion of foreign bodies between the mantle and the shell, or by the secretion of a nacreous cicatrix to close perforations of boring molluscs, worms, &c.

Concretions are small free calcosphaeritic bodies which occur at times in the connective tissues. In some molluscs they are due to the calcification of degenerated Sporocysts or of dead Cercariae, and to other causes.

The author then describes the minute structure, the origin and development of the pearl and the life-history of the parasite. From Dr. Jameson's work it seems that it is possible to infect *Mytilus* with the parasite, and he discusses the bearing of the facts in his paper upon the problem of artificially producing pearls. It seems clear from this valuable research, that in many molluscs yielding valuable pearls, Trematodes are one, if not the exclusive, cause of pearl formation.

Simroth, H.—Die Nacktschneckenfauna des Russischen Reiches. 4to. pp. 321, 27 Tafn., 10 Karten u. 17 textfign. St. Petersburg: 1901 [1902]. Der K. Akad. d. Wissensch.

Of the many magnificent works which have emanated from the pen of the illustrious Leipzig professor, none have exceeded in interest, or surpassed in the wealth and beauty of illustration, the invaluable memoir before us. No review, limited in space, as here, can do justice to such a work, and we are perforce compelled only to give a very brief resume of the contents.

Commencing with an introduction, Dr. Simroth defines the limits of the region treated of, and the various divisions of the same; discusses the supposed centres of origin and the lines of distribution, and concludes with a definition of the term "slug."

Passing to the special part of the work, it opens with a detailed account of the anatomy of *Anadenus giganteus* and a consideration of its relationship with other genera. Scattered throughout the accounts of the new genera and species, the author discusses, and adds many original observations and facts to, such subjects as the division of genera and species in part by means of colour, the relations of *Heynemannia* and *Lehmannia*, the origin of the genus *Limax*, the colour bands of slugs, distribution of *Paralimax*, classification of *Agriolimax*, the genus *Parmacella*, the Agnathous slugs, conditions of life of the Agnathous slugs, self-fertilisation, and a host of points concerning the generative organs, free-muscles, digestion, affinities, distribution, &c. The work is a mine of information, rich and exhaustive in detail and invaluable to every student of malacology.

The new genera, species, etc., described are as follows:—*Arion subfuscus*, Drp. v. *fennicus*, *A. sibiricus*, *Limax ananowi*, Simr. v. *imereticus*, *L. ordubadensis* (= *colchicus*, Simr.), *Metalimax elegans*, *Monochroma brunneum*, *Paralimax brandti*, v. Mts. forms *coriaceus*, *nubilus*, *notatus*, *lilacinus*, *P. marmoratus*, *P. niger*, and form *nigerrimus*, *P. albomaculatus*, *P. salamandroides*, *P. gyratus*, *P. gracilis*, *P. ochraceus*, *P. albocarinatus*, *P. raddei*, and forms *striatus pictus*, *elegans*, *variegatus*, *obscurus*; *P. minutus*, *Agriolimax laevis*, Müll. v. *perversus*, *A. agrestis*, *L. v. turkestanus*, *A. tauricus*, *A. transcaucasicus* and vars *simplex* and *coeciger*, *A. caspius*, *A. subagrestis*, Simr. v. *minutus*, *A. itius*, *A. ananowi*, *A. osseticus*. *Tropidolytopenne* is a new subgenus of *Lytopenne* with *L. maculata*, Koch and Heyn., as the type; also *Liolytopenne* containing two new species, *L. caucasica* and *L. grusina*. A new subgenus of *Gigantomilax*, termed *Turcomilax*, is described, with *G. nanus*, Simr., as the type, and of *Gigantomilax*, s. s. a new species *G. robustus*. The remaining new species are: *Parmacella korschinskii* and v. *rubra*, *P. levandri*, *P. persica*, *Trigonochlumys minor*, *Pseudomilax reibischi* and *P. ananowi*.

The genus *Phricolestes* named in 1900 is now described with *P. usscharicus* and *P. ponticus* (= *Pseudomilax lederi*, Retowski, non Bottger); and the genus *Hyrcaolestes* with *H. valentini*.

In nearly all cases the new genera are accompanied by a wealth of anatomical descriptions and figures, and, as has already been pointed out, many interesting observations upon their habits, habitat, distribution, affinities, etc.

Simroth, H.—Über einige kürzlich beschriebene neue Nacktschnecken, ein Wort zur Aufklärung systematischer Verwirrung. *Zool. Anz.*, 1902, Bd. xxv, pp. 355-357.

Dr. Simroth is of opinion that the genus *Ostracolethe*, described by him in 1901, is the same as *Myotesta*, Collge., described in the same year. There are, however, quite a number of differences in the two accounts. Dr. Simroth states that the mantle is perforated, and that though the cleft there projects the fine point of a cone-like shell, while Mr. Collinge very emphatically states that the shell is flat and plate-like, and entirely covered and enclosed by the mantle. The radula is also a further point upon which the two authors are at variance.

Simroth, H.—Ueber die wahrscheinliche Herleitung der Gattungen *Monochromo* und *Paralimax*. *L'Ann. du Mus. Zool. l'Acad. Imp. Sc. St. Petersb.*, 1902, T. vii., pp. 283-286.

Simroth, H.—Ueber die Verbreitung der russischen Nacktschnecken. *Ibid.*, pp. 287, 288.

Simroth, H.—Über das natürliche System der Erde. *Verhandl. d. Deutschen Zool. Gesell.*, 1902, pp. 19-42, figs. 1-9.

Simroth, H.—Ueber die Ernährung der Tiere und der Weichtiere im besonderen. *Verhandl. d. V. Int. Zool. Con. Berlin*, 1901, 1902, pp. 1-9, fig.

Dautzenberg, Ph.—Description de mollusques nouveaux provenant de L'île Obi (Moluques). *Le Nat.*, 1902, pp. 247-248, figs. 1-7.

The author describes and figures the following species, all of which are new: *Trochomorpha subternatana*, *Helix (Albersia) omissa*, II. (*Papuina*) *groutti*, *H. (P.) obiensis* and a var. *minor*, *Leptopoma fulgurans* and *L. altius*.

Dautzenberg, Ph.—Observations sur quelques mollusques rapportes par M. Ch. Allaud, du sud de Madagascar. *Bull. Soc. Zool. France*, 1902, T. xxvii, pp. 196-199.

Dautzenberg, Ph.—Revision des *Cypræidae* de la Nouvelle-Calédonie. *Journ. de Conchyl.*, 1902, vol. I, pp. 291-384, pl. vii.

The *Cypræidae* of New Caledonia have previously been catalogued by Crosse in 1869, who enumerated 45 species, also by Rossiter in 1882, whose list contained 60 species. The present Revision treats of 70 species, and 52 varieties, 12 of which are new, in addition to which 7 monstrosities are described and figured.

Not wishing here to enter into a discussion of the value of the different divisions of the family, the author adopts four principal genera: *Cypræa* (s.s.) *Luponia*, *Epona* and *Trivia*.

Dall, W. H.—Synopsis of the Family *Veneridae* and of the North American recent species. *Proc. U.S. Nat. Mus.*, 1902, vol. xxvi, pp. 335-412, pls. xii-xvi.

So far as may be represented by any one family, the *Veneridae* represents the culmination of Pelecypod evolution. Although no true Venerid,

in the strict sense, appears before the Tertiary, their recognisable ancestry appears in the Upper Cretaceous or Lower Eocene. In the present synopsis Dr. Dall deals with this family in a similar manner to that in which he has already treated other Pelecypod families. Numerous corrections and changes have been made in the nomenclature, and nineteen new species are described and figured.

Ridewood, W. G.—On the structure of the Gills of the Lamellibranchia. Phil. Trans. Roy. Soc., 1903 (ser. B), vol. 195, pp. 147-284, 61 figs. in text.

We have already given a brief outline of this valuable work (see ante, 1902, p. 143): the complete paper is now before us, and we are able to deal with it in greater detail.

The author states that in this investigation, 215 species of these Molluscs, belonging to 118 genera, are taken into account, and their gills were studied both by means of serial sections and dissected preparations. In almost all cases staining was done by means of borax-carminé, followed by picro-nigrosin. After a brief resume of previous work, and some remarks upon the terminology, he passes on to consider the Evolution of the Synaptorhabdic Gill. After reviewing the opinions of previous writers, and comparing them with his own observations, Dr. Ridewood is led to conclude that in the presence of the many conflicting descriptions in closely allied forms, the phenomena of gill ontogeny are extremely difficult to elucidate: and that, pending some further special research, we may "conclude that the perforation or slitting into filaments of a continuous gill-membrane is an infraction of the rule that ontogeny is a repetition of phylogeny." It is of interest to note, that the remarkable diversity of structure exhibited by the etenidia is not shared by the labial palps. The plication of the lamellae, to which Hancock, and later Duvernoy, attached considerable importance, is now regarded as of less value than the differentiation of principal filaments, which latter are confined to the Pseudolamellibranchia and the Eulamellibranchia. They are not, however, met with in all the Pseudolamellibranchs, as Pelssener imagined, for in some of the latter the gills are homorhabdic; in non-plicate gills, principal filaments are also wanting. The author considers that the plication of the lamellae and the differentiation of principal filaments are not to be looked upon as of more than specific, or at the most, sub-generic value. The apical filaments, cilia, chitinous skeleton, endothelium, calcified rods, intrafilamentar septa, interlamellar junctions, and interlamellar extensions of the septa, are each dealt with in detail. The calcified rods, on account of the confusion that has arisen with regard to them, are deserving of more than passing notice. He mentions that these structures are peculiar to the *Unionidae* and *Mulleria*, and some authors have failed to discriminate between the thickened bands of chitin, such as occur in the gills of most Eulamellibranchia, and these calcareous rods, which are embedded in the chitin. They are not continuous rods of uniform width extending the full height of the demibranch, but consist of a succession of short rods, which gradually shade off and terminate in the middle of each interfilamentar junction. Dr. Ridewood further states that these rods were discovered by Rengarten in 1853, while the best description of them is that given by Janssens, who, in 1893, showed that they are composed of calcium phosphate, with a little calcium carbonate, and a chitin or conchylin base.

As a result of the investigation, the author confirms the view that ctenoidal filaments, held together by ciliated discs, are of essentially simpler structure than those connected by subfilamentar tissue, and the ciliated disc is a more archaic mode of junction than the cellular connection.

It is proposed to abolish the group Pseudolamellibranchia, to remove *Pinna* from the *Aviculidae* and place it in a separate family, the *Pinnidae*, and to include it, and the *Ostreidae* and *Limidae*, in the Eulamellibranchia. The remaining *Aviculidae*, together with the *Pectinidae*, *Spondylidae*, and *Dimyidae*, are to be joined to the Filibranchia, and to constitute a new group the Eleutherorhabda. With regard to the Septibranchia, Dr. Ridewood does not consider there is sufficient evidence to warrant their removal from the Eulamellibranchia, as a separate order, and consequently he places them as a sub-order (*Poromyacea*), and unites them with the remaining Lamellibranchia into one order, which he proposes to term Synaptorhabda.

The following is an outline of Dr. Ridewood's classification:—

- (1) Order Protobranchia.—This is Pelseneer's order adopted without alteration.
- (2) Order Eleutherorhabda.—Arranged in series on the two sides of the gill axis are elongated filaments. Adjacent filaments are held in position by stiff cilia disposed in isolated patches (ciliated discs).

It comprises the sub-orders Dimyacea, Mytilacea, and Pectinacea.

- (3) Order Synaptorhabda.—There are no ciliated discs. The interlamellar edges of adjacent filaments are connected by cellular tissue. These organic interfilamentar junctions are situated at uniform intervals up the filaments, and convert the linear interfilamentar spaces into series of fenestrae.

This order comprises the sub-orders Ostracea, Submytilacea, Tellinacea, Veneracea, Cardiacea, Myacea, Pholadacea, Anatinacea, and Poromyacea.

Dr. Ridewood recognises that the amount of family disruption this scheme involves will doubtless prove startling to the systematist, and he does not claim that it represents in any way the genetic affinities of the forms included. What he aims at, is the "formation of classificatory tables, admittedly artificial and based each on a single character, so that the taxonomist of the future may, by a process of correlation of these tables and a careful weighing of the respective values of the facts therein laid before him in a compact and readily assimilable form, arrive at the truth concerning the phylogenetic history of the Lamellibranchia." The present work is intended as a contribution towards this ultimate object.

The remainder of the paper, and comprising the bulk of it, consists of a minute survey of gill-structure throughout the Lamellibranchia and is accompanied by numerous figures; appended to it, is a very full bibliography which seems to contain references to all the literature bearing upon the morphology of Lamellibranch gills.

The paper is indeed one of the most important contributions the subject has yet received, and is one which will serve as a basis for research in years to come.—A. D. LMM.

Dall, W. H.—Review of the Classification of the Cyrenacea. Proc. Biol. Soc. Washington, 1903, pp. 5-8.

A brief but important paper, settling forth some surprising changes in nomenclature. *Calyculina*, Clessin, is a synonym of *Musculium*, Link, 1807. Our familiar *Pisidium* is to be called *Corneocyclas*, Ferussac, 1818, with sections and subgenera as follows:—

Subg. *Corneocyclas*.

Sect. *Corneocyclas*, s. str., type *Corneocyclas pusilla*—*Pisidium pusillum* (Gmel.)

Sect. *Phymesoda*, Raf., type *Corneocyclas virginica*—*Pisidium virginicum* (Gmel.)

Sect. *Pisidium*, C. Pfr., type *Corneocyclas annica*—*Pisidium annicum* (Mull.)

Sect. *Cycloralyx*, Dall, type *Corneocyclas scholtzii*—*Pisidium scholtzii*, Cless.

Subg. *Cymatocyclas*, Dall, type *Corneocyclas compressa*—*Pisidium compressum*, Prime.

Subg. *Tropidocyclas*, Dall, type *Corneocyclas henslowiana*—*Pisidium henslowianum*, Shepp.

At the end of the paper it is indicated that *Cyclas islandica* is the proper name for our *Cyprinu islandica* (L.).—T. D. A. COCKERELL.

EDITOR'S NOTES.

It may not be out of place to direct attention to several changes which appear in this, the first part of volume x.

Firstly, we offer a hearty welcome to Mr. H. Howard Bloomer, Mr. G. K. Gude, and Mr. Henry Smer, whose names have been added to the list of editorial colleagues. All are well-known malacologists, and for many years have been active and generous supporters of the Journal.

As to the Journal itself, we have slightly increased the amount of printed matter on each page containing original articles, and the notices of Current Literature, Notes, etc., are printed in a larger type than hitherto.

We have recently received new editions of the well-known and useful catalogues of works and pamphlets treating of the Mollusca, issued by Messrs. R. Friedländer und Sohn (with upwards of 3,000 titles) and that of Mr. W. Junk (1,703 titles), both of Berlin.

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Vol. X.

A REVISION OF THE COLUMBELLIDAE OF THE
PERSIAN GULF AND NORTH ARABIAN SEA, WITH
DESCRIPTION OF *C. CALLIOPE*, N.SP.

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

In the enumeration by Mr. Standen and myself ⁽¹⁾ of the Gastropoda collected, mostly by Mr. Frederick W. Townsend, of the Indo-European Telegraph Service, in the Persian Gulf, Gulf of Oman, and northern portion of the Arabian Sea, twenty-six species of *Columbellidae* are mentioned, of which all excepting one (*Aesopus urania*, M. and S.) belong to the typical genus *Columbella*. To this paper we would refer in explanation of the following notes.

A few months ago some additional material was submitted by us, from the same source, to Mr. Stephen Pacc, then engaged on his exhaustive and laborious Catalogue of the *Columbellidae*. We are very much indebted to him for so kindly examining so large a quantity of specimens, and for his pronouncements upon them. He pointed out at the same time one or two errors which had crept into the enumeration; as well as one important omission, that of *C. flavida*, Lam.

The following therefore must be taken as a revised list.

¹ Proc. Zool. Soc. Lond., 1901, vol. ii, pp. 327-460, Pls. xxi-xxiv.

1.—*Columbella pardalina*, Lam.*Columbella propinquans*, E.A.Sm.

Probably synonymic. Recorded from both Persian Gulf, Mekran Coast, and North Indian shores.

2.—*Columbella rustica*, Lam.

Mr. Pace so determines two or three examples collected by Mr. Townsend at Bombay, and which were referred at first to *C. fuscata*, Sowb. This last is a native of Panama, St. Elena, and Monte Christo, W. Central America. It is the first record of the Mediterranean *C. rustica* being found beyond the Gulf of Suez. The examples are not quite typical, and we hope a further supply may come to hand, in order that the important question of its geographical distribution be more definitely studied.

3.—*Columbella versicolor*, Sowb.

Hab.—Mekran Coast, near Charbar.

4.—*Columbella (Mitrella) agnesiana*, Melv. and St.

Hab.—Persian Gulf: Bushire; Gulf of Oman; Maskat, 10 fathoms; Mekran Coast: Charbar, sandy mud, 15 fathoms.

5.—*Columbella (Mitrella) alizonae*, Melv. and St.

Hab.—Persian Gulf: Shaikh Shuaib Island, and at Bushire. Also in lat. 27° N., long. 52° E., on the telegraph cable. Received in 1902 from Maskat, at 47 fathoms, very varied in pattern and in fine condition. India: lat. 18° 58" N., long. 71° 45" E., 40 fathoms.

6.—*Columbella (Mitrella) astolensis*, Melv. and St.

Hab.—Mekran Coast: Astola Island, 3 fathoms, sand. Also off Charbar at 7 fathoms.

7.—*Columbella (Mitrella) blanda*, Sowb.

Hab.—Persian Gulf: Gulf of Oman, lat. 24° 55" N., long. 57° 59" E., 30 fathoms, sand and mud.

A beautiful pale form, with clearly traced longitudinal markings, and hardly a vestige of dorsal clouding, has been very recently dredged by Mr. Townsend in the Gulf of Oman, at 205 fathoms, also occurring in the same form off Bahrain in the Persian Gulf.

Var. *candidans*, Melv. and St.

Hab.—Karachi.

An interesting, pure white, unmarbled form.

8.—Columbella (Mitrella) calliope, n.sp.

♂. Testa ovata, versus apicem attenuata, laevigata, solidula, anfractibus octo, quorum duo apicales laeves, vitrei, quatuor his proximi longitudinaliter laevicostati, costis numerosis sed inconspicuis, anfractu ultimo et penultimo laevibus, spiraliter aretissime brunneolineatis, apertura ovato-oblonga, labro intus multidenticulato, crassiusculo, columella versus basim recta.

Long. 12, lat. 5 millim.

Hab.—Bombay (Alexander Abercrombie, Esq.).



This was formerly esteemed by us as a form of *C. marquesa*, Gaskoin, of the variety *b.* figured in Reeve, *Conch. Icon.*, f. 217, and so catalogued both in the Bombay list²⁾, and the enumeration of the Mollusca of the Persian Gulf and Arabian Sea.³⁾

Last year it was examined by Mr. Stephen Pace, who considers it quite distinct, and worthy of a specific name. We have only seen two or three examples, which, however, show no tendency to variation, and are identical both in form, marking, and colour.

9.—Columbella (Mitrella) cartwrighti (Paco MS.), Melv.

Hab.—Persian Gulf: Bahrein Is. (Captain Cartwright).

Usually found at about 7 fathoms; muddy sand bottom.

10.—Columbella (Mitrella) dorisæ, Issel.

Hab.—Persian Gulf: Bushire (M. F. Houssay).

Perhaps a variety of *C. mindoroensis*, Rvo. The specimen in the Townsend collection is very doubtfully referred here.

11.—Columbella (Mitrella) outerpe, Melv.

Hab.—India: Karachi (F. W. Townsend), Bombay (A. Abercrombie).

Common in both these localities, but not yet reported elsewhere.

²⁾ Mem. Manch. Soc., 1892 (s. 4), vol. vii, pp. 17-51.

³⁾ Op. cit.

12.—Columbella (Mitrella) flavilinea, Melv.

Hab.—India : Bombay (A. Abererombie). Not common ; and as yet not noticed in the Townsend collections.

13.—Columbella (Mitrella) nomadica, Melv. and St.

Hab.—India : Karachi.

A handsome form, figured in the Proc. Zool. Soc. Lond., 1901, vol. ii, pl. xxi, f. 7. Received by Mr. S. Pace : not yet collected by Mr. Townsend.

14.—Columbella (Mitrella) zebra, Gray.

Hab.—Persian Gulf : Linjah, 3 fathoms ; Mekran Coast : general.
C. miser, Sowb., and *C. elata*, Rve., are apparently but forms of the above.

15.—Columbella (Mitrella) terpsichore, Leathes.

Hab.—India : Bombay (A. Abererombie).

Sometimes confused with *C. miser*, Sowb.

N.B.—*C. (Mitrella) rugulosa*, Sowb., had best be erased from the former list. It was reported on insufficient authority, from Karachi, but being a well-marked species, only known from the Galapagos Islands, there but little doubt that it does not occur in Indian Seas.

16.—Columbella (Atilia) albonodulosa, Gaskoin.

Hab.—Mekran Coast : Local.

17.—Columbella (Atilia) conspersa, Gaskoin.

Hab.—Persian Gulf ; India : Karachi.

This is synonymous with *C. puella*, Sowb., from the Andaman Isles.

Amongst the specimens in the Townsend collection from Karachi are some labelled by a *lapsus calami*, *C. compressa*, Gask., a misprint for *conspersa*.

18.—Columbella (Seminella) melitoma, Melv. and St.

Hab.—India : Karachi.

19.—Columbella (Seminella) phaula, Melv. and St.

Hab.—India : Karachi.

20.—Columbella (Seminella) selasphora, Melv. and St.

Hab.—India : Karachi.

N.B.—*C. atomella*, Ducloux, reported from Bombay, seems an agglomeration, mostly worn, of the three recently separated species just mentioned.

21.—Columbella (Seminella) townsendi, Melv. and St.

Hab.—India : Karachi.

22.—Columbella (Conidea) flava, Brug.

Hab.—Mekran Coast; India: Karachi (Townsend). Bombay (Abercrombie).

This is the *C. flavula* of Lamarck.

23.—Aesopus urapia, Melv. and St.

Hab.—Mekran Coast: Local. The white variety (*albens*) occurring with the type. For a full description of this interesting mollusc, see the paper above quoted, p. 407.

THE ANATOMY OF CERTAIN SPECIES OF CERATISOLEN AND SOLECURTUS.

By H. H. BLOOMER.

(Plate ii.)

Ceratissolen legumen, L.

Owing to the many points of resemblance of *Ceratissolen legumen* to the species of *Solen*, already described by me¹, I purpose contrasting it with *Solen ensis* in the same manner as I have dealt with *S. siliqua*, *S. vagina*, and *S. pellucidus*.

EXTERNAL CHARACTERS.

C. legumen is comparatively shorter and deeper than *S. ensis*. It not only curves slightly along its dorsal surface, but also along the ventral one, particularly at the anterior end. The bands of pallial muscles pass round the anterior part of the mantle lobes, and proceed posteriorly to where the dorsal integument is connected with the teeth of the shell (Fig. 1, *H.*), the latter being situated some distance away from the anterior end.

The foot (Fig. 1, *F.*) gradually increases in depth towards its distal end, and is there of considerable size.

The pedal aperture, situated at the anterior end, extends a short distance along the ventral surface, and the mantle lobes at the posterior part of it carry on their inner surface a tentacular fringe, which evidently represents the fourth aperture (Fig. 1, *F. A.*).

Along the dorsal surface from the anterior end to near the teeth of the shell (Fig. 1, *H.*) there is no concrescence of the mantle lobes, thus forming an aperture to a chamber superior to the anterior adductor muscle. Anteriorly this chamber communicates with the pallial chamber, the aperture of which is continuous with the pedal aperture. The edges of the mantle lobes bordering the whole of this dorsal chamber bear a tentacular fringe, but the fringe does not pass round the anterior end of the lobes.

¹ Journ. Malac. 1901, pp. 36 & 27; 1902, pp. 18 & 133.

The free portions of the siphon (Fig. 1, *In. S'*. & *Ex. S'*.) are long and narrow, and their distal ends turn dorsally.

The inner parts of the bases of the gills are joined together as in *S. marginatus*.

MUSCULATURE.

i. *The Pallial Muscles.*—The muscular bands along the pallial edge pass round the anterior end, and proceed posteriorly as far as the junction of the mantle lobes with the dorsal integument, and close to the part of the latter penetrated by the teeth of the shell (Fig. 1, *II*). At the posterior end, where the mantle lobes form the proximal portion of the siphon, the walls of the two chambers are more muscular, and the divisional wall of greater length.

The anterior adductor muscle (Fig. 1, *A. A.*) is a broad plate of muscles attaining its maximum depth in the posterior part. Anteriorly it curves slightly towards the dorsal surface.

The posterior adductor muscle (Fig. 1, *P. A.*) is situated more posteriorly, and the muscular dorsal integument between it and the siphon is consequently shortened.

ii. *The Pedal Muscles.*—The muscles of the distal end of the foot are very strongly developed. The retractor pedis anterior muscles are thick, and do not extend far anteriorly; while the bifurcated parts (Fig. 1, *P. R. A.*, *P. R. A'*.) are also short. When the muscles reach the foot, the fibres pass in a posterior direction under, instead of over, the longitudinal pedal muscles, as in *S. marginatus*.

The bifurcated parts of the retractor pedis posterior muscles (Fig. 1, *P. R. P.*) are longer than in *S. ensis*.

ALIMENTARY CANAL.

The oesophagus (Figs. 2 and 3, *Oe*) is short, proceeds a little distance dorsally; and curving, passes into the stomach. The stomach is proportionately larger than in *S. ensis*. There are no divisional walls between the oesophageal and cardiac portions (Fig. 2, *C. St.*), while the pyloric portion (Fig. 2, *P. St.*) is large, and assumes a more ventral position, having the appearance of being somewhat drawn towards the pedal cavity. The central cavity (Fig. 2, *Can.*) is large, and its divisional walls are more marked, particularly on the dorsal and posterior sides. The sac of the crystalline style (Fig. 1, *C. C.*) leaves the pyloric portion on its ventral side more anteriorly. It goes some distance along the pedal cavity, as in *S. marginatus*. The intestine (Fig. 1, *In.*) leaves the stomach, and passes directly along the surface of the sac of the crystalline style (Fig. 1, *C. C.*), adhering to it nearly the whole of its length, going along the dorsal surface and returning along the ventral one. It then curves round the pyloric portion, and on its dorsal side continues as the rectum (Fig. 1, *R.*), the latter runs posteriorly to the cloacal chamber, and terminates

in a *bilobed* anus (Fig. 1, A). As previously mentioned, the anus is situated more posteriorly than in *S. ensis*.

The liver (Fig. 1, L) is situated as in *S. ensis* over the fore-part of the stomach, and passes for a short distance over the anterior adductor muscle, and posteriorly under the stomach as far as where the intestine leaves it.

NERVOUS SYSTEM.

The nervous system, like that of *S. pellucidus*, differs from *S. ensis* in the number of the pallial nerves. Each anterior pallial nerve gives rise to one branch only, which leaves the main nerve just after it reaches the anterior adductor muscle, and crosses the mantle lobe, then divides, the two parts joining the circumpallial nerve.

The posterior pallial nerve does not give rise to any branch which crosses the mantle lobe as in *S. ensis*.

There is only one circumpallial nerve.

CIRCULATORY SYSTEM.

This is the same as in *S. ensis*, excepting in a few minor details.

Solecurtus strigillatus, L.

EXTERNAL CHARACTERS.

The mantle lobes are comparatively short and wide. They project separately some little distance anteriorly from the dorsal surface of the anterior adductor muscle, and in a semi-circular curve form the pedal aperture; while posteriorly they are broader, and from a position above the posterior adductor muscle run with a slighter curve laterally. In the anterior part of the mantle lobe the muscles of the pallial edge are wide and thick, but they gradually diminish in width towards the posterior end. The pedal aperture, lying ventrally, extends in a dorso-posterior direction, and on each mantle lobe is bordered by a muscular flap. The mantle lobes are connected ventrally with each other by a wide piece of muscular tissue, which posteriorly is continuous with the proximal portion of the inhalent siphonal chamber. Dorsally the proximal portion of the siphon is for some distance from the median line connected with the mantle lobes and the dorsal integument; while the muscles, chiefly from the lateral portion of it, pass under the mantle lobes and afterwards through them in large and powerful siphonal retractor muscles, and are attached to the valves of the shell.

The external surface of the muscular tissue connecting the ventral portions of the mantle lobes, the free edges of the mantle lobes, and the proximal portions of the siphonal chambers are coloured a mottled brown, but the brown colour of the free portions of the siphon is of a more consistent nature. This colouring, however, appears to be subject to variation, and some specimens are nearly white.

In an extended condition the proximal portion of the siphon is of considerable length, and nearly of a uniform size, but in a contracted state it is larger at the centre and compressed at the ends. The free portions, when fully extended, are likewise of considerable length. One specimen measured 6 c.m. along the median line from the posterior adductor muscle to the anterior adductor muscle, and the proximal portion of the siphon, though not fully extended, was of the same length. Part of the free portions were missing, this being usually the case, as presumably being due to the action of the preservative medium on the arrangement of the circular muscles forming the lateral ribbings, and making them of a somewhat brittle nature. In another instance the proximal portion of the siphon was in a very contracted condition, and only measured 2 c.m.; while the free portion of the exhalent chamber measured 5.5 c.m., and the inhalent one 6.1 c.m.

There is no fourth aperture.

The foot is very large, being deep and muscular. The periostracum passes from the mantle lobes to the edges of the valves.

The dorsal integument posterior to the teeth of the shell is thin, and it is to be observed that the teeth deeply penetrate into the viscera.

The gills are long, and extend in a more or less folded condition to the posterior end of the proximal portion of the inhalent siphonal chamber, to which they are attached.

The inner parts of the bases of the gills are joined together, forming the division between the two siphonal chambers.

MUSCULATURE.

i. *The Pallial Muscles.*—The muscles along the edges of the mantle lobes form anteriorly deep bands, which diminish in width as they pass posteriorly. From the ventral border of the anterior and posterior margins of each lobe proceed two muscular bands, which cross the piece of muscular tissue connecting the ventral edges of the mantle lobes, and converging towards each other, meet and unite at the centre of the tissue. They evidently act as retractor muscles for the purpose of drawing together the ventral parts of the mantle lobes. The walls of the proximal portion of the siphonal chambers (Fig. 4, *Ex. S.* & *In. S.*) are thick and muscular, and continuous with the dorsal integument and the mantle lobes. Chiefly laterally they give rise to two large muscles which pass through the mantle lobes, and from a large surface adhere to the valves of the shell. These undoubtedly act as siphonal retractor muscles.

On the inside of each lateral part of the proximal portion of the siphon and between the two chambers, is a large muscular ridge (Fig. 4, *S. R.*), to which adhere the outer sides of the bases of the gills. At the posterior end of the proximal portion of the siphon it decreases in size, and continues

as the free portions (Fig. 4, *Ex. S'*. & *In. S'*.). The interior muscles of the siphon are chiefly longitudinal and the outer ones circular, the latter thus forming internal and external coverings.

Externally, the free portions of the siphon are ribbed laterally. Internally, they are also ribbed laterally, but not so deeply; whilst longitudinally there are a number of rounded ribbings, with finer ones between. The chambers gradually taper towards their distal ends.

The anterior adductor muscle (Fig. 4, *A. A.*) is a comparatively narrow plate of muscles. It spreads out on either side from the median line, and obtains its maximum width where it is connected with the valves of the shell. Dorsally, it is joined with the dorsal integument and the mantle lobes. Posteriorly, it is connected with the ventral integument.

The posterior adductor muscle (Fig. 4, *P. A.*) is also a narrow plate of muscles joined anteriorly by connective tissue with the retractor pedis posterior muscle, and posteriorly with the dorsal integument, the siphon and the mantle lobes.

ii. *The Pedal Muscles.*—The foot (Fig. 4, *F.*) is very large, deep and muscular. The muscles are of three kinds, viz., longitudinal, transverse, and circular. In the proximal portion, where the greater part of the viscera is situated, the walls are thin and the muscles lie close together. Inside the muscular integument are two layers of longitudinal muscles, between which is a circular layer which passes around the foot at a right angle to its axis. There are numerous bundles of transverse muscles which cross the foot between the other muscles to the pedal integument. They are also plentiful in the proximal part, where they pass either between or through the viscera. Towards the distal half the muscles begin to fray out more, intermingle with each other, and gradually increasing in number soon become a network of powerful muscles, thus making the distal portion an exceedingly muscular mass.

The anterior retractor pedis muscles (Fig. 4, *P. R. A.*) are short and thick, passing at the side of the liver to the valves. When they reach the foot the muscle fibres spread out, passing both ventrally and anteriorly over the inner longitudinal muscles, and bury themselves in the pedal integument. There are no bifurcations of the free portions of the muscles.

The posterior retractor pedis muscle (Fig. 4, *P. R. P.*) is comparatively short, and bifurcates at its posterior end, the bifurcated parts being attached by their dorsal surfaces to the valves of the shell. They are joined by connective tissue with the posterior adductor muscle. On reaching the pedal cavity the muscle spreads out; and the fibres, passing in an anterior direction as a portion of the longitudinal muscles of the foot, eventually merge themselves in the pedal integument.

The elevator pedis muscles (Fig. 4, *E. P.*) are situated at the posterior dorsal point of the foot, and are connected with the valves at their most dorsal parts.

Attached to the shell between each of the elevator pedis and siphonal retractor muscles is a long and narrow muscle, which is connected with the muscular tissue running along the base of the gills, and evidently acting as a branchial retractor muscle for the purpose of folding the gills into a close mass when the proximal portion of the siphon is contracted.

ALIMENTARY CANAL.

The mouth (Figs. 5 & 6, *M.*), a transverse opening of the ventral integument, is situated under the posterior portion of the anterior adductor muscle, and between it and the foot. The lips (Figs. 5 and 6, *A. L.* and *P. L.*), formed by the junction of the labial palps, project forwardly.

The oesophagus (Figs. 5 & 6, *Oe.*) is narrow, of medium length, and proceeds posteriorly to the stomach.

The stomach (Figs. 4, 5 and 6, *St.*) is an irregularly-shaped sac, containing a number of divisions. This applies particularly to the left side, which is divided into four parts by muscular ridges. For convenience, I will call the divisions Anterior, Posterior, Central, and Dorso-central. Towards the centre of the left half is an oval muscular ridge (Fig. 5, *A. D. R.*) completely bordering a deep cavity—the central division (Fig. 5, *C. D.*). The lumen soon spreads out, and extends a considerable distance anteriorly and posteriorly. On the dorsal side, and continuous with this ridge, is a slighter one (Figs. 4 and 5, *A. D. R.*) passing along the dorsal surface of the stomach down the right side, and returning along the ventral surface in a more pronounced degree, and joining the ventral side of the ridge of the central division, thus separating the anterior division from the posterior portion of the stomach. The postero-dorsal part of the ridge of the central division is developed into a muscular papilla (Fig. 5, *M. P.*). From the posterior side of the base of the papilla runs another muscular ridge (Fig. 5, *P. St. R.*), which first separates the dorso-central from the posterior division, and then passes along the dorsal surface in a posterior direction towards the median line, and disappears. The Dorso-central division (Fig. 5, *D. D.*) is smaller, but of considerable depth, and lies above the muscular papilla. The Posterior division (Fig. 5, *P. St.*) is very large. The ventral portion, after narrowing, forms the opening of the caecum of the crystalline style (Fig. 5, *C. C.*) and intestine (Fig. 5, *In.*). The caecum of the crystalline style is a large and long sac, passing first in a ventral direction, then gradually curving, terminates near the dorsal surface of the pedal cavity. When the caecum and the intestine leave the stomach, the intestine (Fig. 4, *In.*) on the right anterior side of the caecum, they are only partly divided from each other, the intestine being small and appearing as a narrow, deep, and irregular groove on the side of the caecum. At the distal end of the caecum the intestine becomes quite separate, and the typhlosole commences, formed by the invagination of a

portion of the intestinal wall. It then returns along, and connected with the right dorsal side of the caecum for about two-thirds the length of the latter, when, becoming free, it makes a few folds and the typhlosole disappears. The intestine then makes a large number of irregular folds, and continuing as the rectum passes through the ventricle, shortly reaches the posterior adductor muscle, passes closely round it, and returning a short distance along the ventral surface, terminates in a large bilobed anus having a circular appearance (Fig. 4, A.).

The crystalline style (Figs. 6 & 7, C. S.) fills the greater part of the caecum, and extends to the anterior portion of the stomach.

The triuspid body occupies the centre of the stomach, and has branches radiating into the different divisions.

A transverse section across the caecum of the crystalline style and the intestine of *Solecurtus candidus* (Fig. 7), shows the former to be lined with a columnar epithelium (*Ep. Col.*), carrying a dense fringe of long cilia, the nuclei are situated with regularity near the centre of the cells a little closer to the base than the free end; while the latter—the intestine—is lined with an epithelium (*Ep. C.*), consisting of short ciliated cells, broad, and chiefly connected with each other at the free end, narrowing towards the base, and having undeveloped cells and spaces between. The division of the caecum from the intestine is marked by a constriction of the enveloping muscular layer. On the one side the columnar epithelium passes inside this constricted part and a short distance along the side of the intestine, gradually merging into the intestinal epithelium. On the opposite side, however, occurs a curious growth (*Ep. W.*), where the epithelium consists of very long cells of uniform width, and passing from the base to the free end in a slight wave-like course, the nuclei being abundant and situated in the basal portion of the cells. It, however, ends abruptly at the point where the wall projects farthest into the lumen, marking on this side the division between the caecum and the intestine, and the smaller intestinal cells then follow; on the other side of it the cells gradually decrease in length, until they merge into the ordinary columnar epithelium of the caecum. The cilia on this curious growth of epithelium are scanty and short, and near the intestinal cells it apparently altogether disappears. In this latter part there is a break in the epithelium (*Ep. B.*), which continues through a number of sections, and then the epithelium resumes its normal condition. It is probably a duct communicating with the gland underneath the epithelium. It may be remarked this curious piece of epithelium closely resembles that described by Johnstone in *Cardium*.⁽²⁾

The liver or digestive gland (Fig. 4, L.) is a large organ surrounding the stomach, with the exception of a small portion of the dorsal and posterior parts. The large bile duct enters the stomach on the ventral surface,

* *Cardium*, Liverpool Marine Biological Committee Memoirs.

just anterior to where the intestine leaves it. The small bile duct opens into the central division.

The whole of the viscera in the proximal part of the foot is bound together also with the pedal muscles, by a large quantity of connective tissue.

CIRCULATORY SYSTEM.

Menegaux³⁾ states that the general circulatory system agrees with that of *Solen*.

The venous blood is collected into the various sinuses, and from the sinus of the visceroparietal ganglion it is conveyed by the efferent branchial vessels to the gills, and from them by the efferent branchial vessels to the auricles.

Over the posterior portion of the foot lies the large ventricle, with large triangular auricles. The anterior aorta proceeds a short distance along the rectum, until it reaches the muscular portion of the foot; then continues under the dorsal integument, and gives off a number of branches which vascularise the viscera, anterior adductor muscle, the mantle lobes, and the foot. The posterior aorta shortly after leaving the ventricle, forms the dilation known as the bulbus arteriosus; and then, dividing, continues along the mantle lobes, and sends branches to the posterior adductor muscle and the siphon.

The gills extend horizontally from a position between the labial palps, and level with the retractor pedis anterior muscles, right to the posterior end of the proximal portion of the siphon. The inner parts of the bases of the gills are connected together, while the outer parts are joined with the walls of the siphonal chamber, thus separating the exhalent from the inhalent chamber. When the siphon is contracted, the gills are folded on themselves in a close mass, while in an extended condition these folds disappear.

The gills belong to the type which Dr. Ridewood⁴⁾ has termed synaptorhabdic, and he states: "The lamellae are highly plicate, the plicae being flattened antero-posteriorly, so as to resemble the leaves of a book. The number of filaments in a plica are about 30 in the outer, and 40 in the inner demibranch. . . . The principal filaments are large, and have a broad, shallow, frontal groove, from the middle of which there sometimes arises . . . a ridge of tall epithelial cells. There is a fair amount of muscle fibre, running some vertically and some horizontally in relation with the principal filaments."

The kidneys are situated posterior to the liver and elevator pedis muscles, but do not extend far posteriorly; while laterally they go a considerable distance, passing along the mantle lobes to the siphonal retractor muscles. Menegaux⁵⁾ states the viscerorenal orifices exist as in *Solen*.

³⁾ Recherches sur la circulation des Lamellibranches Marins, 1890.

⁴⁾ Phil. Trans. 1903 (ser. B.), vol. 195, pp. 147-284.

⁵⁾ *Op. cit.*

NERVOUS SYSTEM.

The cerebro-pleural ganglia are situated between the posterior portion of the anterior adductor muscle and the ventral integument, just antero-laterally to the retractor pedis anterior muscles. They lie some distance apart, and are joined by a commissure. Anteriorly, each ganglion gives rise to a nerve, which passes underneath the anterior adductor muscle, innervating it, and then continues as the pallial nerve.

Posteriorly, a connective joins each cerebro-pleural with the visceroparietal ganglion. The connective passing between the retractor pedis anterior muscle and the body wall, buries itself in the latter, shortly afterwards it emerges and clings close to the wall. Then, becoming free, it continues between same and the viscera until it reaches the bifurcated parts of the retractor pedis posterior muscles, and passing through the inside wall, joins the visceroparietal ganglion.

Each cerebro-pleural ganglion is also joined by a connective with the pedal ganglion. The connective immediately becomes buried in the muscular body wall; and passing between the longitudinal and transverse muscles of the foot, joins the pedal ganglia.

The visceroparietal ganglia are large, and situated between the bifurcated portions of the retractor pedis posterior muscle. Posteriorly the ganglia give rise to two branchial nerves, which pass directly to the gills; also to two nerves, which give off a number of branches, innervating the posterior adductor muscle, the posterior portion of the dorsal integument, and the siphon. On each side one large branch—the pallial nerve—crosses the siphonal retractor muscle, and continues round the mantle lobe as the circum-pallial nerve.

The pedal ganglia are situated in the proximal portion of the foot above about the centre of the caecum of the crystalline style, among the transverse muscles, and are surrounded by muscular connective tissue. They give off a number of nerves, which, passing between the longitudinal and transverse muscles, innervate the foot.

Solecurtus candidus.

EXTERNAL CHARACTERS.

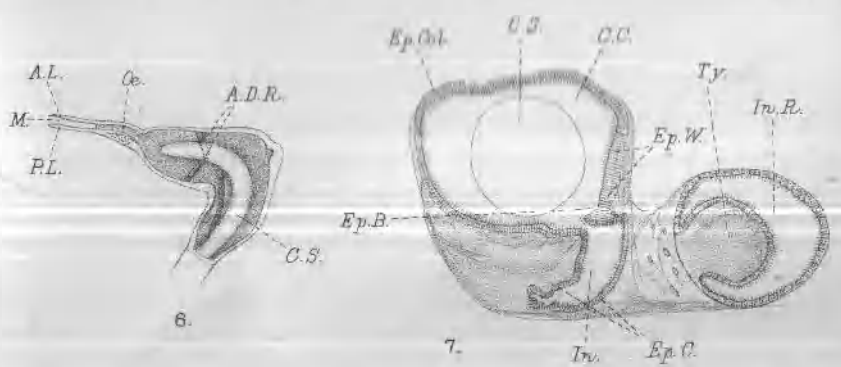
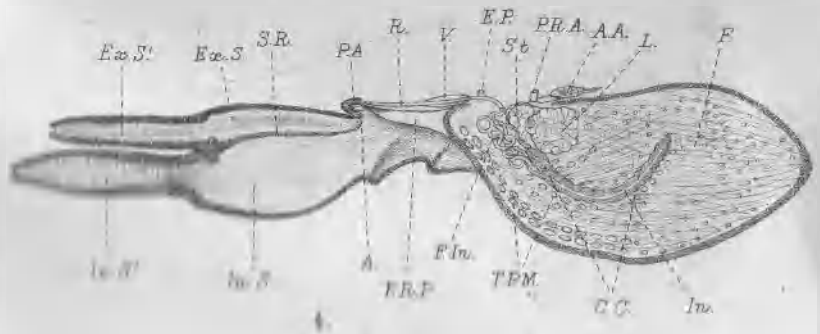
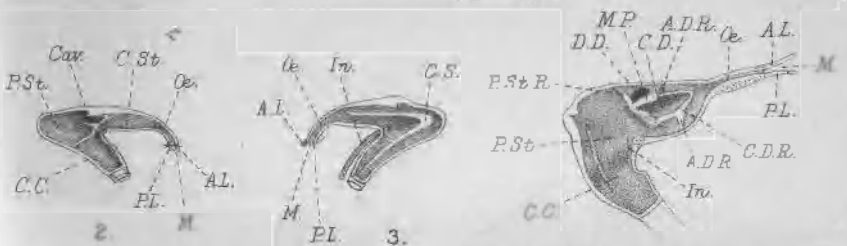
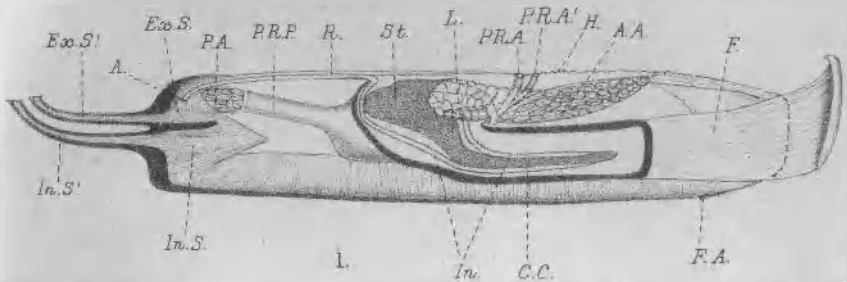
The anterior portions of the mantle lobes curve slightly more than in *S. strigillatus*. Posteriorly the lobes from a more anterior position over the posterior adductor muscle take a greater curve, and consequently project more posteriorly. The edges of the lobes are more crenulated, particularly the parts bordering the pedal cavity, and they carry a tentacular fringe. The edges of the mantle lobes are of an orange colour, while the remaining part of the animal is nearly white, with the exception of the distal portion of the foot, which has a dirty orange tinge. The internal structure is similar to *S. strigillatus*. It is impossible to say whether the slight differences noticeable are constant or not, owing to the limited number of specimens examined.

REFERENCE LETTERS.

A.	Anus.	<i>In.</i>	Intestine.
A. A.	Anterior adductor muscle.	<i>In. R.</i>	Returning intestine.
A. D. R.	Ridge separating the anterior from the other portion of the stomach.	<i>In. S.</i>	Proximal portion of the inhalent siphonal chamber.
A. L.	Anterior or upper lip.	<i>In. S'.</i>	Free portion of the inhalent siphonal chamber.
C. C.	Caecum of crystalline style.	L.	Liver.
Cav.	Cavity receiving the small bile duct.	M.	Mouth.
C. D.	Central division of the stomach.	M. P.	Muscular papilla.
C. D. R.	Ridge bordering the central division of the stomach.	Oe.	Oesophagus.
C. S.	Crystalline style.	P. A.	Posterior adductor muscle.
C. St.	Cardiac portion of stomach.	P. L.	Posterior or lower lip.
Con. T.	Connective tissue.	P. R. A. P. R. A'.	Retractor pedis anterior muscle.
D. D.	Dorso-central division of the stomach.	P. R. P.	Retractor pedis posterior muscle.
Ep. R.	Break in the curious growth of epithelium, probably a duct.	P. St.	Posterior division of the stomach.
Ep. C.	Ciliated epithelium.	P. St. R.	Ridge running along part of dorsal surface of the posterior division of the stomach.
Ep. Col.	Columnar epithelium.	R.	Rectum.
E. P.	Elevator pedis muscle.	S. R.	Ridge dividing the inhalent from the exhalent chamber of the proximal portion of the stomach.
Ep. W.	Curious growth of epithelium.	St.	Stomach.
Ex. S.	Proximal portion of the exhalent siphonal chamber.	T. P. M.	Transverse pedal muscles.
Ex. S'.	Free portion of the exhalent siphonal chamber.	Ty.	Typhlosole.
F.	Foot.	V.	Ventricle.
F. A.	Tentacular fringe representing the fourth aperture.		
F. In.	Folded portion of the intestine.		
H.	Point where the dorsal integument is connected with the teeth of the shell.		

EXPLANATION OF PLATE II.

- FIG. 1. *Ceratisolen legumen*, L. View from the right side, showing alimentary canal, &c. $\times 1\frac{1}{2}$.
- FIG. 2. *Ceratisolen legumen*, L. Longitudinal section of the stomach, showing internal structure of the left side. $\times 1\frac{1}{2}$.
- FIG. 3. *Ceratisolen legumen*, L. Longitudinal section of the stomach, showing internal structure on the right side. $\times 1\frac{1}{2}$.
- FIG. 4. *Solecurtus strigillatus*, L. View from the right side, showing alimentary canal. $\times \frac{3}{4}$.
- FIG. 5. *Solecurtus strigillatus*, L. Longitudinal section of the stomach, showing internal structure of the left side. $\times 2$.
- FIG. 6. *Solecurtus strigillatus*, L. Longitudinal section of the stomach, showing internal structure of the right side. $\times 2$.
- FIG. 7.—*Solecurtus candidus*. Transverse section through the caecum of the crystalline style and intestine of *Solecurtus candidus*, showing the relation of one to the other. $\times 16$.



HNB del. ad nat.

Huth, lith. London

CLASSIFICATION OF THE BRITISH SPECIES OF THE GENUS SOLEN, LINNÉ,¹

By H. H. BLOOMER.

Having recently described some of the chief features in the anatomy of the species of *Solen*, I now purpose considering how they bear on the question of the present classification. For this purpose it will be sufficient if I only call attention to the chief points by which the other species differ from *S. ensis* without going into the anatomy of the latter.

The chief differences in *S. siliqua* are :—It is larger, and quite straight along the dorsal surface. The oesophagus is straighter, and the divisions of the stomach are more pronounced. The cardiac portion does not project so far anteriorly, nor does the posterior end of the pyloric portion rise so much dorsally, and the muscular papilla is more central.

In *S. marginatus* the following are the chief points of difference :—It is straight along the dorsal surface. There is no fourth aperture, and there are no labial grooves. The inner parts of the bases of the gills are joined together. The free portion of the siphon is longer. The pallial and pedal muscles are more developed. The free portion of the retractor pedis anterior muscle is shorter, the bifurcations lie close together, and the fibres of it cross the foot in a posterior direction, passing underneath instead of over the longitudinal muscles. The lips project anteriorly, the oesophagus is longer and proceeds posteriorly to the stomach, the latter lying in a more posterior position over the distal end of the foot. The muscular wall dividing the oesophageal from the cardiac portion is more developed, 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 is of considerable length, leaves the pyloric portion on its ventral surface, curves, and passes in an anterior direction. The intestine passes along the caecum round the distal end, and returns along the other side, and is connected with it for the greater portion of the distance. The liver does not project anteriorly over the anterior adductor muscle. Anteriorly each cerebro-pleural ganglion gives rise to only one nerve—the anterior pallial nerve—which has one branch. There is only one circumpallial nerve.

Solen pellucidus possesses some features of resemblance to *S. ensis*, some to *S. marginatus*, and others not common to either of these species

¹ Read at a meeting of the Midland Malacological Society.

It will, therefore, be assumed that the points not hereafter mentioned are the same as in *S. ensis*. It resembles *S. marginatus* in the following points:—In the strong development of the pedal muscles. The inner parts of the bases of the gills are joined together. The fibres of the retractor pedis anterior muscles cross the foot under, instead of over, the longitudinal ones. The long oesophagus and position of the stomach. The shape of the anterior part of the stomach. The length and direction of the caecum of the crystalline style. In possessing only one circumpallial nerve.

The features by which it differs both from *S. ensis* and *S. marginatus* are:—The hinge of the shell is situated some distance from the anterior end, and the anterior part of the anterior adductor muscle, together with the dorsal integument, terminate there. What represents the fourth aperture is present at the postero-ventral part of the pedal aperture. The presence of a supra-pedal chamber at the antero-dorsal end. The large pyloric portion of the stomach, and of the proximal part of the caecum of the crystalline style, and the absence of folds in the intestine shortly after leaving the stomach. The numbers of branches of the anterior pallial nerve, which are more than in *S. marginatus*, but fewer than in *S. ensis*.

It is admitted that the type of the genus *Solen* is *S. vagina*, Linné¹, and it is evident that the anatomical differences between *S. vagina* and *S. ensis* and *siliqua* prevent the two latter being placed in the same genus. In the recent classification² these two species have been placed in the genus *Ensis*, Schumacher, and I do not see any reason why this should be altered. That there are distinctive, and what I have found to be constant, characters, I think I have shown, thus justifying them being treated as separate species, and not varieties. There now remains *S. pellucidus*. This animal I have endeavoured to demonstrate possesses some characters common to *S. ensis*, some common to *S. vagina*, and others possessed by neither of them. It, therefore, follows that *S. pellucidus* cannot be placed in the genus *Solen* or *Ensis*. In the before-mentioned classification it has been placed in the genus *Cultellus*, Schum., and as I have not been able to see the type animal of Schumacher's genus (*C. magnus*), I cannot at present say if anatomically this is correct or not.

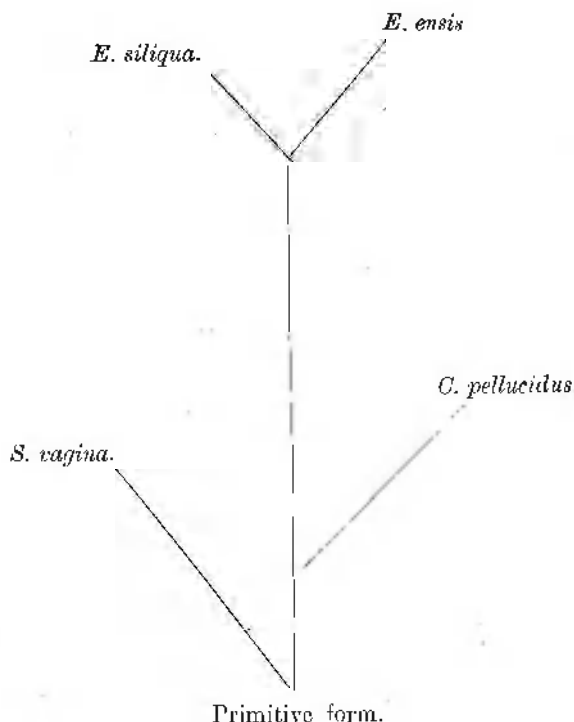
I look upon *Solen vagina* as a more primitive form, and upon *Ensis ensis* and *E. siliqua* as more specialised forms—perhaps *E. ensis* slightly more so than the *E. siliqua* and *Cultellus pellucidus*, coming somewhere between *S. vagina* and *E. siliqua*. I do not, however, suggest that any one species has directly originated from the other. Perhaps the following tree will better illustrate what I wish to convey:—

¹ British Conchology, Jeffreys.

² A History of British Mollusca and their shells. Forbes and Hanley.

³ Synopsis of the *Solenidae* of North America and the Antilles. Dall.

⁴ List of British Marine Mollusca prepared by a Committee of the Conchological Society of Great Britain and Ireland.



Since the publication of Dr. Ridewood's valuable work on the structure of the gills of the Lamellibranchia no review of their classification would be complete without a reference to it: but as I propose referring to the work in more detail at a later date when dealing with the classification of other genera of the *Solenidae*, I will only now say that I do not see anything in it disagreeing with the above conclusions.

ON THE ORIGIN AND FUNCTION OF THE FOURTH APERTURE IN SOME PELECYPODA.

By H. H. BLOOMER.

It has been suggested that the origin of the fourth aperture corresponds with a rudimentary fissure for the byssus. While this may explain the cause of the orifice in certain of the Pelecyпода, I have from observations come to the conclusion that in others the origin is totally dissimilar; and, further, in those to which this theory may apply it has in certain cases since been utilised for an altogether different function. It is noticeable

that in the animals possessing the fourth aperture the coneresced ventral portion is comparatively of considerable length. Pelseuec⁽¹⁾ calls attention to this feature. It must, however, be observed that there are genera belonging to these families having proportionately the same extent of ventral conerescence, in which the orifice does not occur.

I have recently attempted to show that *Solen vagina* is a more primitive form than *Ensis ensis* or *E. siliqua*, that *Cultellus pellucidus* lies between *S. vagina* and *E. siliqua*; and, further, that the position of *Ceratisolen legumen* is between *S. vagina* and *C. pellucidus*. *S. vagina* has no fourth aperture, neither has *C. legumen*, but in the latter the dorsal and ventral surfaces of the pedal aperture carry a tentacular fringe, and extend further posteriorly. In *C. pellucidus* what represents the fourth aperture is also present, but whether it is separated from the pedal aperture I have not been able to determine, as this portion is so easily ruptured. However, in the examination of a large number of specimens, I have not found any conerescence of the mantle lobes between these pairs. In *E. ensis* and *E. siliqua* the fourth aperture is situated more posteriorly, being about the centre of the ventral surface. There may be other genera with the orifice between these two positions, but up to the present none have come under my notice. From a morphological point of view, it is reasonable to infer that a portion of the pedal aperture first became specialised by developing a tentacular fringe; then this fringe extended posteriorly, and the pallial walls coalesced, separating the fourth from the pedal aperture, and finally the fourth aperture gradually proceeded further posteriorly, until it attained a position favourable for the function it originated for.

If either *S. ensis* or *E. siliqua* is examined, it will be seen that the fourth aperture is an elliptical opening bordered on both sides by a row of tentacles, those on the one side alternating with those on the other, that from it on the inside of each mantle lobe is a groove, and in these grooves lie the distal portions of the labial palps, the ends of them being near to the opening. The labial palps, and particularly the parts which form the lips, are of considerable length.

From experiments on *E. siliqua*, I observed that when particles of carmine were placed near the aperture they were gradually drawn in, the greater portion of them being passed between each pair of labial palps, and accumulated near the bases, just in the track where the food travels from the gills to the mouth. Now, as in all probability the labial palps assist the gills in rejecting objectionable matter, as well as being the medium by which the food is conveyed to the mouth, it appeared possible that the greater portion of the carmine would be detected and ejected by the exhalant aperture, and that is what happened. Nevertheless, I found a certain portion of the pigment had been passed anteriorly to this position, and

¹ Introduction à l'étude des mollusques.

some even near to the mouth itself. I am thus led to believe the fourth aperture is in some degree employed as an accessory food-providing organ. I also observed that the orifice was constantly used for the purpose of ejecting water and foreign matter from the pallial cavity, especially if through irritation the valves were suddenly closed, consequently I further think that in *E. siliqua* and *E. asis* the fourth aperture acts in the dual capacity of an accessory food-providing organ, and an exhalent orifice for ejecting water or foreign matter, though the latter function is probably a secondary one. In *Lutraria elliptica* and *Thracia papyracea*, the fourth aperture is situated at the antero-ventral part of the mantle lobes. It is a small orifice, has no tentacular fringe, is surrounded by the very strongly developed muscles of the pallial edge, and is apparently under the control of the animal. The labial palps do not come near it, being situated in the anterior part, and the portion of the gills lying dorsally are a considerable distance away, so that the aperture is not in close communication with any other organ, as in *E. siliqua*. *Lutraria elliptica* used the aperture frequently in suddenly ejecting water or any objectionable matter from the pedal cavity. When particles of carmine were placed close to it, they were not drawn in, as in *E. siliqua*, the orifice only being used for ejecting water, &c., and evidently not as an accessory food-providing organ. The origin of the aperture is apparently of a different and more remote period than that of *E. siliqua*.

A CLASSIFIED LIST OF THE HELICOID LAND SHELLS OF ASIA

(PART VI*.)

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

(Plate iii.)

xiii. MALAY ARCHIPELAGO.

The region now under consideration possesses one of the richest and most varied land molluscan faunas of the globe. The physical conditions are eminently favourable to molluscan life, while the splitting up of the region into innumerable islands has contributed to the formation of local races. The first naturalist to collect land shells here was Rumphius, who resided in Amboina, where he died in 1706; it was not, however, until the beginning of the nineteenth century that the mollusca began to be collected in a systematic manner. The first expedition was that of Baudin to Timor in 1800-1804, and subsequent voyages were made by Freycinet, Duperrey, Beechey, Dumond d'Urville, Vaillant, and Belcher, the results being published in the various works dealing with the respective expeditions.

* See ante, p. 245.

The next two important contributions are by Dr. A. R. Wallace and Professor E. von Martens, who visited many of the islands, whence they brought home a great number of novelties. The former naturalist published a check-list, the new species being described by Henry Adams; while the latter gave his results in the publication of the Prussian Expedition to Eastern Asia. This work constitutes a veritable landmark in the malacology of the region, and forms the basis of all subsequent work in this branch of zoology. Becçari, Doria, and d'Alburtis followed, while more recently Bock, Forbes, Weyers, Everett, Doherty, O. Strubell, Kukenthal, Weber, Semon, Ten Kate, Fruhstorfer, and Roebelen have further enriched our knowledge by the addition of new material. Mention must also be made of the sumptuous work on the Mollusca of Celebes by the Brothers Sarasin, who have contributed much to that portion of the fauna.

While looking over the collection of Malaysian land shells in the British Museum, Mr. Smith pointed out to me a few shells collected by Doherty, and others which had been purchased, which had not been worked out, and he kindly placed them at my disposal. Four appear to be undescribed, and I now append diagnoses and figures of them. Two others were at first believed to be new, and under this impression they were figured. I discovered subsequently that they were already described.

On glancing at the list of the Helicoids of the Eastern Archipelago, one is struck by the fact that as one goes eastwards the *Zonitidae*, which as far as number of species is concerned, at first preponderate, decrease and give way to the *Helicidae*, which thereupon, in their turn, outnumber the *Zonitidae*. The dividing line, roughly speaking, appears to be one separating Borneo from Celebes and the Moluccas. This, however, scarcely applies to the Lesser Sunda Islands east of Sumbawa. Of the *Zonitidae*, the genus *Dyakia* is confined to the Malay Peninsula, Sumatra, Java, and Borneo; while *Nesta* is absent from Sumatra and Java; for although I have doubtfully referred one Javan species (*dwi-paensis*) to *Nesta*, it will probably prove to pertain to *Lamprocystis*, or some allied genus. *Macrochlamys* is fairly general in distribution, but appears to be replaced in Borneo by *Everettia*, which reaches Buru through Celebes. *Hemiplecta* and *Trochomorpha* are distributed over the whole group. *Macrocyloides* has hitherto only been recorded from Borneo, Buru, Amboina, Haruku, and Saparua, being represented in each of these islands by one species. Of *Endodontidae* only one species is known in Java, and one in Celebes. Coming to the *Helicidae*, *Pseudobba* has two species each in Celebes and Sangir. *Planispira*, s.s., does not appear to occur west of Lombok and Celebes; it has its centre of distribution in the Moluccas, and is replaced in the Aru Islands by the section *Cristigibba*, which forms a connecting link with the New Guinea fauna. *Trachia* occurs only (otherwise than on the Continent of Asia) in the Malay

Peninsula and Celebes, connecting the fauna with that of India and Burma. *Chloritis* is generally distributed, providing another connecting link with the mollusca of Further India on the one hand, and through the section *Sulcobasis* in the Aru Islands, with the fauna of New Guinea on the other. *Albersia* and *Papuina* range from the Moluccas through the Aru Islands into New Guinea. *Rhagada* is known only in Sumba, Dana, Flores, and Solor, its extra limital representatives being as far off as North Australia. *Amphidromus* (an arboreal genus of bright, conspicuous colouring), here finds its head-quarters, and occurs in most of the islands; a few off-shoots occur in Further India. *Pseudopartula* is known only from Java, Sumatra, and Borneo. *Pyrochilus*, a small group, possessing four species, is confined to Halmahera and Batchian. *Ganesella* is represented by a few species in Sumatra, Java, Borneo, and Celebes, forming another link with the fauna of the Continent of Asia. The presence of *Phoenicobius* and *Orthostylus* in Palawan and neighbouring islands connects the Bornean with the Philippine fauna, a connection still further evidenced by the occurrence of *Calocochlea* in Sangir and the Tukan Bessi group. *Crystallopsis* occurs in Buru, Goram, and the Aru Islands, thence ranging to the Solomon Islands. Lastly, *Pupisoma* is found in Penang, the Sumat group, Borneo, Lombok, and Amboina, its remaining members occurring in India, Ceylon, Philippine Islands, and Japan.

In the following pages the faunas of the various islands are treated separately; and for convenience of reference I have added an index to the lands; also a Bibliography.

In concluding this series of papers on the Helicoid Land Shells of Asia, I take the opportunity of expressing my deep obligations to Mr. W. E. Collinge, Mr. H. Wallis Kew, Mr. John Ponsonby, and Mr. E. A. Smith for valuable assistance and suggestions.

A few new records of habitat based on specimens (from reliable sources) in my own collection are indicated by an asterisk.

***Dyakia smithiana*, n.sp.**

Pl. iii. figs. 1a, 1b.

Shell sinistral, rimate, pyramidal, finely striated, the striae cut into granules by spirals. opaque, lustreless, pale straw-yellow; spire elevated, apex acute, suture shallow. Whorls 6, flattened above, tumid below, increasing slowly at first, last whorl twice as wide as penultimate, subangulate at the periphery, not descending in front, slightly dilated towards the mouth. Two narrow dark brown bands revolve just below the suture, gradually disappearing upwards: at the periphery occurs also a dark brown band, with a narrow, faint one immediately below it; these two latter are only visible on the body whorl. Aperture oblique, subovate, margins subparallel; peristome thin, straight, columellar margin slightly reflected over the narrow perforation of the umbilicus.

Diam. maj. 32, min. 29; alt. 35 millim.

Hab.—Sumatra. Type in the British Museum. (Purchased).

This handsome species is quite distinct from any known *Dyakia*, and I have much pleasure in associating with it the name of the courteous Assistant Keeper of Zoology of the British Museum, Mr. Edgar A. Smith.

***Planispira quadrifasciata*, Le G. var. *halmaherica*, n. var.**

Pl. iii, figs. 2*a*, 2*b*, 2*c*.

Shell discoid, moderately umbilicated, dull yellowish, finely striated. Spire depressed, apex flattened, suture shallow. Whorls $4\frac{1}{2}$, rather convex above, rounded at the periphery, subangular round the umbilicus; last whorl shortly descending in front, dilated towards the mouth, crested and gibbous behind the peristome. Aperture oblique, subrotundate; margins approaching; peristome white, scarcely thickened, shortly reflected, bearing a slight tubercle on the columellar margin which is slightly dilated above, overhanging the deep funnel-shaped umbilicus. Three narrow dark brown bands revolve round the body whorl—one above and one below the periphery, the third round the umbilical angulation.

Diam. maj. 16.5, min. 13; alt. 7.5 millim.

Hab.—Dodinga, Halmahera (Doherty).

***Chloritis unguicollina*, Mart.**

Pl. iii, figs. 4*a*, 4*b*, 4*c*.

Two specimens, measuring respectively $14 \times 12 \times 8.5$ and $13 \times 11 \times 7.5$ millim., labelled "Alor." (Doherty). Mr. Smith informs me, however, that he is not sure of the habitat. The species has hitherto only been recorded from Buru.

***Chloritis (Trichochloritis) albodentata*, Smith.**

Pl. iii, fig. 7.

Planispira albodentata, Smith; Ann. and Mag. Nat. Hist., 1899 (7), iii, p. 411.

Hab.—South Flores, alt. 3,600 ft.

The species is now figured for the first time. The drawing has been made from the type in the British Museum.

***Chloritis (Trichochloritis) tabularis*, n. sp.**

Pl. iii, figs. 5*a*, 5*b*, 5*c*.

Shell depressed conoid, light fulvous, finely striated, closely covered with hair-scars arranged in quincunx. Whorls 5, a little convex above, tumid below, rounded at the periphery, angular round the deep narrow umbilicus, increasing slowly, the last twice as wide as penultimate, not descending in front, scarcely dilated towards the mouth. Aperture nearly horizontal,



1a



1b



2a



3



4a



2b



4b



2c



7



4c



5a



5b



5c



6a



6b



6c

A S Ruth lith & a nat

widely ear-shaped; margins distant, connected by a thin callus, sinuous in outline; peristome scarcely thickened, shortly reflected, columellar margin dilated above and reflected over the umbilicus.

Diam. maj. 20, min. 17; alt. 12 millim.

Hab.—Sumatra (Purchased).

Thersites (Bhagada) supracostulata, Schepm.

Pl. III, figs. 6a, 6b, 6c.

The bands in this species vary considerably. In a suite of several specimens in the British Museum, one has a broad peripheral band; in the others all the bands are linear. One specimen is pure white, bandless.

Hab.—Sumba (Liverett).

Helicostyla (Calcochleas) talautana, n.sp.

Pl. III, fig. 3.

Shell imperforate conoid, finely striated, decussated with microscopic spiral lines, the earlier whorls violaceous, the body-whorl straw yellow, or fuscous chestnut colour. Spire depressed, apex obtuse, suture rather shallow, margined. Whorls $4\frac{1}{2}$, convex; last whorl not descending in front. Aperture a little oblique, subrotundate; peristome fulvous rose edged with white, a little thickened, flattened and reflexed; margins convergent, connected by a thin callus, columellar margin widened and flattened. One specimen has a narrow brown peripheral band on the straw yellow body-whorl, a second is bandless; a third specimen shows a trace of a band on the fuscous chestnut body-whorl.

Diam. maj. 37, min. 30; alt. 31–34 millim.

Hab.—Talaut (Doherty).

This new species somewhat resembles *Helicostyla tukanensis*, Pfr., in outline, but it is considerably larger, and the aperture is less dilated; while the columellar margin is more vertical.

A. MALAY PENINSULA.

a. MALACCA.

Genus *TROCHONANINA*, Meuss.

lychnia, Bens.

Genus *XESTA*, Alb.

malaccana, Pfr.

Genus *HEMPLECTA*, Alb.

humphreysiana, Lea.

v. turbinata, Mart.

arguta, Pfr.

monozonalis, Lam. (?)

Genus *RIYSOTA*, Alb.

cymatum, Bens.

chevalieri, Soul.

Genus *DYKIA*, G. A.

lindstedti, Pfr.

amphidroma, Mart.

? *balestieriana*, Lea.

altersi, Mart.

= *janus*, Pfr. non Chemn.

Genus *VITRINA*, Gray.

heliciformis, Pfr.

= *ophiria*, Pfr.

Genus *PYRAMIDULA*, Fitz.

Section *PYRAMIDULA*, s.s.

- umbonalis, Bens.
 tutulus, Bens.
 Genus CHLORITIS, Beck.
 Section TRICHOCHLORITIS, Pils.
 platytropis, Mdff.
 Genus AMPHIDROMUS, Alb.
 aureus v. leucoxantha, Mart.
 inversus, Müll.
 interruptus, Müll.
 Genus EULOTA, Hartm.
 similis, Per.
- b. SINGAPORE.
- Genus TROCHONANINA, Mousc.
 lychnis, Bens.
 Genus HEMPLECTA, Alb.
 striata, Gray.
 = naninoides, Bens.
 = isabella, H. & J.
 humphreysiana v. bifasciata,
 Mart.
 Genus DYAKIA, G.-A.
 amphidroma, Mart.
 Genus AMPHIDROMUS, Alb.
 aureus v. melanomma, Pfr.
 comes v. polymorpha, Can-
 mundus, Pfr.
- c. RIOW (OR RHIO).
- Genus AMPHIDROMUS, Alb.
 aureus v. melanomma, Pfr.
 d. JOHORE.
- Genus HEMPLECTA, Alb.
 humphreysiana v. complanata,
 Mart.
- c. SALANG OR JUNK CEYLON.
- Genus MACROCHLAMYS, Bens.
 resplendens, Phil.
 Genus DYAKIA, G.-A.
 salangana, Mart.
 Genus HEMPLECTA, Alb.
- striata, Gray.
 Genus HELICARION, Fér.
 praecegens, Mart.
 nucleatus, Stol.
 Genus TROCHOMORPHA, Alb.
 sculpticarina, Mart.
 castra, Bens.
 Genus AMPHIDROMUS, Alb.
 atricallosus, Gould.
 = eques, Pfr.
- f. PERAK.
- Genus EUPLECTA, Semp.
 bijuga, Stol.
 Genus XESTA, Alb.
 malaouyi, de Morg.
 Genus DYAKIA, G.-A.
 retrorsa, Gould.
 kintania, de Morg.
 = labatensis, de Morg. (juv.)
 Genus MACROCHLAMYS, Bens.
 diadema, Dall.
 resplendens, Phil.
 stephoides, Stol.
 hatchongi, de Morg.
 jousoufi, de Morg.
 bartoni, de Morg.
 Genus MICROCYSTINA, Müsch.
 townsendiana, Nev.
 Genus HEMPLECTA, Alb.
 striata v. leechi, de Morg.
 sakayana, de Morg.
 floweri, Smith.
 Genus APOPARMARION, Clge.
 partridgei, Clge.
 Genus PARAPARMARION, Clge.
 elongatus, Clge.
 Genus HELICARION, Fér.
 nucleatus, Stol.
 lineolatus, Mart.
 lowi, de Morg.
 permollis, Stol.
 Genus LAMPROCYSTIS, Pfr.
 malayana, Mdff.

- conulna*, Mdf.
 Genus SITALA, H. Ad.
 carinifera, Stol.
 pataniensis, de Morg.
 Genus KALIELLA, W. T. Blauf.
 perakensis, Nev.
 Genus VITRINOPSIS, Semper.
 douvillei, de Morg.
 (Gaetis douvillei, de Morg.)
 Genus TROCHOMORPHA, Alb.
 grubaueri, Mdf.
 timorensis, Mart.
 ? = *thieroti*, de Morg.
 swettenhami, de Morg.
 Genus PLANISPIRA, Beck.
 Sub-genus TRACHIA, Alb.
 penangensis, Stol.
 wrayi, de Morg.
 hardouini, de Morg.
 Genus CHLORITIS, Beck.
 Section TRICHOCHLORITIS, Pils.
 malayana, Mdf.
 breviseta, Pfr.
 Genus AMPHIDROMUS, Alb.
 auricus v. *melanomima*, Pfr.
 atricollosus, Gould.
 perakensis, Fult.
 sinensis, Bens. v.
 xiengensis, Mor.
 Genus GANESSELLA, W. T. Blauf.
 perakensis, Grosse.
 v. *subperakensis*, Pils.
 bouryi, de Morg.
 Genus EULOTA, Hartm.
 similaris, Fér.

 g. PENANG.
 Genus EUPLECTA, Semp.
 bijuga, Stol.
 Genus MACROCHLAMYS, Bens.
 stephoides, Stol.
 resplendens, Phil.
 Genus RHYSOTA, Alb.
 cynatium, Bens.
- Genus HEMIPLECTA, Alb.
 striata, Gray.
 Genus HELICARTON, Fér.
 nucleatus, Stol.
 permollis, Stol.
 Genus SITALA, H. Ad.
 carinifera, Stol.
 = *Trochomorpha kusana*, Aldr.
 Genus KALIELLA, W. T. Blauf.
 palmicola, Stol.
 Genus TROCHOMORPHA, Alb.
 castra, Bens.
 cantoriana, Bens.
 timorensis, Mart.
 Genus PLANISPIRA, Beck.
 Sub-genus TRACHIA, Alb.
 penangensis, Stol.
 Genus AMPHIDROMUS, Alb.
 atricollosus, Gould.
 auricus v. *melanomima*, Pfr.
 Genus EULOTA, Hartm.
 similaris, Fér.
 Genus PUPISOMA, Stol.
 orella, Stol.
- h. QUEDA OR KEDAH
 Genus XESTA, Alb.
 malaccana, Pfr.
- i. PULO LANGKAWA.
 Genus RHYSOTA, Alb.
 cynatium, Bens.
- j. KELANTAN (OR KALANTAN).
 Genus EUPLECTA, Semp.
 bijuga v. *convexospira*, Mdf.
 Genus MACROCHLAMYS, Bens.
 stephoides, Stol.
 hardwickei v. *kelantanensis*,
 Mdf.
 Genus HEMIPLECTA, Alb.
 humphreysiana, Lea.
 Genus SITALA, H. Ad.

carinifera, Stol.
subscalaris, Mdff.
sublineolata, Mdff.

k. *LIGEH* (OR *LIGOR* ?)
 Genus *GIRASIA*, Gray.
peguensis, Theob.

Genus *TROCHOMORPIA*, Alb.
grubaueri, Mdff.
kelantanensis, Mdff.
castra, Bens.

l. *NAWNG CHIK*.
 Genus *CRYPTOSEMELUS*, Clige.
gracilis, Clige.

Genus *CHLORITIS*, Beck.
malayana, Mdff.

m. *JALOR*.
 Genus *AMPHIDROMUS*, Alb.
perversus, L.

B. SAMUI GROUP.

Genus *XESTA*, Alb.
siamensis, Pfr.
 Genus *MACROCHLAMYS*, Bens.
limbata, Mdff.
 Genus *HEMIPLECTA*, Alb.
weinkauffiana v. *inflata*, Mdff.
 Genus *SITALA*, H. Ad.
insularis, Mdff.

Genus *KALIELLA*, W. T. Blanf.
subsculpta, Mdff.
 Genus *CHLORITIS*, Mdff.
 Section *TRICHOCHLORITIS*, Pils.
platytropis v. *samuiana*, Mdff.
 Genus *AMPHIDROMUS*, Alb.
moniliferus, Gould.
 Genus *PUPISOMA*, Stol.
oreolla, Stol.

C. SUMATRA.

Family **Zonitidae**.
 Sub-family **Macrochlaminae**.
 Genus *MACROCHLAMYS*, Bens.
malaccana, Pfr.
convoluta, Desh.
 = *convallata* v. *infusca*,
 Mart.
auroa, Mart.
 Genus *MICROCYSTINA*, Mörch.
infans, Pfr.
 Genus *HEMIPLECTA*, Alb.
densa, A. & R.
schumacheriana, Pfr.
humphreysiana v. *gemina*, v.d.B.
hoodjongensis, Smith.
umbilicaris, Le G. v. *sumat-*
rana, Mart.
 = *desgrazii*, Hombr.
arguta, Pfr.
obliquata, Reeve.

monozonalis, Lam. (?)
castanea, Müll.
marangensis, Akl.
 Genus *DYAKIA*, G.-A.
amphidroma, Mart.
 v. *martini*, Pfr.
 v. *mackensiana*, Soul.
granaria, Bock.
maarseveeni, Bock.
smithiana, Gude.
weyersi, Smith.
runghii, v.d. B.
sumatrensis, MOUSS.
foveata, Pfr.
 Sub-family **Helicariionae**.
 Genus *HELICARION*, Fér.
bocki, Smith.
lineolatus, Mart.
sumatrensis, Schepm.
 Genus *SITALA*, H. Ad.

carinifera v. marangensis, Ald.
 Sub-family **Zonitinae**.
 Genus **VITRINA**, Gray.
 heliciformis, Pfr.
 hyalea, Bock.
 Genus **TROCHOMORPHA**, Alb.
 planorbis, Less.
 bicolor, Mart.
 costulata, Mart.
 dohertyi, Ald.
 Family **Helicoidae**.
 Group **EPIPHALLOGONA**, Pils.
 Genus **PLANISPIRA**, Beck!
 Sub-genus **CRISTIGIBBA**, Can.
 quadrivolvis, Mart.
 Sub-genus **TRACHIA**, Alb.
 smitli, Bock.
 Genus **CHLORITIS**, Beck.
 Section **TRICHOCHLORITIS**, Pils.
 crassula, Phil.
 = *störjana*, Mouss.
 toinentosa, Pfr.
 tabularis, Gude.
 Genus **AMPHIDROMUS**, Alb.
 inversus, Müll.
 porcellanus, Mouss.
 sumatranus, Mart.
 semifrenatus, Mart.
 Sub-genus **PSEUDOPARTULA**, Pfr.
 dohertyi, Aldr.
 Genus **GANESSELLA**, W. T. Blant.
 gysseriana, Pfr.
 = *conulus*, Mart.
 rufiflora, Bock.
 Group **BELOGONA EUADENIA**.
 Genus **PLECTOTROPIS**, Mart.
 winteriana, Pfr.

sumatrana, Mart.

DOUBTFUL RECORDS.

Trochonanina conus, Phil.

Patula cavernula, Smit.

a. BANCA.

Genus **EVERETTIA**, G.-A.

conus, Pfr.

Genus **HEMIPECTA**, Alb.

umbilicaris, Le G. v. *bankana*,
 Mart.

Genus **DYAKIA**, G.-A.

amplidroma, Mart. v. *macken-*
siana, Soul.

b. BILITON.

Genus **AMPHIDROMUS**, Alb.

aureus v. *melanomma*, Pfr.

c. BATU ARCHIPELAGO.

Genus **HEMIPECTA**, Alb.

humphreysiana, Lea.

Genus **DYAKIA**, G.-A.

weyersi, Smith. Bodjo.

d. ENGANO.

Genus **MACROCHLAMYS**, Bens.

dohertyi, Hend.

Genus **HELICARION**, Fér.

albellus, Mart. var.

Genus **TROCHOMORPHA**, Alb.

hartmanni, Pfr.

Genus **PLANISPIRA**, Beck.

aldrichi, Hend.

Genus **AMPHIDROMUS**, Alb.

enganoensis, Fult.

D. JAVA.

Family **Zonitidae**.

Sub-family **Arlophantinae**.

Genus **TROCHONANINA**, Mouss.

conus, Phil.

multicarinata, Boettg.

Sub-family **Macrochlaminae**.

? Genus **MACROCHLAMYS**.

dwipaensis, Gude.

— *jenynsi*, Mart. non Pfr.

Genus **MICROCYSTINA**, Moreh.

- infans, Pfr.
 Genus **HEMIPLECTA**, Alb.
 densa, A. & R.
 v. herklotsiana, Dohrn.
 v. moussoniana, Mart.
 v. corrosa, Mouss.
 Humphreysiana, Lea.
 v. turbinata, Mart.
 v. complanata, Mart.
 v. gemina, v.d. B.
 = bifasciata, Mart.
 patens, Mart.
 moussoni, Pfr.
 rareguttata, Mouss.
 inquinata, v.d. B.
 umbilicaris, Le G. v. suudana,
 Mart.
 v. virescens, Mart.
 centralis, Mouss.
 arguta, Pfr.
 bataviana, v.d. B.
 = induta, Pfr. (juv)
 duplocincta, Mdff.
 acutecarinata, Mdff.
 marginata, Mdff.
 acelidota, Mdff.
 v. robusta, Mdff.
 javana, Fér.
 = javacensis, Fér.
 = javanica, Lam.
- Genus **DYAKIA**, G.-A.
 regalis, Bens.
 = vittata, A. & R.
 rumphii, v.d.B.
 clypeus, Mouss.
 = v. zollingeriana, Mart.
 v. jagoriana, Mart.
 ryssolemma, Alb.
- Sub-family **Helicaroninae**.
 Genus **HELICARION**, Fér.
 lineolatus, Mart.
 albellus, Mart.
 = wonosariensis, Mouss.
 agilis, Mart.
- adolphi, Boettg.
 perfragilis, Mdff.
 fruhstorferi, Mdff.
- Genus **PARMARION**, P. Fisch.
 reticulatus, Hasselt.
 taeniatus, Hasselt.
 pupillaris, Humb.
 v. punctata, Mart.
 v. marmorata, Mart.
 v. vittata, Mart.
 luteus, Mouss.
 planus, Mouss.
 weberi, Simr.
- Genus **MICROPARMARION**, Simr.
 austeni, Simr.
 fruhstorferi, Simr.
 boettgeri, Simr.
 javanica, Cllege.
- Genus **COLLINGEA**, Simr.
 strubelli, Simr.
- Genus **LAMPROCYSTUS**, Pfr.
 gedeana, Mdff.
 fruhstorferi, Mdff.
 circumlineata, Mdff.
 subglobosa, Mdff.
 exigua, Mdff.
 nana, Mdff.
 radiatula, Mdff.
 vitreiformis, Mdff.
- Genus **SITALA**, H. Ad.
 micula, Mouss.
 bandongensis, Boettg.
 javana, Mdff.
- Genus **KALIELLA**, W. T. Blanch.
 indifferens, Boettg.
 javana, Boettg.
 acutiuscula, Mdff.
 sitaliformis, Mdff.
 platyconus, Mdff.
 angigyra, Mdff.
 convexoconica, Mdff.
 ambliia, Mdff.
 densetorta, Mdff.
 viridula, Mdff.

- macrostoma*, Mdff.
pisum, Mdff.
 Sub-family **Zonitinae**.
 Genus **TROCHOMORPHA**, Alb.
planorbis, Less.
 v. *javanica*, Mouss.
bicolor, Mart.
hartmanni, Pfr. (?)
tricolor, Mart.
zollingeri, Pfr.
concolor, Boettg.
strubelli, Boettg.
 Family **Endodontidae**.
 Group **HAPLOGONA**, Pils.
 Genus **PYRAMDULA**, Fitz.
javana, Mdff.
 Family **Helicidae**.
 Group **EPIPIHALLOGONA**, Pils.
 Genus **CILORITIS**, Beck.
 Section **TRICHOCHLORITIS**, Pils.
crassula, Phil.
helcinoides, Mouss. non Hembr.
 = *cryptopila*, Mouss. in Coll.
tetragyra, Mdff.
fruhstorferi, Mdff.
 Genus **AMPHIDROMUS**, Alb.
palaceus, Mouss.
 v. *subaurantia*, Fult.
 v. *appressa*, Mart.
 v. *pura*, Mouss.
 v. *tener*, Mart.
winteri, Pfr.
 v. *inauris*, Fult.
heerianus, Pfr.
 v. *robusta*, Fult.
javanicus, Sowb.
alticola, Fult.
perversus, Linn.
interruptus, Müll.
 v. *emaciata*, Mart.
 v. *sultana*, Lam.
 v. *inflata*, Fult.
 v. *elongata*, Fult.
porcellanus, Mouss.
filozonatus, Mouss.
furcellatus, Mouss.
 = v. *flammulata*, Mart.
 v. *virescens*, Mart.
elegans, Mouss.
 Sub-genus **PSEUDOPARTULA**, Pfr.
galericulum, Mouss.
 v. *gedeana*, Pils.
 v. *fasciata*, Anc.
 v. *impunctata*, Anc.
 Genus **GANSELLA**, W. T. Blanch.
bantamensis, Smith.
BELOGONA EUADENIA, Pils.
 Genus **EULOTA**, Hartm.
similaris, Fér.
 v. *subdepressa*, Mart.
 v. *solidula*, Mouss.
 v. *subsimilaris*, Mouss.
transversalis, Mouss.
 Genus **PLECTOTROPIS**, Mart.
rotatoria, v.d.B.
winteriana, Pfr.
sumatrana v. *moussoniana*, Mart.
intumescens, Mart.
huttoni, Pfr.
 = *orbicula*, Hutt. non Orb.
smirnaensis, Mouss.
leucomphala, Mdff.
epiplatia, Mdff.
trichotrochium, Mdff.
ciliocincta, Mdff.
schepmani, Mdff.
 Genus **HELICOSTYLA**, Fér.
 Section **CRYSTALLOPSIS**, Anc.
coelaxis, Pils.
BELOGONA SIPHONADENTIA, Pils.
 Genus **ACANTHINULA**, Beck.
perpusilla, Mdff.
tiluana, Mdff.
 DOUBTFUL OR SPURIOUS RECORDS.
Chloritis unguilina, Fér.
 „ *unguicula*, Fér.
Crystallopis najas, Pfr.
Helicostyla rustica, Mouss.

- a. MADURA.
 Genus *HEMIPLECTA*, Alb.
javana, Fér.
 Genus *AMPHIDROMUS*, Alb.
filozonatus, MOUSS.
 Genus *EULOTA*, Hartm.
transversalis, MOUSS.
 Genus *PLECTOTROPIS*, Mart.
squamulosa, MOUSS.
 b. BAWEAN.
 Genus *HEMIPLECTA*, Alb.
bataviana, v.d.B.
 Genus *AMPHIDROMUS*, Alb.
interruptus, Müll.
 c. POPOLI.
 Genus *PLECTOTROPIS*, Mart.
rotatoria, v.d.B.
 d. PRINCE'S ISLAND.
 Genus *AMPHIDROMUS*, Alb.
aureus, Martyn.
 e. KRAKATAO OR RAKATA.
 Genus *HEMIPLECTA*, Alb.
umbilicaris, Le G. v. *sumatrana*,
 Mart
arguta, Pfr.
 Genus *CILORITIS*, Beck.
 Section *TRICHOCLORITIS*, Pils.
helicinoides, MOUSS.
 Genus *AMPHIDROMUS*, Alb.
inversus, Müll.
 f. PULO SUNGIAN (EILAND
 DWARS IN DE WEG.)
 Genus *HEMIPLECTA*, Alb.
virens, Mart.
 Genus *DYAKIA*, G.-A.
amphidroma, v. *martini*, Pfr.
 Genus *TROCHOMORPHA*, Alb.
bicolor, Mart.
 Genus *AMPHIDROMUS*, Alb.
inversus, Müll.
 g. CHRISTMAS ISLAND.
 Genus *LAMPROCYSTIS*, Pfr.
normani, Smith.
mabelae, Smith.
mildredae, Smith.

E. BORNEO.

- Family **Zonitidae**.
 Sub-family **Arlophantinae**.
 Genus *TROCHONANINA*, MOUSS.
conicoides, Mete.
 v. *parva*, Smith.
 v. *crenulata*, Mdff.
labuanensis, Pfr.
tropidophora, A. and R.
whiteheadi, Smith.
heraclea, Smith.
 Genus *XESTA*, Alb.
glutinosa, Mete.
brotii, Bonnet.
moluensis, Smith.
padasensis, Smith.
thisbe, Smith.
haramensis, Koh.
 Genus *EUPLECTA*, Semp.
bijuga, Stol.
 Genus *XESTINA*, Semp.
themis, Smith.
 Sub-family **Macrochlaminae**.
 Genus *EVERETTIA*, G.-A.
consul, Pfr.
subconsul, Smith.
cutteri, H. Ad.
 v. *haramensis*, Koh.
jucunda, Pfr.
 v. *nana*, G.-A.
hyalina, Mart.
aglaja, Pfr.
 v. *emarginata*, Nev.
cinnamomea, Val.
subimperfiorata, Smith.
planior, Smith.
haramensis, Smith.
thalia, Smith.
bocki, Issel.

Genus *MICROCYSTINA*, Mörch.

- infans*, Pfr.
- tersa*, Issel.
- maedougalli*, Issel.
- lowi*, Issel.
- perlucida*, Issel.
- dyakana*, G.-A.
- st. jehni*, G.-A.
- pudens*, G.-A.
- sechusa*, G.-A.
- cavernae*, G.-A.

Genus *RHYSOLO*, Alb.

- brookei*, A. and R.
- = *gigas*, Pfr.
- v. *baramensis*, Kob.
- borneensis*, Pfr.

Genus *HEMPLECTA*, Alb.

- densa*, A. and R.
- v. *atrolusca*, Mart.
- butakoferi*, Schepm.
- schumacheriana*, Pfr.
- obliquata*, Reeve.
- sonleyetiana*, Pfr.
- donovani*, Pfr.
- nobilis*, Pfr.
- arguta*, Pfr.
- praeacuta*, Smith.
- rahongensis*, Smith.

Genus *DYAKIA*, G.-A.

- regalis*, Bens.
- v. *unifolor*, G.-A.
- janus*, Chemn.
- lindstedti*, Pfr.
- v. *eastanea*, Smith.
- amphidroma*, Mart.
- v. *intermedia*, Mart.
- mindaiensis*, Bock.
- = *sarawakana*, Dohrn.
- = *mendaiensis* (Semp. l), Tenison-Woods.
- intradentata*, G.-A.
- busauensis*, G.-A. (cm.).
- = *busanensis*, G.-A.
- v. *concolor*, Smith.

- mohiensis*, G.-A.
- sublebilis*, Smith.
- densestriata*, Schepm.

Genus *MACROCYCLOIDES*, Mart.

- obscurata*, A. & R.

Sub-family *Helicarioninae*.Genus *HELICARION*, Fér.

- borneensis*, Pfr.
- whiteheadi*, G.-A.
- semicalcareus*, Schepm.

Genus *PARMARION*, P. Fisch.

- goethuisi*, Schepm.
- everetti*, Clige.
- intermedium*, Clige.

Genus *MICROPARMARION*, Simr.

- litteratus*, Schepm.
- sultoni*, Clige.
- constrictus*, Clige.

Genus *DAMAYANTIA*, Issel.

- dilecta*, Issel.
- carinata*, Clige.

Genus *WIEGMANNIA*, Clige.

- dubia*, Wiegman.
- gigas*, Clige.
- ponsonbyi*, Clige.
- borneensis*, Clige.

Genus *COLLINGEA*, Simr.

- smithi*, Clige. and G.-A.
- (*Damayantia smithi*, C. and G.-A.)
- pullenata*, Clige. and G.-A.
- sirothi*, Clige. and G.-A.

Genus *ISSELENTIA*, Clige.

- plicata*, Clige.
- globosa*, Clige.

Genus *HYCES*, Heyn.

- becardi*, Issel.
- doriae*, Issel.

Genus *DURCELLA*, G.-A.

- hosei*, G.-A.

Genus *SITALA*, H. Ad.

- everetti*, G.-A.
- singularis*, G.-A.
- rarecostulata*, Smith.
- baritensis*, Smith.

- moluensis, Smith.
 carinifera, Stol.
 = *Trochomorpha kusana*, Aldr.
 angulata, Issel.
 rumbangensis, Smith.
 demissa, Smith.
 cara, Smith.
 duleis, Smith.
 accepta, Smith.
 amussitata, Smith.
 inaequisculpta, Smith.
 Genus **KALIELLA**, W. T. Blanf.
 doliolum, Pfr.
 = *Sitala orchis*, G.-A.
 Sub-family **Zonitinae**.
 Genus **TROCHOMORPHA**, Alb.
 planorbis, Less.
 v. *appropinquata*, Mart.
 v. *lessoni*, Mart.
 v. *nummus*, Issel.
 bicolor, Mart.
 metcalfei, Pfr.
 kinabaluensis, Smith.
 v. *pallida*, Smith.
 Family **Helleidae**.
 Group **EPIPIALOGONA**, Pils.
 Genus **CAMAENA**, Alb.
 Section **PHOENICOBIUS**, Mörch.
 trailli, Pfr.
 Genus **PLANISPIRA**, Beck.
 dulcissima, Smith.
 Sub-genus **CRISTIGIBBA**, Can.
 quadrivolvis, Mart.
 Genus **CHLORITIS**, Beck.
 Section **CHLORITIS**, s.s.
 flexuosa, Pfr.
 latecostata, Kob.
 Section **TRICHOCHLORITIS**, Pils.
 everetti, H. Ad.
 tomentosa, Pfr.
 kinabaluensis, Smith.
 meander, G.-A.
 Genus **PAPUINA**, Mart.
 antiqua, A. and R.
- Genus **AMPHIDROMUS**, Alb.
 perversus, Linn.
 v. *similis*, Pils.
 = *atricullosa*, Schepm.
 interruptus, Müll.
 martensi, Boettg.
 inversus, Müll.
 hosei, Smith.
 adamsi, Reeve.
 v. *rufocincta*, Fult.
 v. *inornata*, Fult.
 v. *aureocincta*, Fult.
 v. *rubiginosa*, Fult.
 v. *placida*, Fult.
 v. *angulata*, Fult.
 pietus, Fult.
 v. *concinna*, Fult.
 v. *connectens* (Fult.)
 = *everetti* v. *connectens*, Fult.
 Sub-genus **PSEUDOPARTULA**, Pfr.
 nasuta, Mete.
 Genus **GANESSELLA**, W. T. Blanf.
 mbahensis, G.-A.
 subflava, G.-A.
 rufiflora, Boek.
 BELOGONA EUADENIA, Pils.
 Genus **EULOTA**, Hartm.
 incauta, Smith.
 Genus **PLECTOTROPIS**, Mart.
 winteriana, Pfr.
 grumulus, G.-A.
 Genus **PUPISOMA**, Stol.
 pulvisculum, Issel.
 Genus **HELICOSTYLA**, Fér.
 Section **ORTHIOSTYLUS**, Beck.
 satyrus v. *minima*, Pils.
 DOUBTFUL OR SPURIOUS RECORDS.
 Chloritis unguiculastra, Mart.
 Euhadra orientalis, Reeve.
 a. PALAWAN (OR PARAGUA).
 Family **Zonitidae**.
 Sub-family **Arlophantinae**.
 Genus **TROCHONANINA**, Mouss.

- paraguensis, Smith.
 v. eurystoma, Mdff.
 v. densilirata, Mdff.
 conicoides, Metc.
 v. subconvexa, Mdff.
- Sub-family Macrochlaminae**
Genus MACROCHLAMYS, Bens.
 pseustes, Smith.
- Genus MICROCYSTINA, Mörch.**
 st. johni, G.-A.
- Genus HEMIPLECTA, Alb.**
 densa, A. and R.
 v. everetti, Smith.
 schumacheriana, Pfr.
 egeria, Smith.
- Sub-family Helicarioninae.**
Genus LAMPROCYSTIS, Pfr.
 goniogyra, Mdff.
 succinea, Pfr.
 myops, D. and S
 chlororaphe, Smith.
- Genus SITALA, H. Ad.**
 baritensis, Smith.
- Genus KALIELLA, W. T. Blanf.**
 accepta (Smith), Mdff.
 (Sitala accepta, Smith).
 infantilis (Smith), Mdff.
 (Sitala infantilis, Smith).
- Genus HEMTRICHA, Mdff.**
 plateni, Dohrn.
- Sub-family Zonitinae.**
Genus TROCHOMORPHA, Alb.
 loocensis, Hid.
 boholensis, Semp.
 metcalfei, Pfr.
 repanda, Mdff.
 splendens, Semp.
 pseudosericina, Boettg.
- Family Helleidae.**
Group EPIPHALLOGONA, Pils.
Genus CAMAENA, Alb.
 stolidota, Q. and M.
- Section PITOENICOBUS, Mörch.**
 trailli, Pfr.
- v. turrita, Mdff.
 monochroa, Sowb.
 palawanica, Pfr.
 = doriae, Dohrn.
 = sauliae, Rve.
 v. albolabiata, Mdff.
 v. fulva, Mdff.
 v. fuscolabiata, Mdff.
 v. confusa, Mdff.
 v. fusca, Mdff.
 sauliae, Pfr. (Murigi Island.)
 = palumba, Souv.
 lagunae, Hid.
 v. gigas, Mdff.
 egregia, Desh.
 avus, Pfr.
- Genus OBBA, Beck**
Sub-genus OREOBBA, Pils.
 camelus, Pfr. (Bakuit Island).
- Genus CHLORITIS, Beck.**
Section TRICHOCHLORITIS, Pils.
 inquieta, Dohrn.
- Genus AMPHIDROMUS, Alb.**
 antobaptus, Dohrn.
 v. gracilis, Fult.
 v. contracta, Mdff.
 quadrasi v. solida, Fult.
 v. everetti, Fult.
- BELOGONA EUADENIA, Pils.**
Genus EULOTA, Hartm.
 fodiens, Pfr.
- Genus HELICOSTYLA, Fér.**
Section ORTHOSTYLUS, Beck.
 satyrus, Brod.
 v. palawanensis, Pfr.
 v. cyanocephala, Pils.
 v. cinerosa, Pfr.
 v. librosa, Pfr.
- b. BALABAC.
- Genus TROCHONANINA, MOUSS.**
 labuanensis, Pfr.
 paraguensis, Smith.
- Genus LAMPROCYSTIS, Pfr.**

- myops*, Dohrn.
goufogyra, Mdff.
succinea, Mdff.
discoidea, Q. and M.
 = *balabacensis*, Smith.
 Genus *CAMAENA*, Alb.
 Section *PHOENICOBIVS*, Mörch.
monochroa, Sowb.
lagunae, Hid.
 Genus *AMPHIDROMUS*, Alb.
quadrasii v. *versicolor*, Fult.
 v. *dubia*, Fult.
 Genus *HELICOSTYLA*, Fér.
 Section *CORASIA*, Alb.
samboanga, H. and J.
 c. **MANGSI.** (BALABAC STRAITS.)
 Genus *AMPHIDROMUS*, Alb.
adamsi v. *mangsiiana*, Pils.
 Genus *HELICOSTYLA*, Fér.
 Section *CORASIA*, Alb.
samboanga v. *intaminata*, Gld.
 Section *ORTHOSTYLUS*, Beck.
satyrus v. *graellsii*, Hid.
 d. **PANALINGOAN.** (S.W. OF
 PALAWAN.)
 Genus *CHLORITIS*, Beck.
 Section *TRICHOCHLORITIS*, Pils.
euprosyne, Smith.
 e. **BUSUANGA.** (N. OF PALAWAN).
 Genus *CAMAENA*, Alb.
 Section *PHOENICOBIVS*, Mörch.
monochroa, Sowb.
 Genus *HELICOSTYLA*, Fér.
 Section *ORTHOSTYLUS*, Beck.
satyrus, Brod.
 f. **BANGUEY.**
 Genus *TROCHONANINA*, Mouss.
alexis, Smith.
 Genus *EVERETTIA*, G.-A.
- subconsul, Smith.
 (also Mengalun Island).
bangueyensis, Smith.
 Genus *HEMIPLECTA*, Alb.
obliquata, Reeve.
 Genus *DYAKIA*, G.-A.
lindstedti, Pfr.
 Genus *LAMPROCYSTIS*, Pfr.
myops, Dohrn.
 Genus *CHLORITIS*, Beck.
 Section *TRICHOCHLORITIS*, Pils.
tomentosa v. *major*, Smith.
 Genus *AMPHIDROMUS*, Alb.
adamsi, Reeve.
 v. *subunicolor*, Fult.
 v. *articulata*, Fult.
 v. *simplex*, Fult.
 v. *ornata*, Fult.
 v. *luteofasciata*, Fult.
 v. *superba*, Fult.
quadrasii, Hid.
 Genus *HELICOSTYLA*, Fér.
 Section *ORTHOSTYLUS*, Beck.
satyrus, Brod.
 g. **SULU GROUP.**
 1. **SIBUTU.**
 Genus *TROCHONANINA*, Mouss.
sylvana, S. and D.
bongaensis, Smith.
 = *conicoides* v. *crenulata*,
 Mdff.
 Genus *MACROCHLAMYS*, Bens.
angulata, Mdff.
 Genus *LAMPROCYSTIS*, Pfr.
myops, Dohrn.
 Genus *KALIELLA*, W. T. Blant.
doliolum, Pfr.
 = *Sitala orchis*, G.-A.
 Genus *TROCHOMORPHA*, Alb.
metcalfei, Pfr.
 Genus *OBBA*, Beck.
marginata, Müll.
 v. *nana*, Mdff.

Genus CHLORITIS, Beck.

Section TRICHOCHLORITIS, Pils.
sibutuensis, Smith.Genus PLECTOTROPIS, Mart.
squamulifera, Mdff.

Genus HELICOSTYLA, Fer.

Section GORASTA, Alb.
samboanga, H. and J.
= aegrota v. zonata, Smith.

2. BILATAN.

Genus LAMPROCYSTIS, Pfr.
myops, Dohrn.Genus TROCHOMORPHA, Alb.
metcalfei, Pfr.Genus AMPHIDROMUS, Alb.
roeseleri, Mdff.
= maculiferus, v. Smith.Genus HELICOSTYLA, Fer.
Section HYPELOSTYLA, Mart.
camelopardalis, v. boholensis,
Brod.

3. TAWI-TAWI.

Genus MACROCHLAMYS, Bens.
angulata, Mdff.Genus TROCHOMORPHA, Alb.
metcalfei, Pfr.

4. BONGAO.

Genus TROCHONANINA, Mouss.
conicoides, Mete.
sylvana D. and S.
bongaoensis, Smith.Genus MACROCHLAMYS, Beus.
angulata, Mdff.Genus MICROCYSTINA, Mörch.
pseudosuccinea, Mdff.
gemma, Mdff.Genus TROCHOMORPHA, Alb.
metcalfei, Pfr.Genus PLECTOTROPIS, Mart.
squamulifera, Mdff.

5. SULU ISLAND.

Genus MACROCHLAMYS, Bens.
angulata v. dimidiata, Mdff.Genus TROCHOMORPHA, Alb.
sylvana, S. and D.Genus OBBA, Beck.
marginata, Müll.
v. nana, Mdff.Genus CHLORITIS, Beck.
Section TRICHOCHLORITIS, Pils.
suluana, Mdff.Genus AMPHIDROMUS, Alb.
roeseleri, Mdff.

h. LABUAN.

Genus TROCHONANINA, Mouss.
labuanensis, Pfr.
conicoides, Mete.Genus XESTA, Alb.
decrespignyi, Higg.
v. pallide-fasciata, G.-A.Genus EVERETTIA, G.-A.
juvunda, Pfr.
consul, Pfr.Genus HEMIPLECTA, Alb.
densa, v. ignobilis, Mart.
v. lowiana, Mart.Genus DYAKIA, G.-A.
hugonis, Pfr.Genus KALIELLA, W. T. Blanf.
doliolum, Pfr.
= Sitala orchis, G.-A.Genus TROCHOMORPHA, Alb.
planorbis v. lessoni, Mart.
ceroconus, Pfr.Genus CHLORITIS, Beck.
Section TRICHOCHLORITIS, Pils.
tomentosa, Pfr.
plena, G.-A.Genus AMPHIDROMUS, Alb.
adamsi v. hamata, Fult.Genus PLECTOTROPIS, Mart.
pudica, G.-A.

i. TIGA.

Genus EVERETTIA, G.-A.

jucunda, G.-A.

Genus LAMPROCYSTIS, Pfr.

chlororaphe, Smith.

Genus GANESSELLA, W. T. Blauf.

tigaensis, G.-A.

j. KAREMON (OR KARAMON).

Genus EVERETTIA, G.-A.

consul v. rufa, G.-A.

Genus CHLORITIS, Beck.

Section TRICHOCHELORITIS, Pils.

tomentosa, Pfr. banded var. G.-A.

k. PULO LANT.

Genus DYAKIA, G.-A.

amphidroma v. mackensiana,

Mart.

mindaiensis, Beck.

Genus PARMARION, H. P. Fisch.

dohertyi, G.-A.

l. NATUNA GROUP.

I. GREAT NATUNA (OR Bunguran).

Genus TROCHONANINA, Mouss.

affinis, Smith.

bunguranensis, Smith.

Genus EVERETTIA, G.-A.

cinnamomea, Val.

Genus MICROCYSTINA, Mörch.

bunguranensis, Smith.

Genus HEMPLECTA, Alb.

humphreysiana, Lea.

Genus DYAKIA, G.-A.

hugonis, Pfr.

Genus SIPALA, H. Ad.

carinifera, Stol.

baritensis, Smith.

Genus TROCHOMORPHA, Alb.

natunensis, Smith.

Genus ENDODONTA, Alb.

Sub-genus CHAROPA, Alb.

perseulpta, Smith.

Genus AMPHIDROMUS, Alb.

aureus v. natunensis Fult.

2. SIRHASSEN.

Genus TROCHONANINA, Mouss.

affinis, Smith.

Genus EVERETTIA, G.-A.

cinnamomea, Val.

Genus HEMPLECTA, Alb.

humphreysiana, Lea.

Genus SIPALA, H. Ad.

sirhasseensis, Smith.

Genus TROCHOMORPHA, Alb.

natunensis, Smith.

To be concluded.

ON A NEW GENUS AND SPECIES OF THE FAMILY PHENACOHELICIDAE.

By HENRY SUTER.

(Plate iv.)

Ranfuriya constanceae, gen. et sp. nov.

Pl. iv, figs. 1-5.

Spirit Specimen : Animal (Figs. 1-2) limaciform, minute, black all over, with a subcentral visceral hump, the greater part of the viscera protected by a shell, which in turn is partly covered by the mantle. Most likely in the living animal the mantle covers the whole of the shell. All the tentacles are retracted. Neck, sides, and tail rugose, three longitudinal grooves on the neck; mantle smooth, minutely punctured. Sole un-

divided, with slight transverse rugae, separated from the foot by a double pedal line. Genital orifice behind the right tentacles; pulmonary orifice on the right anterior side of the mantle, ending in a short distal slit; anal orifice on the right side just below the middle of the visceral hump. Tail rounded, with a caudal pore.

Total length 6, height 3, height of neck 1.75 millim.

Visceral hump: length 4.5, height 2, breadth 2.5 millim.

Breadth of sole 1.5 millim.

Shell (Fig. 3) auriform, yellowish-horny, flexible, membranaceous, transparent, with a notch on the right posterior side; one whorl only, with microscopical distant lines of growth.

Length 2.75, breadth 1.6 millim.

Jaw (Fig. 4) arcuate, delicate, composed of 15 very thin vertical laminae, all of which are separated from one another.

Radula (Fig. 5) elongated tongue-shaped, consisting of about 150 straight transverse rows of teeth, the formula being 13-7-1-7-13. The last marginal tooth is a minute plate with a rudimentary denticle; in the two following teeth the denticles still coalesce, but show beginning division. The base of attachment in most of the marginals is much broader than high. On the 17th tooth the division into distinct teeth begins; the ectocone is always smallest, sometimes bidentate, the mesocone is the stoutest, and the entocone is more slender, and slightly directed towards the centre of the radula. A few quadrate transition teeth occur between the marginal and lateral teeth, on which the ectocone is minute, the mesocone large, reaching to the posterior margin of the base, and the entocone about twice the size of the ectocone. The laterals have a square base, higher than broad, and are tricuspoid. The mesodont reaches a little beyond the posterior margin of the base, the side-cusps are short and with minute cutting points. The central tooth is exactly like the mesial laterals.

On dissecting the minute animal, I found it to be in a rather bad condition for the purpose, but I fully satisfied myself that it was immature. I hope that further search for this slug will provide adult specimens, when the anatomy can be properly worked out.

Hab.—Auckland Islands, where it was found by Lady Constance Knox, who handed it over to the Hon. H. C. Butler, and by whom it was given to Capt. F. W. Hutton. The latter, with his usual kindness and liberality, kindly sent me the unique specimen for description, for which my best thanks are due to him.

The genus is named, by kind permission, in honour of his Excellency the Earl of Ranfurly, K.C.M.G., etc., Governor of New Zealand, and the species in honour of his Excellency's daughter, Lady Constance Knox.

According to the facts brought forward, there can be no doubt about the systematic position of this slug; the presence of a caudal pore, the

jaw composed of numerous laminae, and the characters of the teeth of the radula clearly prove that it must be included in the family *Phenacohelminidae*.

Ranfuryla stands in the same relation to *Flammulina*, as *Schizoglossa* does to *Paryphanta*.

Type in my collection.

New Zealand, Auckland, May, 1903.

EXPLANATION OF PLATE IV.

Fig. 1, 2.	<i>Ranfuryla constanceae</i> .	Animal, magnified 10 times.
Fig. 3.	" "	Shell " " "
Fig. 4.	" "	Jaw, greatly magnified.
Fig. 5.	" "	Teeth of radula, magnified 720 times.

DESCRIPTIONS OF NEW LAND SHELLS FROM THE AUSTRO-MALAYAN REGION.

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

Illustrations of the species herein described will be given later. All the "types," except that of *Helicina varians*, which is in my collection, are in the British Museum.

Xesta sulcatula, n.sp.

Shell depressed-conoid, thin, narrowly perforate; sculpture microscopic spiral lines above and below, crossing the faint lines of growth. Colour yellowish-green, slightly paler above, with a chestnut line above the suture. Whorls 5, plano-convex, regularly increasing. Mouth lunate; lip thin except for a slight reflexion at its columellar junction, a very thin callus joining the margins.

Alt. 14; diam. max. 22.5 millim.

Hab.—Obi.

Planispira (Cristigibba) albopieta, n.sp.

Shell openly umbilicated, planorbiform, with the spire a little sunken in the middle, thin, translucent, light brown above, and generally paler below, with a dark zone at the periphery, a white zone just below, and several other white zones (generally interrupted) both above and below; the colour pattern does not pass the constriction behind the lip. Whorls $4\frac{1}{2}$, regularly increasing, with a well-marked suture, the last whorl descending, with a well-marked "crest" and corresponding depression behind the lip. Mouth ovate, somewhat oblique, with the lip white, expanded and reflexed.

Alt. 8.5; diam. max. 19 millim.



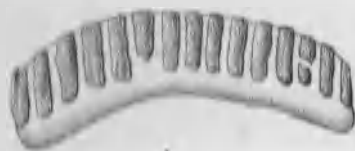
1.



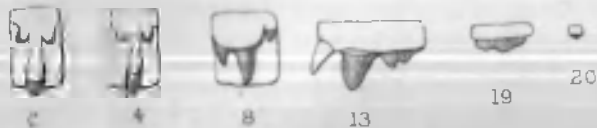
3.



2.



4.



5.

Hab.—*Halmahera*; a more polished and shining form from Obi. Noteworthy for its colour pattern, consisting of a dark brown peripheral band, and the other white zones, which are usually interrupted.

***Papuina callosa*, n. sp.**

Shell trochiform, yellow-brown, either unicolorous or with a dark chestnut band at the periphery and below the suture on the last whorl, this colouring also being exhibited by the somewhat mamillate protoconch; sculpture well-marked lines of growth and minute granulations, the protoconch having faint radiating striae. Whorls $5\frac{1}{2}$, flattened, the last whorl descending a little, being flattened on the base, acutely keeled at the periphery, and somewhat compressed behind the mouth. Mouth sub-quadrate, the lip reflected and expanded, especially on the lower and columellar margins, where it is thickened also internally, and the columellar margin is furnished (generally) with a broad flattened callosity; the lower margin is slightly impressed from below, producing the effect of an obscure denticle in the middle. The lip is well expanded over the umbilical region, and is purplish-brown in colour, becoming darker at the edges.

Alt. 16.5; diam. max. 27 millim.

Hab.—*Halmahera*.

***Papuina wallaceana*, n. sp. (*P. aurora* var. b.)**

Shell large, thin, depressed-conoid, moderately umbilicate, the umbilicus being partly concealed by the reflected columellar margin of the lip; slightly compressed on the base; sculpture consisting only of lines of growth, which give a roughened appearance to the shell; protoconch sandi. Colour yellow-brown, with (in the type) six narrow blackish-chestnut bands, one at the periphery, two above, and three below; other specimens lack the bands of colour. Whorls $5\frac{1}{2}$, slightly convex, with the suture well marked, last whorl a little descending. Mouth sub-ovate, with a weak peristome, which is reflexed, expanded, and slightly thickened, especially below; columellar margin well reflected over the umbilicus.

Alt. 21; diam. max. 36 millim.

Hab.—*Waigiou*.

Recalling in colour of shell and lip the unlocalised *P. pennantiana*, but lacks the acute carination of that species; in shape it resembles a depressed *P. multizona*! much larger than *P. aurora*.

***Papuina pyrgus*, n. sp.**

Shell perforate, the perforation being nearly covered by the reflexed columellar lip, solid, conical; sculpture, well-marked lines of growth; colour olivaceous; spire moderately elongated; protoconch large and smooth. Whorls 7, plano-convex, a trifle concave above the sutures, the last whorl not descending, acutely keeled, with the base flattened. Aper-

ture sub-triangular, with the peristome well expanded and reflexed, white, the outer margin sinuous, the basal margin slightly arched, and the columellar margin reflexed over the umbilical region, and furnished with a small tooth.

Alt. 30; diam. max. 35.5 millim.

Hab.—Waigiou.

Nearly related to *P. turris*, H. Ad., but more depressed, the cone not being so acute angled.

Leptopoma diplochilus, n.sp.

Shell very similar in shape to a somewhat depressed form of *L. vitreum*, and densely, microscopically, spirally striated. Colour pale lilac, with narrow darker spiral lines (fourteen on the last whorl). Lip double, the outer portion very largely expanded and flattened, with thin edges, sinuate on the columellar margin; the inner portion strongly projected forward, slightly on the inner, but largely on the outer margin, where it projects 2.5 millim.

Alt. 14; diam. max. 15 millim.

Hab.—Waigiou.

This remarkable shell is unlike any other species of *Leptopoma* known to me, owing to the presence of a double lip, with the "inner tube" strongly drawn out, and recalling some forms of *Cyclophorus*.

Leptopoma (Leucoptychia) lamellatum, n.sp.

Shell moderately umbilicated, thin, pellucid, turbinate, white, either plain or flocked with red, or white on the last whorl with red upper whorls, or banded (in one specimen) with dark brown. Protoconch moderately sharp; sculpture spiral lirae, on the last whorl there is one at the periphery and five above; microscopic spiral striation is also present; the last half of the last whorl is marked by about twelve strong lamellae, stronger than and cutting the spiral lirae. Whorls 5½, moderately convex. Mouth rounded, with the lip thickened and reflected, white, continuous. Operculum thin, horny, multispiral.

Alt. 16; diam. max. 16 millim.

Hab.—Waigiou.

Closely related to *L. scalare*, Ad., but much larger and slightly more depressed. Some specimens are larger than the actual type.

Palaina ponsonbyi, n.sp.

Shell ovate-conic, rimate, white, faintly tinted with yellow; protoconch moderately blunt and smooth, the other whorls densely sculptured with closely-set irregular lirae; those on the last whorl being far more distant than the others. Suture well impressed. Whorls 7, convex, the penultimate the broadest, and the last whorl being compressed and slightly flat-

tened above the junction with the peristome. Mouth nearly round; lip double, the outer portion being moderately expanded, except where the adnate peristome joins the last whorl.

Alt. 4.8; diam. max. 2.2 millim.

Hab.—Waigiou.

Omphalotropis waigiouensis, n.sp.

Shell ovately conic, thin, rimate; sculpture closely set fine lines of growth; protoconch blunt. Colour white or pale yellow. Whorls $5\frac{1}{2}$, convex, suture well impressed, the last whorl measuring nearly $\frac{1}{2}$ of the altitude of the shell. Mouth ovate, lip slightly incrassate and reflexed in the umbilical region, with a light callus joining the margins.

Alt. 4.8; diam. max. 3.3. millim.

Hab.—Waigiou.

Recalling, in form, *O. granum*, Pfr.

Helicina varians, n.sp.

Shell thin, depressed conoid; sculpture none except closely set lines of growth. Colour in the type specimen yellow, with a reddish-brown band above the periphery; other specimens are uniform yellow, without any banding; or with radiating red-brown streaks, with or without banding, and varying ground colour. Whorls $4\frac{1}{2}$, flattened but slightly convex, periphery acutely keeled. Mouth triangular, lip white, lightly reflexed, and subdentate near the junction of the lower margin with the body whorl; a light callus joins the margins.

Alt. 7; diam. max. 11 millim.

Hab.—Santa Cruz Islands.

Belonging to the group of *H. suprafasciata*, but lacks the spiral sculpture on the upper surface.

NOTES.

A New Irish Vertigo.—The occurrence of a living example of *Vertigo heldi*, Clessin, near Ballintoy, Co. Antrim, is recorded by Mr. B. Tomlin (Irish Nat., 1903, vol. xii, p. 110). Dr. Boettger, who has seen the specimen, considers *V. heldi* as a sub-species of *V. alpestris*. It differs, however, from this latter species in the possession of an additional whorl, and general larger dimensions, it is reddish-brown in colour, has a feeble dentition, and a differently shaped mouth.

CURRENT LITERATURE.

Pilsbry, Henry A.—Tryon's Manual of Conchology, ser. ii, vol. xv. (pt. 59), pp. 129-208, pl. 34a-55. Philadelphia: Academy of Natural Sciences.

Dr. Pilsbry continues the list of species of *Urocoptis* of Jamaica. Following this the undermentioned subgenera and sections are dealt with, viz.,

Sub-genus *Autocoptis*, Pils., dealing with the Haitian forms. Type *U. monilifera*, Pfr. Sub-genus *Arangia*, Pils. & Van. Type *U. sowerbyana* Pfr. The variety *montetoronis* is new. Sub-genus *Idiostenma*, Pils. and Van. Type *U. uncata*, Gundl. Section *Muceo*, P. and V. Type and sole species *U. interrupta*, Gundl. Sub-genus *Gochlodinella*, P. and V. Type *U. poeyana*, Orb. The variety *larteeftua* from Cuba, is new. Sub-genus *Gomgyllostoma*, Albers. Type *U. elegans*, Pfr. A key to the following sections is then given: *Fibricutis*, Pils., *Sectilumen*, P. and V., *Esocara*, P. and V., *Pycnoptychia*, P. and V., *Paracallonia*, Pils., *Callonia*, Cr. and Fisch., *Liocalonia*, Pils. *U. humboldtiana*, Pfr. variety *peraffinis* is a new variety from Western Cuba. It is similar to *U. humboldtiana*, but somewhat more solid, less shining, and the striae are widely spaced, especially on the spire. *U. oligomexus* is a new species from Cuba. It is near to *U. saxosa*, Poey, but differs from that species chiefly by the much reduced median axial lamella.

Blanford, W. T.—Notes on Mr. W. M. Daly's collections of Land and Fresh-water Mollusca from Siam. Proc. Malac. Soc. Lond., 1903, vol. v, pp. 274-284, pl. viii.

Dr. Blanford enumerates forty species of which the following are new, *Ampullaria dalyi*, *Melania binodosa*, and *Paludomus siamensis*.

Kobelt, W. and Mollendorff, O. von.—Catalog der Familie *Bulimnidae*. Nachr. d. Deutsch. Malak. Gesell., 1903, pp. 36-66.

Dimon, A. C.—Quantitative study of the effect of Environment upon the forms of *Nassa obsoleta* and *trivittata* from Cold Spring Harbour, Long Island. Biometrika, 1902, vol. ii, pp. 24-43.

The authoress has studied in some detail the variation and correlation of these two species of *Nassa*. She discusses the influence of density and stillness of the water on depauperization.

Hoyle, W. E.—Notes on the Type Specimen of *Lobigo oblianae*. Ball. Mem. and Proc. Manchester Lit. and Phil. Soc., 1903, vol. 47, No. 9, pp. 10, 1 pl.

A result of an examination of the type of this Cephalopod, described by Robert Ball in 1841, Mr. Hoyle confirms the opinion, which had been formed by others as well as himself, that this species is not distinguishable from the *Todaropsis veranyi* of Girard. The distinctive characters of the genus are given, and of the Irish specimen as fully as its state of preservation permits, accompanied by figures of some of the more critical parts, also a table of the synonymy, with references to the descriptions and figures.

Pace, S.—On the Anatomy of the Prosobranch genus *Pontiothauma*, E. A. Smith. Journ. Linn. Soc. (Zool.), 1903, vol. xxviii, pp. 455-462, pl. 42.

From an examination of the type specimens of this genus, Mr. Pace concludes that the affinities are with the *Mangilinae*; but so little is known as

to the anatomy of other allied forms, that at present it is impossible to assign the two known species of *Pontiothauma* to any precise position in the sub-family. It would, however, appear that their nearest allies are *Pleurotomella*, Verrill, and *Spergo*, Dall. The author is of opinion that the structure of the soft parts of *P. abyssicola*, E. A. Sm., justify its removal from the genus, but before proposing another new name, thinks it advisable to wait until further details are forthcoming regarding *Pleurotomella*, etc. It seems a great pity that a valuable morphological paper, such as this, could not have been better illustrated. -

Marshall, J. T.—Additions to "British Conchology." Part VII. Pp. 59. Torquay: 1903.

This paper is a continuation of the series of papers which, under this title, have been appearing since October, 1893, in the Journal of Conchology. The author details numerous interesting facts and observations upon the distribution, size, nomenclature, and variation of the British marine mollusca. The following varieties are described as new:—*Cerithiopsis barleci*, Jeffr., var. *interrupta*, *Clathrella anceps*, Eichw., var. *soluta*, *C. linearis*, Mont., var. *minor*, *Pleurotoma brachystoma*, Phil., var. *alba*, *Pholas candida*, var. *cylindracea* and *Lacuna pallidula* var. *imperfurata*.

Glamann, G.—Anatomisch-systematische Beiträge zur Kenntniss der Tracheopulmonaten. Zool. Jahrb. (Abth. f. Morph.), 1903, Bd. 17, pp. 679—762, Tafn. 29—34.

Dr. Glamann gives a detailed account of the anatomy of *Aneitella virgata*, E. A. Sm., and compares the genus with other Tracheopulmonata, so far as their internal structure is known. The kidney of *Aneitella* is dealt with in great detail, and compared with that in *Aneitea*.

Walker, Bryant and Pilsbry, H. A.—The Mollusca of the Mt. Mitchell Region, North Carolina. Proc. Acad. Nat. Sci. Phila., 1902, pp. 413—442, pls. xxiv, xxv.

This is a report based upon material collected in the summer of 1901. The expedition was undertaken primarily for the purpose of exploring Mt. Mitchell, the highest peak of the Appalachian range, with an altitude of 6,711 feet, of whose fauna nothing was known except a few species collected by Hemphill in a hurried visit nearly twenty years ago. In all 59 species or sub-species are recorded, of which the following are new: *Polygyra tridentata* v. *tennesseensis*, *P. andrewsae* subsp. *intermedia*, *Vitrea approxima*, *V. vanattui*, *Gastrodonta gularis* subsp. *theloides* and *decussata* (Pils. and Van.). The only species peculiar to Mt. Mitchell, re-discovered on the present expedition, seems to be the rare little *Vitrea clingmani*, Dall.

Pallary, P.—Appert à la faune malacologique de l'Arabie et de l'Égypte. Bull. de l'Inst. Égyptien, 1901, pp. 1—8, pl.

The following new species are described and figured: *Leucochroa arabica*, *Helix (Eremina) fourtaui*, *Limnæa sikenbergeri*, *Valvata innesi*, and *Pseudamnicola sinaica*.

Pallary, P.—Mollusques recueillis par le Dr. Innes Bey dans le Haut-Nil. Ibid., 1902, pp. 1—14, pls. i, ii.

The author records twenty-four species, of which the following are new: *Lanistes innesi*, *Corbicula artini*, *Unio fourtaui*, *Spathella fourtaui*, and *Spatha innesi*.

Pilsbry, Henry A.—The Land Mollusca from Japan and the Bonin Islands.

Proc. Acad. Nat. Sci. Phila., 1902, pp. 25—32.

Dr. Pilsbry has in preparation a monographic account of the non-marine mollusca of the Bonin Islands, in which the undermentioned species will be figured; in the meantime it is thought desirable to publish brief notices of Mr. Nakada's discoveries (who is still collecting there). Of the genus *Helicina*, Lam., the following new species are indicated: *H. capsula*, *H. ogosawarana*, *H. hirasei*, *H. yoshiwaruna* and vars. *arata* and *microtheca*. Descriptions are given of *Alycaeus bisacisus* from Suimura, *Cyclophorus kikuiensis* from Osumi, *Diplommatina kiiensis* and *pubica* from Kii, and *Kaliella ogosawarana* and *Nesopupa dedecora* from Hahajima. A new sub-genus of *Hirasea*, Pils., is described under the name of *Fametesta*, with *H. mirabilis*, n. sp., from Hahajima, as the type. *H. operculina*, Gld., from Pecl Island, is also included in this sub-genus.

Pilsbry, Henry A.—Revision of Japanese *Viviparidae*, with Notes on *Melania* and *Bithynia*. Ibid., pp. 115—121, pl. ix.

"The *Viviparidae* of Japan, so far as their appearance in the field of literature is concerned, are involved in mind-destroying chaos," writes the author of this paper, in whose opinion there are four Japanese species, viz., *V. malleatus*, Rve., of which *V. taeta*, v. Mts., is perhaps only a form, in which case, the name has priority; *V. japonicus*, v. Mts., and var. nov. *iwakawa*; *V. histricus*, Gld.; and *V. sclateri*, Ffld. Possibly this last species is only a variety of *V. histricus*.

Professor Pilsbry is of opinion that *V. oxytropis*, Bens., *V. ingallsiana*, Lea non Rve., and *V. stelmaphora*, Bgt., do not occur in Japan.

The following new varieties are also described: *Melania reiniana* v. *hidakiensis* and *M. libertina* v. *latifusus*. Figures are given of the four Japanese *Viviparidae*, the new varieties, and of *Bithynia striatula* v. *japonica*, Pils.

Pilsbry, Henry A.—On the Localities of A. Adams' Japanese *Helicidae*. Ibid., pp. 233—240.

Pilsbry, Henry A.—Additions to the Japanese Land Snail Fauna. Nos. VI, VII. Ibid., pp. 360—382, pls. xvii, xviii, xix—xxi; pp. 517—533, pls. xxvii, xxviii.

Detailed descriptions are here given of species briefly defined in the author's Catalogue of the *Clausilidae* of the Japanese Empire, and of the following new species, etc.: *Cl. ducalis* v. *decapitata*, *C. heteroptyx*, *C. subulina* v. *leucopeas*, *C. caryostoma* v. *juyi*, *C. graciae*, *C. pigra*, *C. agna*, *C. caloptyx*, *C. daemonorum*, *C. pachyspira*, *C. kurozuensis*, *C. platyptyx*, *C. subaculus*, *C. ueniopsis*, and other new varieties. A list of additions and corrections to the above mentioned Catalogue concludes number vii.

Pilsbry, Henry A.—South-western Land Snails. Ibid., pp. 510—512.

Pilsbry, Henry A.—New Land Mollusca from Idaho. Ibid., p. 593.
Pristiloma idahoense, n. sp.

Reiss, O. M.—Das Ligament der Bivalven. Morphologie seines Ansatzfeldes seine Wirkung, Abstammung zum Schalenwachsthum. Jahr. Ver. fur Vaterl. Naturk. in Wurt., 1902, Bd. lviii, pp. 179—291, pls. ii—v.

Matheron, P.—Note sur les Mollusques Fossiles des Gisements Carbonifères du midi de la France. Ann. Mus. d'Hist. Nat. Marseille.—Geologie, 1902, T. vii, pp. 9—22.

Repelin, J.—Description des Faunes et des Gisements du Cénomanién Saumâtre ou d'eau douce du midi de la France. II. Mollusques. Ann., Mus. d'Hist. Nat. Marseille.—Geologie, 1902, T. vii, pp. 42—112, pls. i—vii.

The author enumerates 95 species, of these 16 are not named, and 58 are described and figured as new. A new genus of *Ampullariidae*, termed *Ampullopsis* (*A. faujasi*, de Serres, type.) is also described.

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The new species are *Oleacina (Salasiella) fossilis*, *Archaeozonites conicus*, *Hyalinia (Polita) miocaenica*, *H. (Gyalina) roemeri*, n. subgen., *H. (Vitrea) procrystallina*, *Strobilus botteri*, *Pleurodonte (Galactochilus) silesiaca*, *Azecca frechi*, *Coryna oppolienensis* and var. *turrata*, *Leucochilus ferdinandi*, *Planorbis (Gyrorbis) gurichi*, *Adelopoma martensi*, and unnamed species of many other genera.

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Ancel, P.—Sur l'hermaphroditisme glandulaire accidentel et le déterminisme cyto-sexuel des gamètes. *Ibid.*, pp. lxxxiv—xciv.

- Lacaze-Duthiers, H. de.**—Morphologie de *Tridacna elongata* et de *Hippopus*.
Arch. de Zool. exp. et gen., 1902 (3 ser.), T. x, pp. 19—212, pls. v—x.
- Boutan, L.**—La Detorsion chez les Gastéropodes. Ibid., pp. 241—268,
pl. xi.
-

EDITORS' NOTES.

We have to thank many of our subscribers, both at home and abroad, for their kind congratulations and expressions of goodwill on the appearance of the first part of another volume.

The collection of Mollusca made by the late Dr. Francis Archer, of Liverpool, and his son, the late Surgeon-Colonel Archer, has recently been presented to the University of Birmingham.

We understand that the well-known J. T. Marshall Collection of British shells has passed into the hands of Mr. J. R. Brockton Tomlin, of Chester.

Messrs. Sowerby & Fulton have favoured us with a copy of their latest (April, 1903) Catalogue of Cephalopoda, Pteropoda, Gastropoda (Marine and Freshwater), and Scaphopoda, enumerating nearly 4,000 species. As in their previous catalogues, the names are printed in double columns, with wide margins each side, so that it may serve as a check-list also. Museum curators and collectors generally will find it both of use and value.

THE
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No. 3.

OCTOBER 20th, 1903.

VOL. X.

DESCRIPTIONS OF NEW SPECIES OF NASSA,
PURPURA, LATIRUS, VOLUTA, CONUS, STOMATELLA
AND SPONDYLUS.

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

(Plate v.)

Nassa optima, n.sp.

Pl. v, figs. 1, 2.

Testa ovato-acuminata, crassa, polita, cinerea, albo unilasciata; spira elata, acuta; anfractus 8, primi $1\frac{1}{2}$ laeves, sequentes planato convexi, costis numerosis crassis leviter obliquis superne nodulosis instructi, sulcis interruptis brevibus paucis spiraliter sculpti, sutura breviter canaliculata sejuncti: penultimus magis convexus, costis evanidis; ultimus $\frac{2}{3}$ longitudinis testae aequans, ventricosus, laevis, superne nodulis inaequalibus paulo elevatis coronatus, basin versus liratus, canaliculatus, rostro brevissimo obliquo acutimarginato; apertura latiuscula, lamina columellari callosa, expansa, intus corrugata, supra uniplicata, peristoma ad marginem acutum, extus late plicato varicosum, intus liratum; canalis anticus latiusculus, recurvus, posticus brevis.

Long. 25. diam. 15 millim.

Hab. —N.W. Australia.

A number of specimens of this interesting species were received from Mr. Bernard H. Woodward, of the West Australian Museum. Compared with *N. coronata*, Brug., the body whorl is much shorter, the spire longer and more acute, the upper whorls being more closely and distinctly plicate; elevation is only faintly indicated.

Purpura eudeli, n.sp.

Pl. v, fig. 3.

Testa ovata, depressiuscula, rugosissima, fuscescens; spira brevis; anfractus $3\frac{1}{2}$ rapide accrescenti, primi $1\frac{1}{2}$ minuti laeves, penultimus convexus, iris 4 spiralibus multituberculatis instructus; sutura concava excavata; anfractus ultimus magnus, longitudinaliter rugose lamellosus transversim octo-costatus, nodulis numerosis elevatis rugosis oblique inclinatis ad marginem concavo productis munitus; apertura ampla, intus coeruleo-cinerea, fusco fasciata, ad marginem nigro-fusco limbata; columella concava depressa, glabra, luteola, macula fusca elliptica superne picta.

Long. 30, diam. 21 millim.

Hab.—Gorée, West Africa (Eudel).

Several specimens of this remarkable *Purpura* in the collection of the late Captain Eudel were labelled *P. grayi*, Kiener, to which it bears some slight external resemblance, but that is a *Monoceros* and was previously described by Dr. Gray under the name of *M. grande*. *P. eudeli* has more affinity with *P. patula*, Linn., but having compared it with many specimens of that species in various stages of growth I am convinced that it is perfectly distinct.

Latirus singularis, n.sp.

Pl. v, fig. 10.

Testa elongato-fusiformis, fusca, solidula; spira clato-pyramidata; anfractus 6, convexi, spiraliter lirati, longitudinaliter striato-laminati, primi 2 laeves, sequentes 3 longitudinaliter plicato-costati, penultimus angulatus, supra angulum leviter concavus, infra convexusculus; sutura angustissime canaliculata; anfractus ultimus $\frac{2}{3}$ longitudinis testa superans, angulata, supra angulum concavo depressa, infra leviter convexus, infra medium concavo attenuatus, ad basim late rostratus; umbilicus fere claudens; apertura oblonga, intus pallide lutescens, glabra; peristoma acutum, postice angulatum; columella leviter arcuata, laevis, infra medium obtusissime angulata, haud plicata; canalis latiusculus.

Long. 70, diam. 27 millim.

I am not acquainted with any species of *Latirus* at all resembling this. It appears to form a link between *Latirus* and *Hemifusus*, and may possibly find its place in the latter genus, although its form is more like that prevailing in the former.

Voluta dohrni, n.sp.

Pl. v, fig. 8.

—*Voluta dubia*, Dohrn: Jahrb. D. Mal. Gesell., 1879, vol. vi, pp. 150–156, pl. iv, figs. 1–3; non Broderip: Zool. Journ., vol. iii, p. 81, pl. 3, fig. 1.

The shell is of a rather solid substance, spirally striated throughout,

and has four very oblique plaits on the columella. It is undoubtedly the species figured and described by Dr. Dohrn as *Voluta dubia*, Brod., from which, however, it is perfectly distinct. Broderip's figure in the *Zoological Journal*, copied in the *Conchologia Iconica*, etc., represents a shell so different that it is strange that this species should have been mistaken for it. With the exception of its being spirally striated and somewhat similarly spotted, it differs in almost every respect, and notably in the absence of the remarkable bulb-shaped apex characteristic of *V. dubia*, and which has its counterpart in *Neptuneopsis gilchristi*, Sowerby. Another remarkable error concerns *Fusus tessellatus*, Schub. and Wagn., which has been placed by Kiener, Reeve and others, in the synonymy of *Voluta dubia*, and Dr. Dall describes and figures a shell which may well belong to the former species as representing the latter, but Kiener figures and describes as *Fusus tessellatus*, Schub. and Wagn., a much larger shell of a much more inflated growth and entirely destitute of columella plaits, which may, however, possibly be a full-grown specimen of that species. It is of a very thin, light substance, and does not at all resemble *V. dubia*.

To crown all this confusion Tryon seeks to unite all these forms with *Voluta junonia*, with which, in my opinion, they have scarcely any affinity.

I have come to the conclusion that there are four perfectly distinct species, namely:—

1. *VOLUTA JUNONIA*, Chemn. : *Conch. Cab.*, xi, pl. 177, fig. 1,704.
2. *VOLUTA DUBIA*, Brod. : *Zool. Journ.*, vol. iii, p. 81, plate iii, fig. 1.
= *Voluta junonia* var. *dubia*, Tryon : *Man. of Conch.*, vol. vi, p. 90, pl. 27, fig. 81.
= *Voluta (Aurinia) dubia*, H. and A. Adams : *Gen. Rec. Moll.*, vol. i, p. 166.
3. *VOLUTA TESSELLATA*, Schub. and Wagn.
= *Fusus tessellatus*, Schub. and Wagn. : *Conch. Cab.*, supp. 3,048.
= *Aurinia dubia*, Dall : *Rep. Blake Gastro. Bull. Mus. Comp. Zool.*, 1889, xviii, p. 151 ; *Proc. U.S. Nat. Mus.*, vol. xxiv, p. 504, pl. xxix, fig. 11. Non *Voluta dubia*, Brod.
? = *Fusus tessellatus*, Kiener : *Spec. Gen. et Icon. Coq. Viv.*, *Fusus*, p. 39, pl. xxix, fig. 1.
4. *VOLUTA DOHRNI*, Sowerby, n.sp.
= *Voluta dubia*, Dohrn : *Jahrb. D. Mul. Gesell.*, vol. vi, pp. 150-156, pl. iv, figs. 1-3. Non Brod.
= *Voluta junonia* var. *dubia* (pro parte), Tryon : *Man. of Conch.*, vol. vi, pl. 27, fig. 77.

***Voluta (Lyria) planicostata*, n.sp.**

Pl. v, fig. 7.

Testa oblongo-fusiformis, solidula, pallide lutescens, lineis numerosis transversis, pallide aurantiacis vittata ; spira clavo pyramidalis, convexius-

cula, ad apicem acuta; anfractus 9, primi 2 minuti, laeves, sequentes convexiusculi, longitudinaliter costati, aliter laeves, costis 12 mediocriter elevatis rotundatis; sutura anguste canaliculata; anfractus ultimus $\frac{3}{4}$ longitudinis testae aequans, convexus, infra attenuatus; costis latiusculis paulo elevatis; prope marginem magis elevatis; apertura elongata, mediocriter lata; peristoma laeve, leviter incrassata; columella rectiuscula, intus lirata, inaequaliter triplicata; lamina columellari latiuscula, extus conspicue fusco marginata.

Long. 53, diam. 22 millim.

Hab.—?

Compared with *V. delessertiana* the shell is more fusiform, smoother, with less numerous and less elevated ribs, and in place of the rich colouring of that species, it has a pale creamy hue, with numerous faint yellowish orange transverse lines. The strongest colour in the shell is found on the margin of the columellar lamina forming a dark brown streak.

The specimen as far as I know is unique, and I have no knowledge of its habitat. Although of pale colour it is in good preservation, and appears to be specifically distinct from its congeners.

***Conus boubeaeae*, n.sp.**

Pl. v, fig. 5.

Testa parva conico-subcylindracea, cinerascens, fusco variegata, lineis numerosis interruptis transversis fuscis albo articulatis picta; spira elatiuscula, planato conica; anfractus 7, primi 2-3 convexiusculi, deinde leviter concavi, ad marginem carinati, sutura canaliculata se juncti; anfractus ultimus subcylindricus, supra sub-acute angulatus, basim versus iratus; apertura angusta, antice latior, intus violaceo tincta.

Long. 16, diam. 8 millim.

Hab.—?

With the exception of the anterior transverse ridges, which are rather strong, the shell is smooth: of a grayish colour mottled with brown, and prettily marked with interrupted lines of brown and white.

On a recent visit to Paris I found several specimens of this interesting little species in the possession of Madame Roubée, after whom I have leisure in naming it.

***Stomatella exquisita*, n.sp.**

Pl. v, fig. 4.

Testa depressa orbicularis, tenuis, pallide luteola, strigis obliquis fuscis picta, liris numerosis inaequalibus instructa, oblique eximie laminato striata; spira depressa, ad apicem breviter elevata; anfractus 3, primus globulosus, albus, laevis, secundus lirato carinatus, ultimus superne depressus, bicarinatus, infra rotunde convexus, inaequaliter multiliratus; apertura lata, leviter obliqua, intus margaritacea; columella oblique arcuata, tenuiter callosa.

Lat. 12, alt. 7 millim.

Hab.—?

This species is somewhat like *S. notata*, A. Adams, but the shell is more angular, with two keels more prominent than the remaining lirae.

***Spondylus occidentans*, n.sp.**

Pl. v, fig. 9.

Testa suboblique ovata, crassa; valva superiori planato-convexa, luteola-aurantio-rufo sex-radiata, undique densissime adiatum lirata, liris brevis, sine et densissime muricatis; valva inferiori ventricosa, luteola, irregulariter squamosa.

Long. 60, lat. 49 millim.

Hab.—Philippines (specimen unique).

A remarkable species very densely imbricated, with minute scales, and two or three rows of somewhat larger ones. It is conspicuously coloured with six orange-red rays.

***Spondylus reeslanus*, n.sp.**

Pl. v, fig. 6.

Testa suborbicularis, depressiuscula, aurantiaca, ferrugineo-fusco prope umbonem variegata; undique multilirata, liris tenuissimis, densissime irregulariter aculeatim spinosis, liris principalibus 6, paulo magis elevatis, squamis erectis elongatis hic illic trifurcatim ramosis munitis; valva superiori planulata, inferiori convexiuscula.

Long. 55, lat. 53 millim.

Hab.—Moluccas (specimen unique).

This charming shell from the collection of the late Admiral van Rees, is most profusely imbricated with numerous rows of thin spines of unequal length, some of the principal ridges bearing long flattened three-forked scales.

DESCRIPTION OF PLATE V.

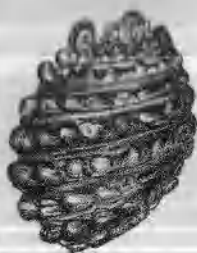
- Fig. 1, 2. *Nassa optima*, n.sp.
 Fig. 3. *Purpura eudeli*, n.sp.
 Fig. 4. *Stomatella exquisita*, n.sp.
 Fig. 5. *Conus bombææ*, n.sp.
 Fig. 6. *Spondylus reeslanus*, n.sp.
 Fig. 7. *Valuta planicostata*, n.sp.
 Fig. 8. *Voluta dohrni*, n.sp.
 Fig. 9. *Spondylus occidentans*, n.sp.
 Fig. 10. *Latirus singularis*, n.sp.



1.



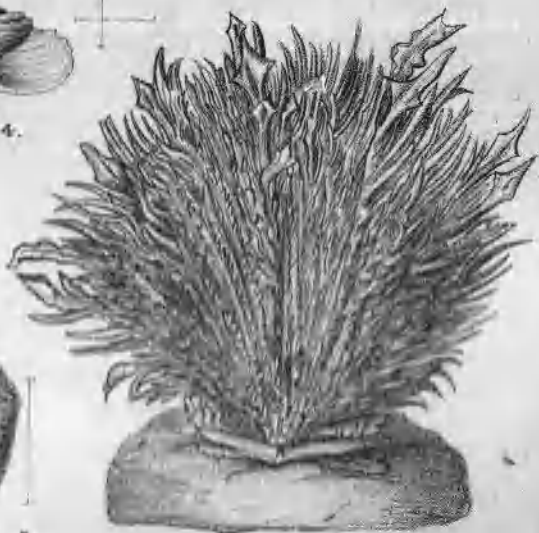
3.



2.



4.



6.



7.



5.



8.



9.



10.

G. B. S. del. ad nat.

Huth, Lith. London.

NEW MARINE SHELLS.

NOTES ON WITH ILLUSTRATIONS OF AUSTRO-MALAYAN LAND SHELLS.

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

(Plate vi.)

Recently (1) I described a few shells from the Austro-Malayan Region; illustrations of them are now given.

PAPUINA WALLACEANA.—For *P. aurora* var. h. at p. 65, read *P. aurora* var. ?.

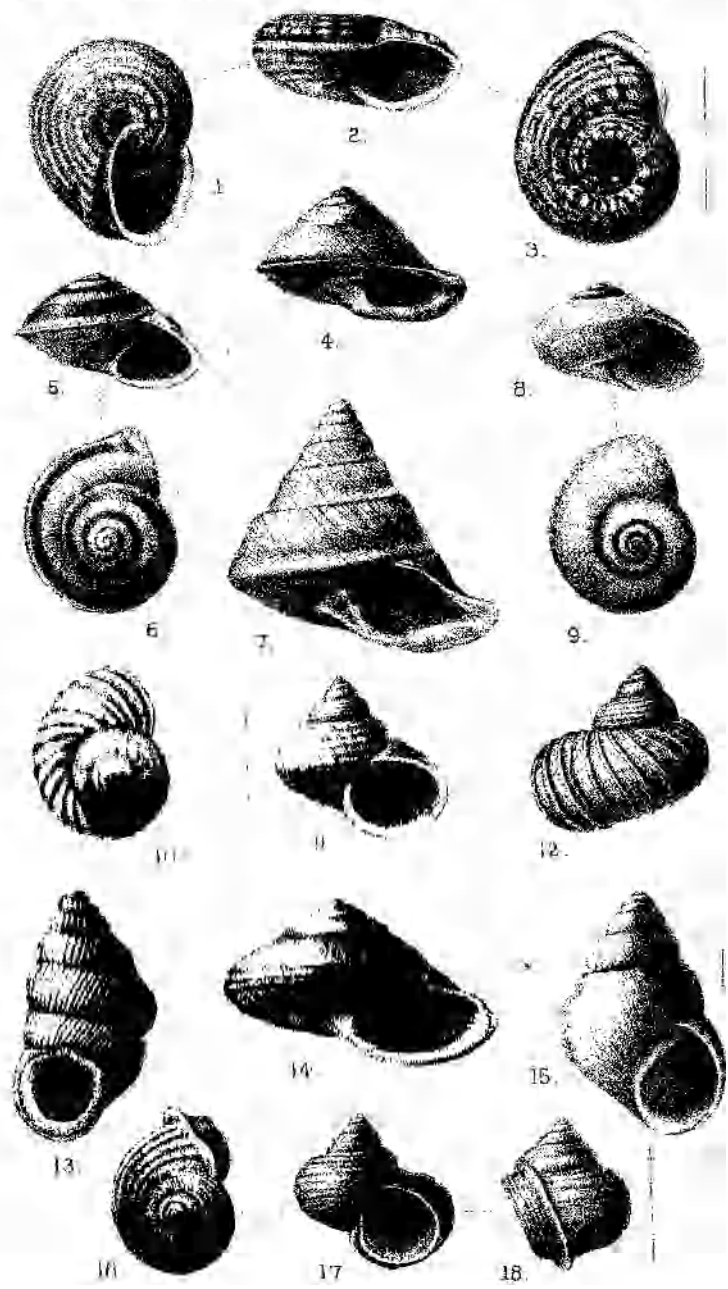
PAPUINA CALLOSA.—Compare *P. pseudolanceolata*, Dautz., which latter, if it prove to be identical, has a few days priority.

LEPTOPOMA LAMELLATUM.—There appears to be a good deal of confusion in this group. In my view it is probable that *L. tissotianum*, Crosse, *multilabre*, Lamk., and *scalare*, Adams, are all varying forms of one widely scattered species. Dr. Kobelt has in "Das Tierreich" placed the Lamarckian species as a monstrosity of *L. massenae*, a view which, taken though it has been by Pfeiffer and others, has been adversely, and I think correctly, criticised by Tapparone-Canefri.

It may be pointed out that the figures recently given in the "Conchylien-Cabinet," purporting to represent *L. scalare*, Adams, do not agree with Adams' figures, and are probably taken from a Halmahera species and not from the Waigiu shell.

EXPLANATION OF PLATE VI.

- Figs. 1-3. *Cristigibba albopicta*, Sykes.
Fig. 4. *Papuina callosa*, Sykes.
Figs. 5, 6. *Helicina varians*, Sykes.
Fig. 7. *Papuina pyrgus*, Sykes.
Figs. 8, 9. *Xesta sulcatula*, Sykes.
Figs. 10-12. *Leptopoma lamellatum*, Sykes.
Fig. 13. *Palaina ponsonbyi*, Sykes.
Fig. 14. *Papuina wallaceana*, Sykes.
Fig. 15. *Omphalotropis waigiouensis*, Sykes.
Figs. 16-18. *Leptopoma diplochilus*, Sykes.



FIGS 1-18

PLATE VI

CONTRIBUTIONS TO A KNOWLEDGE OF THE MOLLUSCA OF BORNEO.

(PART I*.)

BY WALTER E. COLLINGE, M.Sc.,
THE UNIVERSITY, BIRMINGHAM.

(Plates vii. and viii.)

In June, 1901, I gave a short account of a small collection of slug-like molluscs from N.W. Borneo⁽¹⁾ for which I was indebted to the kindness of Mr. R. Shelford, of the Sarawak Museum. Since then he has very kindly sent me two further collections, some of which form the subject of the present paper.

Damayantia, Issel.

Damayantia dilecta, Issel.

Damayantia dilecta, Issel: Moll. Born., 1874, p. 390, T. iv, figs. 4-6.

Hab.—Matang, 2,500 feet.

The two longitudinal median furrows mentioned by Issel (Moll. Born., p. 28), and which were not discernible in the specimens I have previously examined from Mt. Penrissen, are very clearly marked in these specimens. They are really a double row of median rugae, with deep sulci between, so that there are three grooves formed by the deep intervening sulci.

Damayantia simrothi, n.sp.

Pl. vii, figs. 1, 2.

Animal a slaty blue, with antero-lateral portions a bright yellow. Mantle smooth and completely covering the shell. The keels are yellowish and well developed on the lateral portions of the visceral mass. Head and tentacles slaty blue. The dorsum exhibits a sharp yellow keel which slopes downwards from behind the visceral mass posteriorly. The rugae are ill-defined excepting postero-laterally, where they are somewhat more distinct. Caudal mucous pore small. Peripodial groove indistinct. Foot-fringe bright yellow in anterior two-thirds, bluish in the posterior third; lines exceedingly faint. Foot-sole yellow, narrow, and divided into median and lateral planes.

* My best thanks are here tendered to the Council of the Birmingham Natural History and Philosophical Society, for their kindness in defraying the cost of the original drawings.

1. Trans. Roy. Soc. Edinb., 1901, vol. xl., pp. 295-312, Pls. 1-11.

Length (in alcohol) 24.5 millim.

Hab.—Kuching.

As yet I am unable to give any particulars of the internal structure of this species. Externally it differs from the type of the genus, *D. dilecta*, Issel, in its colour, in the comparative shorter length of the dorsum posterior to the visceral mass, and in the more pronounced keels on the mantle.

I have much pleasure in associating with the name of this new species that of Professor Heinrich Simroth.

***Damayantia rugosa*, n.sp.**

Pl. vii, figs. 8, 4.

Animal mauve or purplish-red in colour; the mantle is devoid of any lateral keels, but is marked by a series of small rugosities. The dorsum is bluntly keeled. Rugae indefinite. Caudal mucous pore and peripodial groove small. Foot-fringe deep, of a yellowish-brown colour. Foot-sole same colour, divided into median and lateral planes.¹

Length (in alcohol) 16 millim.

Hab.—Kuching.

***Wiegmannia*, Cllge.**

***Wiegmannia gigas*, Cllge.**

Wiegmannia gigas, Cllge.: Trans. Roy. Soc. Edinb., 1901, vol. xl, p. 300, pl. i, figs. 6-8; pl. ii, figs. 27, 28.

Hab.—Kuching. Two immature specimens.

***Collingea*, Simr.**

***Collingea eranna*, n.sp.**

Pl. vii, figs. 5, 6; Pl. viii, figs. 13, 14.

Animal a dirty yellow, speckled with light-brown postero-laterally; mantle same colour with darker brown markings. At each side of the head is a dark brownish-coloured band passing from beneath the mantle to the base of the upper tentacles. Dorsum keeled. Caudal mucous pore small. Rugae and peripodial groove indistinct. Foot-fringe same colour as body, no lincoles. Foot-sole a dirty white, not divided into median and lateral planes.

Length (in alcohol) 23.5 millim.

Shell thin, membranaceous, amber coloured, apex indistinct.

Diam. max. 11, min. 8.5 millim.

Hab.—Kuching.

The Generative Organs (Pl. viii, figs. 13, 14).—These differ from those of the four known species, in the elongated vagina and penis and

1. In my former paper, in the diagnosis of the genus, it was stated, in error, that the foot-sole was not divided into median and lateral planes.

the shorter dart gland and dart-sac. The penis protrudes from its sheath, at the distal end, and on the opposite side there is a small conical papilla distal to which the retractor muscle is inserted. Only a portion of the dart was present in the dart-sac, and this agrees in form with the proximal portion of that of *C. strubelli*, Simr.

Parmarion, P. Fisch.

Parmarion shelfordi, n.sp.

Pl. vii, figs. 7, 8; Pl. viii, figs. 15, 16.

Animal: the whole of the head, mantle and dorsum is blue, with the medio-lateral portions yellow, the lateral margins of the mantle are also yellow, and there is a prominent lateral keel on the mantle, encircling a little more than two-thirds of the visceral mass. The peripodial groove is distinct and rugae only faintly marked. Foot-fringe blue with deeply indented blotches of yellow. Foot-sole yellowish-brown, divided into median and lateral planes.

Length (in alcohol) 32 millim.

Shell thin, membranaceous, oval, with thinner, irregular border, apex indistinct.

Diam. max. 13, min. 8 millim.

Hab.—Kuching.

In my former paper I stated that possibly the genus *Parmarion*, sens. str., did not occur in Borneo, but there can be no question, I think, as to the generic position of the mollusc here described.

The Generative Organs (Pl. viii, figs. 15, 16).—These are characterised by the long free-oviduct, the form of the penis, the short vas deferens, and the form and shape of the dart. The penis has the beak-like distal portion, so characteristic of most species of the genus, and immediately below this is a collar-like sheath, while beyond, the organ becomes more globose. The vas deferens is very short, also the duct of the receptaculum seminis. The dart at its free end is somewhat flattened, with a sharp cutting edge at each side. Above the aperture leading into the cavity of the dart is a solid calcareous head. Passing downward the flattened form gradually disappears until it becomes oval (Pl. viii, fig. 16).

Phlomycus, Raf.

Phlomycus, sp.

From Matang there is a small slug belonging to this genus, which probably may prove to be only a variety of *P. bitineatus*, Bens. It is a bright yellow in colour, with irregular dark brown (almost black) spots and blotches. In alcohol the specimen measures 20 millim. in length.

I am not aware that the genus has hitherto been recorded from Borneo.

Atopos, Simr.**Atopos shelfordi, n.sp.**

Pl. vii, figs. 9-12.

Colour of the notum bluish-brown, with a dark, smooth stripe extending along the mid-dorsal line; the whole of the dorsum is finely granulated and spotted with yellow; underside (perinotum?) brown; foot-sole same colour. The keel of the notum is prominent. Length of notum (in alcohol) 64, breadth 11, height 12 millim. Breadth of foot-sole 6 millim. Female generative orifice 12.5 millim. from the male generative orifice.

Hab.—Mt. Penrissen, 4,800 ft., N.W. Borneo. One specimen.

The genus *Atopos* has not previously been recorded from Borneo.

As only a single specimen has been found I am unable to give more than a very brief description of the internal structure. Mr. Shelford has very kindly given me permission to open the animal, but naturally I have not cared to injure it more than was absolutely necessary to establish its specific distinctness. It differs from any known species in a number of points in the form of the alimentary canal and generative organs, the latter being very distinct. I have not given figures of either system, as the specimen examined is evidently not fully mature.

REFERENCE LETTERS.

<i>alb. gl.</i>	Albumen gland.	<i>p.</i>	Penis.
<i>d. gl.</i>	Dart gland.	<i>pr.</i>	Prostate.
<i>d. s.</i>	Dart-sac.	<i>r. d.</i>	Receptacular duct.
<i>f. ov.</i>	Free-oviduct.	<i>r. m.</i>	Retractor muscle.
<i>H.</i>	Portion of the penis protruding from its sheath.	<i>r. s.</i>	Receptaculum seminis.
<i>h. d.</i>	Hermaprodite duct.	<i>v.</i>	Vestibule.
<i>h. gl.</i>	Hermaprodite gland.	<i>v. d.</i>	Vas deferens.
<i>ov.</i>	Oviduct.	<i>v. g.</i>	Vagina.

EXPLANATION OF PLATES VII. AND VIII.

PLATE VII.

FIG. 1.	<i>Damayantia simrathii</i> , n.sp.	Right lateral view.	× 2.
FIG. 2.	" "	Dorsal view.	× 2.
FIG. 3.	<i>Damayantia rugosa</i> , n.sp.	Right lateral view.	× 2½.
FIG. 4.	" "	Dorsal view.	× 2½.
FIG. 5.	<i>Collingea cranna</i> , n.sp.	Right lateral view.	× 1½.
FIG. 6.	" "	Dorsal view.	× 1½.
FIG. 7.	<i>Formarion shelfordi</i> , n.sp.	Right lateral view.	× 1½.
FIG. 8.	" "	Dorsal view.	× 1½.
FIG. 9.	<i>Atopos shelfordi</i> , n.sp.	Right lateral view.	× 1.
FIG. 10.	" "	Dorsal view.	× 1.
FIG. 11.	" "	Ventral view.	× 1.
FIG. 12.	" "	Portion of the dorsum, highly magnified.	

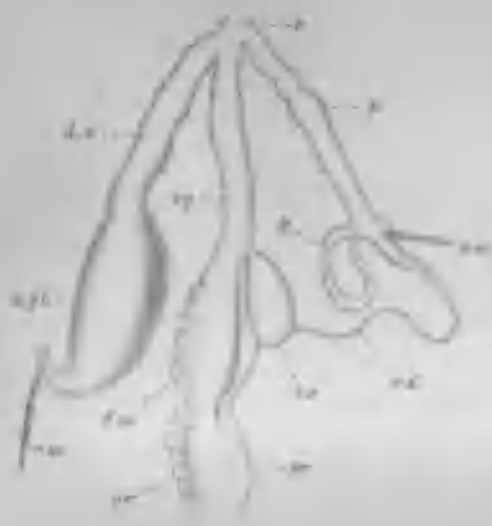
PLATE VIII.

FIG. 13.	<i>Collingea cranna</i> , n.sp.	Portion of the generative organs.
FIG. 14.	" "	Portion of the dart.
FIG. 15.	<i>Formarion shelfordi</i> , n.sp.	The generative organs.
FIG. 16.	" "	Dart. × 17.



Fig 1-8, M.F.F.
Fig 9-12, F.J.F.

Hugh, Lith. London.



13.



14.



15.



16.

W. C. C. 111 111 111

Both LITH. Tendons

A CLASSIFIED LIST OF THE HELICOID LAND SHELLS OF ASIA.

(PART VII. *)

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

F. CELEBES.

Family **Zonitidae.**

Sub-family **Arlophantinae.**

Genus **TROCHONANINA**, MOUSS.
celebesiana, Kob.

Genus **XESTA**, ALB.

cineta, Lea.

= *menadensis*, MOUSS.

v. *mongondica*, Sar.

v. *limbifera*, Mart.

wallacei, Pfr.

v. *biangulata*, Mart.

cidaris, Lam.

balantensis, Kob.

trochus, MÜLL.

= *sulphurea*, Reeve.

-- *circumpicta*, MOUSS.

stuartiae, Sowb.

nemorensis, MüLL.

celebensis, Pfr.

vitellus, SHUTT.

fulvizona, MOUSS.

colorata, MOUSS.

succincta, Mdf. (? Celebes).

porcellanica, Sar.

semilactea, Sar.

ardens, Sar.

nitida (Mdf.), Sar.

= *fulvizona* v. *nitida*, Mdf.

fennemae, Sar.

dimidiata, Smith.

Sub-family **Macrochlaminae.**

Genus **EVERETTIA**, G.-A.

fulvocarnea, Mart.

möllendorffi, Kob.

Genus **HEMIPLECTA**, ALB.

limbifera, Mart.

semisculpta, Mart.

v. *matinangensis*, Sar.

rugata, Mart.

v. *montana*, Sar.

ribbei, Dohrn.

sibylla, Can.

weberi, Sar.

wichmanni, Sar.

totojensis, Sar.

braam-morrisi, Sar.

honthainensis, Smith.

Genus **MACROCYCLOIDES**, Mart.

aberrans, Mdf.

Sub-family **Helicarioninae.**

Genus **HELICARION**, Fér.

idae, Pfr.

riedeli, Mart.

celebensis, Pfr.

adolphi, Boettg.

minahassae, Kob.

wallacei, Smith.

annularis, Kob.

Sub-genus **LEPTODONTARION**, Sar.

- albucuminatus*, Sar.
coriaceus, Sar.
- Genus **OFESIA**, H. Ad.
flammulata, Q. and G.
viridis, Q. and G.
lenticula, Sar.
ombrophila, Sar.
alsophila, Sar.
hygrophila, Sar.
- Genus **LAMPROCYSTIS**, Pfr.
matinangensis, Sar.
cursor, Sar.
macassarica, Sar.
sopotensis, Sar.
musciicola, Sar.
indifferens, Smith.
consors, Smith.
consimilis, Smith.
- Genus **SITALA**, H. Ad.
diplotropis, Mdff.
javana v. *celebesiana*, Mdff.
celebica, Sar.
- Genus **KALIELLA**, W. T. Blanf.
doliolum, Pfr.
celebesiana, Mdff.
platyconus v. *intermedia*, Mdff.
- Sub-family **Zonitinae**.
- Genus **TROCHOMORPHA**, Alb.
planorbis, Less.
 v. *ussuwensis*, Smith.
gorontalensis, Mart.
minahassae, Sar.
ternatana, Le G.
robusta, Sar.
- Genus **VITRINOCONUS**, Semp.
celebesianus, Kob.
marosianus, Sar.
applanatus, Sar.
pileolus, Sar.
- Family **Endodontidae**.
- Group **Haplogona**, Pils.
- Genus **ENDODONTA**, Alb.
celebica, Sar.
- Family **Helicidae**.
- Group **Epiphallogona**, Pils.
- Genus **CAMAENA**, Alb.
 Sub-genus **PSEUDOBBA**, Mdff.
mamilla, Fér.
quoyi, Desh.
 = *undulata*, Q. and G.
- Genus **OBBA**, Beck.
papilla, Müll.
 v. *heroica*, Pfr.
 v. *pygmaea*, Sar.
 v. *platybasis*, Mdff.
papilliformis, Mdff.
listeri, Gray.
 v. *mongondica*, Sar.
 v. *matinangensis*, Sar.
 v. *buolica*, Sar.
 v. *tominica*, Sar.
marginata, Müll.
 v. *sororcula*, Mart.
 = *devincta*, Can.
- Genus **PLANISPIRA**, Beck.
 Sub-genus **PLANISPIRA**, s.s.
zebra, Pfr.
 ? = *guttata*, Le G.
flavidula, Mart.
bulbulus, Mouss.
 = *bulbus*, Mouss.
 v. *gloriosa*, Sar.
tuba, Alb.
 v. *centrocelebensis*, Sar.
howesi (Smith), Sar.
 (Chloritis *howesi*, Smith.)
zodiaca, Fér.
 v. *unicolor*, Sar.
 v. *bonthainensis* (Smith), Sar.
 = *howesi* v. *bonthainensis*,
 Smith.
- lansbergiana*, Dohrn.
- Sub-genus **TRACHIA**, Alb.
pilisparva, Mart.
 = *gabata*, Wallace non Gld.
- Genus **CHLORITIS**, Beck.
- Section **CHLORITIS**, s.s.
biomphala, Pfr.

- minahassae, Sar.
- Section TRICHOCHLORITIS, Pils.
- balantensis, Kob.
- talabensis, Kob.
- plena, G.-A. v. celebensis, Smith.
- Genus PAPUINA, Mart.
- euchroa, Pfr.
- Genus AMPHIDROMUS, Alb.
- becarii, Can.
- perversus, Linn.
- = v. ohesa, Mart.
- v. nivea, Sar.
- v. tener, Mart.
- interruptus, Müll.
- = v. infrapicta, Mart.
- v. strigosa, Mart.
- v. infraviridis, Mart.
- v. sultana, Lam.
- = makassariensis, H. and J.
- maculatus (Fult.), Pils.
- = contrarius v. maculata,
Fult.
- jucundus (Fult.), Pils.
- = filizonatus v. jucunda,
Fult.
- sinistralis, Reeve.
- v. fasciata, Sar.
- v. decolor, Can.
- v. rosea, Fult.
- v. lutea, Fult.
- kruijti, Sar.
- Genus GANESSELLA, W. T. Blauf.
- bembicoides, Mdff.
- leucophlaca, Mart.
- BELOGONA EUADENIA.
- Genus EULOTA, Hartm.
- suffodiens, Boettg.
- = fodiens, Wallace non Pfr.
- textoria, Mart.
- similaris, Fér.
- v. solidula, Mouss.
- Genus PLECTOTROPIS, Mart.
- winteriana, Pfr.
- DOUBTFUL RECORD.
- Sulcobasis sulcosa, Pfr. (Reeve).
- a. SANGIR.
- Genus TROCHOMORPHA, Alb.
- staudingeri, Anc.
- Genus CAMAENA, Alb.
- Sub-genus PSEUDORBEA, Mdff.
- tirmaniana, Anc.
- bonaena, Pfr.
- Genus HELICOSTYLA, Fér.
- Section CRYSTALLOPSIS, Anc.
- leucophthalma, Pfr.
- v. fusco-strigata, Anc.
- Section CALOCOCHLEA, Hartm.
- tukanensis, Pfr.
- b. TALAUT (? TALAUTSE).
- Genus ORBEA, Beck.
- meyeri, Mdff.
- marginata, Müll.
- Genus HELICOSTYLA, Fér.
- Section CORASIA, Alb.
- pnella v. lais, Pfr.
- Section CRYSTALLOPSIS, Anc.
- physalis, Pfr.
- Section CALOCOCHLEA, Hartm.
- tukanensis, Pfr.
- talautana, Gude.
- c. TULAR (OR TALAUR).
- Genus HELICOSTYLA, Fér.
- Section CRYSTALLOPSIS, Anc.
- physalis, Pfr.
- d. XULLA ISLANDS.
- Genus XESTA, Alb.
- citrina, Linn.
- e. BANGAYA.
- Genus XESTA, Alb.
- vitellus, Shutt.
- = bangaiensis, Kob.

Genus *HEMIPLECTA*, Alb.
limbifera v. *bangaiensis*, Mart.

Genus *PLANISPIRA*, Beck.
zodiaca, Fér.

f. BUTON.

Genus *XESTA*, Alb.
butonensis, Sar.
 v. *nigrotaeniata*, Mdff.
 v. *fulva*, Mdff.
 v. *albozonata*, Mdff.
 v. *varia*, Mdff.

g. TUKAN BESSI GROUP.

Genus *XESTA*, Alb.
kaledupana, Rolle. Kaledupa.
perfragilis, Mdff. Kaledupa.
tomiana, Rolle. Tomia.

Genus *HEMIPLECTA*, Alb.
subsulcata, Rolle. Kaledupa.

Genus *AMPHIDROMUS*, Alb.
kuehni, Rolle. Tukan Bessi.

Genus *EULOTA*, Hartm.
textoria, Mart. Tomia.

Genus *HELICOSTYLA*, Fér.

Section *HELICOSTYLA*, s.s.
indusiata, Pfr. Tukan Bessi.
thomsoni, Pfr. Tukan Bessi.

Section *CALOCOCHLEA*, Hartm.
tukanensis, Pfr.

Section *CORASIA*, Alb.
obliquata, Mdff. non Desh.

h. SALEYER (or Salayar).

Genus *XESTA*, Alb.
fulvizona, Mouss.
selayarensis, Smith. Bauluan
 Islet.

Genus *MACROCHLAMYS*, Bens.
minuta, Mart.

Genus *MICROCYSTINA*, Mörch.
consueta, Smith.

Genus *HEMIPLECTA*, Alb.

rareguttata, Mouss.

= *fulvizona* v. *elatior*, Mart.

Genus *AMPHIDROMUS*, Alb.
interruptus v. *sultana*, Lam.
annae, Mart.

Genus *EULOTA*, Hartm.
textoria, Mart.

Genus *HELICOSTYLA*, Fér.

Section *CORASIA*, Alb.
subtenuis, Smith.

i. JAMPEA.

Genus *MICROCYSTINA*, Mörch.
consueta, Smith.

Genus *TROCHOMORPHA*, Alb.
jampeana, Smith.

Genus *PLANISPIRA*, Beck.
admirabilis, Smith.

Genus *EULOTA*, Hartm.
textoria, Mart.

j. KALAO.

Genus *XESTA*, Alb.
kalaensis, Smith.

Genus *MICROCYSTINA*, Mörch.
consueta, Smith.

Genus *KALIELLA*, W. T. Blanf.
indifferens, Boettg.

Genus *AMPHIDROMUS*, Alb.
kalaensis, Fult.

Genus *GANESELLA*, W. T. Blanf.
crassiuscula (Smith).

(*Plectotropis crassiuscula*,
 Smith.)

Genus *EULOTA*, Hartm.
textoria, Mart.

k. BONERATU.

Genus *CHLORINIS*, Beck.
 Section *AUSTROCHLORINIS*, Pils.
argillacea, Fér.

Genus *GANESELLA*, W. T. Blanf.
crassiuscula (Smith).

(*Plectotropis crassiuscula*,
 Smith.)

G. LESSER SUNDA ISLANDS.

a. BALI.

- Genus *HEMIPLECTA*, Alb.
rareguttata, Mouss.
 v. *sparsa*, Mouss.
baliensis, Mouss.
 v. *waandersiana*, Mouss.
 Genus *KALIELLA*, W. T. Blanf.
angigvra, Mdf.
 Genus *TROCHOMORPHA*, Alb.
micula, Mouss.
 Genus *AMPHIDROMUS*, Alb.
interruptus, Müll.
 — v. *infrapictus*, Mart.
 v. *emaciata*, Mart.
 v. *sultana*, Lam.
 v. *mitra*, Mart.
 Genus *EULOTA*, Hartm.
transversalis, Mouss.

b. LOMBOK.

- Genus *EVERETTIA*, G.-A.
perglabra, Smith.
 Genus *MICROCYSTINA*, Mörch.
dyakana, G.-A.
 Genus *TROCHONANTINA*, Mouss.
oxyconus, Mart.
 Genus *HEMIPLECTA*, Alb.
nemorensis, Müll.
coflea, Pfr.
rufolineata, Smith.
internota, Smith.
fruhstorferi, Mart.
perinsignis, Smith.
 Genus *HELICARION*, Fér.
lincolatus, Mart.
 Genus *PARMARION*, P. Fisch.
intermedium, Cllge.
everetti, Cllge.
 Genus *SITALA*, H. Ad.
collinae, Smith.
 Genus *TROCHOMORPHA*, Alb.
bicolor, Mart.

- Genus *PLANISPIRA*, Beck.
infracta, Mart.
 — *porcellana*, Pfr. non Grat.
 Genus *PLECROTROPIS*, Mart.
smiruensis, Mouss.
 Genus *PUPISOMA*, Stol.
pulvisculum, Issel.

c. SUMBAWA.

- Genus *HEMIPLECTA*, Alb.
rareguttata, Mouss.
halata, Mouss.
nemorensis, Müll.
bimaensis, Mouss.
adolescens, Smith.
sumbawana, Smith.
 Genus *DURGELLA*, G.-A.
sumbawaensis, G.-A. (emend.)
 = *sumbaensis*, G.-A.
 Genus *TROCHOMORPHA*, Alb.
discreta, Smith.
 Genus *PLANISPIRA*, Beck.
infracta, Mart.
 = *porcellana*, Pfr. non Grat.
 Genus *AMPHIDROMUS*, Alb.
pocillochroa, Fult.

d. SUMBA.

- Genus *HEMIPLECTA*, Alb.
baliensis v. *soembaensis*, Schepm.
cochlostyloides, Schepm.
 Genus *CHLORITIS*, Beck.
 Section *AUSTROCHLORITIS*, Pils.
argillacea, Fér.
 Section *TRICHOCHLORITIS*, Pils.
conjecta, Smith.
 = *conjector*, Fult.
 Genus *THERSITES*, Pfr.
 Sub-genus *RHAGADA*, Alb.
supracostulata, Schepm.
 Genus *AMPHIDROMUS*, Alb.
latestrigatus, Schepm.

sumbaensis, Fult.
 consobrinus, Fult.
 suspectus, Mart.

e. DANA.

Genus THIERSITES, Pfr.
 Sub-genus RHAGADA, Alb.
 colona, Mart.

f. FLORES.

Genus XESTA, Alb.
 polymorpha, Smith.
 subpolita, Smith.
 melanoraphic, Smith.
 carinocincta, Smith.
 Genus RHYSOTA, Alb.
 peramoena, Smith.
 Genus HEMIPLECTA, Alb.
 rareguttata, Mouss.
 v. crebriguttata, Mouss.
 v. venusta, Beck.
 trochus, Müll.
 v. pyramidata, Mart.
 nemorensis, Müll.
 v. endeana, Mart.
 everetti, Smith.
 floresiana, Mart.
 vomer, Mart.

Genus CHLORITIS, Beck.
 Section AUSTROCHLORITIS, Pils.
 argillacea, Fér.
 albodentata, Smith.
 Genus THIERSITES, Pfr.
 Sub-genus RHAGADA, Alb.
 floresiana, Mart.
 Genus AMPHIDROMUS, Alb.
 floresianus, Fult.
 consobrinus, Fult.
 Genus PLECTOTROPIS, Mart.
 winteriana, Pfr.
 rotatoria, v.d.B.

g. SOLOR.

Genus HEMIPLECTA, Alb.

rareguttata, Mouss.
 v. crebriguttata, Mart.
 v. venusta, Beck.

Genus CHLORITIS, Beck.

Section AUSTROCHLORITIS, Pils.
 argillacea, Fér.

Genus THIERSITES, Pfr.

Sub-genus RHAGADA, Alb.
 solorensis, Mart.

h. ADENARA.

Genus XESTA, Alb.
 parcipila, Mart.
 Genus HEMIPLECTA, Alb.
 rareguttata, Mouss.
 v. sparsa, Mouss.
 v. crebriguttata, Mart.
 v. venusta, Beck.
 Genus CHLORITIS, Beck.
 Section AUSTROCHLORITIS, Pils.
 argillacea, Fér.
 Genus PLANISPIRA, Beck.
 adenarana, Fult. (emend.)
 Genus PLECTOTROPIS, Alb.
 winteriana, Pfr.

i. PURA.

Genus HEMIPLECTA, Alb.
 rareguttata, Mouss.
 v. crebriguttata, Mart.
 Genus AMPHIDROMUS, Alb.
 oscitans, Mart.
 inconstans, Fult.

j. PANTAR.

Genus AMPHIDROMUS, Alb.
 inconstans, Fult.

k. ALOR (OR OMBAI).

Genus HEMIPLECTA, Alb.
 rareguttata, Mouss.
 v. crebriguttata, Mart.
 Genus CHLORITIS, Beck.

Section AUSTRORHODORITIS, Pils.
argillacea, Fér.

Genus AMPHIDROMUS, Alb.

oscitans, Mart.

= inconstans var D. Fult.

inconstans, Fult.

v. gracilis, Mart.

I. TIMOR.

Genus XESTA, Alb.

tumens, Desh.

cidaris, Lam.

dammaensis, Smith.

Genus HEMIPLECTA, Alb.

stuartiae, Sowb.

peasana, Pfr.

inquinata, v.d.B.

Genus HELICARION, Fér.

sericeus, Mart.

Genus TROCHOMORPHA, Alb.

tricolor, Mart.

timorensis, Mart.

Genus PLANISPIRA, Beck.

zonaria, Linn.

Genus CHLORITIS, Beck.

Section AUSTRORHODORITIS, Pils.

argillacea, Fér.

mendax, Mart.

Genus AMPHIDROMUS, Alb.

reflexilabris, Sehepm.

contrarius, Müll.

v. subconcolor, Mart.

v. crassa, Fult.

suspectus, Mart.

v. albolabiata, Fult.

sinistralis, Reeve.

Genus EULOTA, Hartm.

similaris, Fér.

SPURIOUS RECORD.

Crystallopsis conformis, Fér.

(See Waigiou.)

m. ROTTI.

Genus XESTA, Alb.

cidaris, Lam.

Genus AMPHIDROMUS, Alb.

contrarius, Müll.

n. SAMAUW.

Genus CHLORITIS, Beck.

Section AUSTRORHODORITIS, Pils.

argillacea, Fér.

mendax, Mart.

II. MOLUCCAS.

a. GILOLO (OR HALMAHERA).

Family Zonitidae.

Sub-family Ariophantinae.

Genus XESTA, Alb.

citrina, Linn.

aulica, Pfr.

sulfurata, Mart.

halmaherica, Strub.

Sub-family Helicarioninae.

Genus HELICARION, Fér.

kukenthali, Kob.

halmahericus, Kob.

Genus LAMPROCYSTIS, Pfr.

subangulata, Boettg.

ambonica, Boettg var.

Sub-family Zonitinae.

Genus TROCHOMORPHA, Alb.

ternatana, Le G.

larden, Mart.

timorensis, Mart.

planorbis, Less.

Family Helicidae.

Group Epiphallogona, Pils.

Genus CAMAENA, Alb.

Sub-genus PHOENICIBIUS, Mdff.

anacardium, Dohrn.

Genus OBBA, Beck.

calcar, Mart.

Genus PLANISPIRA, Beck.

Sub-genus PLANISPIRA, s.s.

- halmaherica, Strub.
 quadrifasciata, Le G.
 v. halmaherica, Gude.
 scheepmakeri, Pfr.
 v. halmaherica, Kob.
 zonaria, Linn.
 endoptycha v. compta, H. Ad.
 zonalis, Fér.
 = leucostoma, A. and R.
 = subangulata, Pfr. juv.
 atacta, Pfr.
 loxotropis, Pfr.
 v. bernsteini, Mart.
 v. laticlavia, Mart.
 v. pluricincta, Mart.
 v. lorquini, Mart.
 tictzeata, Rolle.
 surrecta, Boettg.
 exceptiuncula, Fér.
 v. phryne, Pfr.
 thetis, Pfr.

Sub-genus CRISTIGIBBA, Can.

- mersispira, Mart.
 giloloensis, Smith.
 albopicta, Sykes.

Genus ALBERSIA, H. Ad.

- pubiceps, Mart.
 zonulata, Fér.
 pseudocorasia, Strub.

Genus PAPUINA, Mart.

- vitrea, Fér.
 = albula, Le G.
 chondrodes, Strub.
 lanceolata, Pfr.
 callosa, Sykes.

Genus PYROCHILUS, Pils.

- lampas, Müll.
 pyrostoma, Fér.
 pseudolampas, Kob.
 kukenthali, Kob.
 brunonis, Kob.

BELOGONA EUADENIA.

Genus PLECTOTROPIS, Mart.

- winteriana, Pfr.

b. MOROTAI (OR MORTI).

- Genus TROCHOMORPHA, Alb.
 hartmanni, Pfr.
 Genus DENDROTRUCHUS, Pils.
 labuanensis, Pfr. *
 Genus PLANISPIRA, Beck.
 loxotropis, Pfr.
 v. bernsteini, Mart.
 v. pluricincta, Mart.

c. TERNATE GROUP.

1. TERNATE.

- Genus XESTA, Alb.
 aulica, Pfr.
 sulfurata, Mart.
 Genus LAMPROCYSTIS, Pfr.
 subangulata, Boettg.
 Genus TROCHOMORPHA, Alb.
 planorbis, Less.
 v. lessoni, Mart.
 approximata, Le G.
 ternatana, Le G.
 Genus PLANISPIRA, Beck.
 quadrifasciata, Le G.
 endoptycha, Mart.
 atacta, Pfr.
 loxotropis v. laticlavia, Mart.
 v. lorquini, Mart.
 exceptiuncula v. phryne, Pfr.
 Genus PAPUINA, Mart.
 pileus, Müll.
 = pilcata, Grm.
 vitrea, Fér.
 = albula, Le G.
 lanceolata, Pfr.
 Genus PLECTOTROPIS, Mart.
 winteriana, Pfr.

2. TIDOR.

- Genus TROCHOMORPHA, Alb.
 planorbis, Less.
 ternatana, Le G.

- Genus PAPUINA, Mart.
 vitrea, Fér.*
 lanceolata, Pfr.
3. MAREH (OR POTIEBAKERS
 EILAND).
- Genus TROCHOMORPHA, Alb.
 planorbis, Less.
- Genus PLANISPIRA, Beck.
 quadrifasciata, Le G.
 v. edentata, Mart.
 = instricta, Mart.
 endoptycha, Mart.
 loxotropis v. lorquini, Mart.
4. MOTIR (OR MOTI).
- Genus TROCHOMORPHA, Alb.
 ternatana, Le G.
- Genus PLANISPIRA, Beck.
 Sub-genus PLANISPIRA, s.s.
 aurita, Mart.
- Sub-genus CRISTIGIBBA, Can.
 mersispira, Mart.
- Genus PAPUINA, Mart.
 vitrea, Fér.
 lanceolata, Pfr.
5. MAKKIAN.
- Genus TROCHOMORPHA, Alb.
 ternatana, Le G.
6. KAIQA (OR KAJAU).
- Genus PLANISPIRA, Beck.
 quadrifasciata, Le G.
 v. edentata, Mart.
 = instricta, Mart.
 atacta, Pfr.
 loxotropis v. lorquini, Mart.
- d. BATCHIAN (OR BATJAN).
- Genus XESTA, Alb.
 ignescens, Pfr.
- luctuosa, Beck.
 sulfurata, Mart.
- Genus LAMPROCYSTIS, Pfr.
 ambonica, Boettg.
 v. exigua, Boettg.
 subangulata, Boettg.
- Genus KALIELLA, W. T. Blanf.
 miliacea, Mart.
 = milium, Mart.
- Genus TROCHOMORPHA, Alb.
 planorbis, Less.
 ternatana, Le G.
 v. batchianensis, Pfr.
- Genus PLANISPIRA, Beck.
 Sub-genus PLANISPIRA, s.s.
 scheepmakeri, Pfr.
 zonaria v. coluber, Beck.
 endoptycha, Mart.
 = compta, H. Ad.
 zonalis, Fér.
 atrofusca, Pfr.
 loxotropis, Pfr.
 v. angusticlavia, Mart.
 kurri, Pfr.
 buelowi, Rolle.
 exceptiuncula, Fér.
 v. aspasia, H. Ad.
 = v. elatior, Mart.
 thetis, Pfr.
- Sub-genus CRISTIGIBBA, Can.
 corniculum, H. and J.
 = kiesneri, Le G.
 semirasa, Mouss.
 = moluccensis, Pfr.
 expansa, Pfr.
 anozona, Mart.
 lacteocincta, Smith.
- Genus CHLORITIS, Beck.
- Section SULCOBASIS, Can.
 rubra, Alb.
- Genus ALBERSIA, H. Ad.
 pubicepa, Mart.
 zonulata, Fér.
- Genus PAPUINA, Mart.

- guberti*, Less.
pileolus, Fér.
 v. turrita, Mart.
 v. pyramidata, Mart.
 v. convexa, Mart.
rhynchostoma, Pfr.
nodifera, Pfr.
ohlendorffi, Kob.
Genus *PYROCHILUS*, Pils.
sulcocinctus, Mart.
pyrostoma, Fér.
 v. extineta, Can.
 v. lucernalis, Kob.
 v. nigrescens, Kob.
xanthostoma, Herkl.
Genus *PLECTOTROPIS*, Mart.
winteriana, Pfr.
 c. TAWALLY.
Genus *TROCHOMORPHA*, Alb.
planorbis, Less.
ternatana, Le G.
Genus *PLANISPIRA*, Beck.
biconvexa, Mart.
Genus *PAPUINA*, Mart.
pileolus v. depressa, Mart.
 f. OBI.
Genus *XESTA*, Alb.
obiana, Mdff.
sulcatula, Sykes.
Genus *MACROCHLAMYS*, Bens.
obiana, Mdff.
Genus *OTESIA*, H. Ad.
taeniolata, Mdff.
Genus *TROCHOMORPHA*, Alb.
ternatana, Le G.
 v. subternatana, Dautz.
bicolor, Mart.
Genus *PLANISPIRA*, Beck.
quadrifasciata v. rollei, Mdff.
 v. kendingiana, Mdff.
liedtkei, Mdff.
spiriplana, Mdff.
pruinosa, Mdff.
kurri v. obiensis, Dautz.
Genus *ALBERSIA*, H. Ad.
pubicepa, Mart.
 = *waterstraati*, Mdff.
obiensis, Mart.
 = *obiana*, Mdff.
 = *omissa*, Dautz.
Genus *PAPUINA*, Mart.
obiana (Mdff.), Dautz.
 = *rhynchostoma v. obiana*,
 Mdff.
 = *grouti*, Dautz.
piliscus, Mart.
 = *pseudosatsuma*, Mdff.
 = *obiensis*, Dautz.
 v. minor, Dautz.
unicolor (Mdff.), Dautz.
 = *lanccolata v. unicolor*, Mdff.
 = *pseudolanceolata*, Dautz.
 g. CERAM.
Genus *XESTA*, Alb.
citrina, Linn.
 v. tiara, Beck.
 v. opaca, Mart.
 v. praetexta, Mart.
 v. aurantia, Mart.
 v. columellaris, Mart.
luctuosa, Beck.
Genus *HEMPLECTA*, Alb.
bella, Pfr.
Genus *MACROCYCLOIDES*, Mart.
quadrispira, Mart.
Genus *TROCHOMORPHA*, Alb.
lardea, Mart.
Genus *OBBA*, Beck.
kobeltiana, Pfr.
Genus *PLANISPIRA*, Beck.
zebra, Pfr.
 ? = *guttata*, Le G.
zonaria, Linn.
 v. obliquata, Mart.
 v. maculata, Mart.

- v. lunulata*, Mart.
v. fasciata, Mart.
v. fasciolata, Less.
v. martini, Schepm.
v. coluber, Beck.
latizona, Pfr.
kurri, Pfr.*
 Sub-genus *CRISTIGIRBA*, Can.
margaritis, Pfr.
v. zonulella, Mouss.
 Genus *CHLORITIS*, Beck.
 Section *CHLORITIS*, s.s.
ungulina, Linn.
v. minor, Fér.
biomphala, Pfr.
martensi, Pfr.
circumdata, Fér.
molliscta, Pfr.
ceramensis, Pfr.
unguicula, Fér.
 Genus *AMPHIDROMUS*, Alb.
laevus, Müll.
 ? = *kobelti*, Rolle.
 h. BURU.
 Genus *XESTA*, Alb.
citrina v. dimidiata, Fav.
 Genus *MACROCHLAMYS*, Bens.
amboinensis, Mart.
buruana, Mdff.
 Genus *EVRETTIA*, G.-A.
consul, Pfr.
 Genus *HEMIPLECTA*, Alb.
peaseana, Pfr.
 Genus *MICROCYSTINA*, Mörch.
marginata, Mdff.
irregularis, Mdff.
 Genus *MACROCYCLOIDES*, Mart.
lutea, Mart.
 Genus *HELICARION*, Fér.
idae, Pfr.
suturalis, Mart.
rollei, Mdff.
 Genus *OTUESIA*, H. Ad.
buruana, Mdff.
 Genus *TROCHOMORPHA*, Alb.
planorbis, Less.
tricolor, Mart.
lardea, Mart.
discus, Mdff.
 Genus *PLANISPIRA*, Beck.
 Sub-genus *PLANISPIRA*, s.s.
zonaria, Linn.
v. fulminata, Mart.
v. coluber, Beck.
 Sub-genus *CRISTIGIRBA*, Can.
buruensis, Pons. and Sykes.
 Genus *CHLORITIS*, Beck.
 Section *CHLORITIS*, s.s.
unguiculina, Mart.
unguiculastra v. buruensis, Mart.
gruneri, Pfr.
 = *buruana*, Mdff.
minima, Fult.
selenitoides, Fult.
kuhni, Mdff.
mirabilis, Mdff.
 Genus *HELICOSTYLA*, Fér.
 Section *CRYSTALLOPSIS*, Anc.
dajae, Pfr.
 i. AMDOYNA.
 Genus *XESTINA*, Semp.
minima, Boettg.
 Genus *XESTA*, Alb.
citrina, Linn.
v. dimidiata, Fav.
v. coagulata, Pfr.
vitellus, Shutt.
spiralis, Le G.
ovivitelus, Reeve.
strubelli, Boettg.
 Genus *MACROCHLAMYS*, Bens.
amboinensis, Mart.
 Genus *HEMIPLECTA*, Alb.
monozonalis, Lam.
humphreysiana v. rapa, Müll.
simplex, Lam.

- Genus *MACROCYCLOIDES*, Mart.
microcyllis, Boettg.
- Genus *LAMPROCYSTIS*, Pfr.
ambonica, Boettg.
 v. *exigua*, Boettg.
gemmula v. *pallidior*, Boettg.
subangulata, Boettg.
- Genus *SITALA*, H. Ad.
bandongensis, Boettg.
- Genus *KALIELLA*, W. T. Blauf.
miliacea, Mart.
 = *milium*, Mart.
indifferens, Boettg.
- Genus *TROCHOMORPHA*, Alb.
lardea, Mart.
- Genus *PLANISPIRA*, Beck.
- Sub-genus *PLANISPIRA*, s.s.
zonaria v. *lineolata*, Mart.
 v. *nitidiuscula*, Boettg.
 v. *fasciolata*, Less.
 v. *collis*, Mouss.
 v. *coluber*, Beck.
- Sub-genus *CRISTIGIBBA*, Can.
tortilabia, Less.
 = *torticollis*, Le G.
 = *gibbosula*, H. and J.
- Genus *CHLORITIS*, Beck.
- Section *CHLORITIS*, s.s.
unguiculastra v. *amboinensis*,
 Mart.
unguicula, Fér.
 = *ungulina*, Chemn. non L.
- Genus *ALBERSIA*, H. Ad.
zonulata, Fér.
- Genus *PAPUINA*, Mart.
pileus, Müll. (? Amboyna.)
steursiana, Shutt.
- Genus *PUPISOMA*, Stol.
philippinicum, Mdf.
- j. HARUKU.
- Genus *XESTA*, Alb.
strubelli, Boettg.
 v. *opaca*, Boettg.

- Genus *MACROCYCLOIDES*, Mart.
sericina, Boettg.
- Genus *LAMPROCYSTIS*, Pfr.
ambonica, Boettg.
- Genus *SITALA*, H. Ad.
bandongensis, Boettg.
- Genus *TROCHOMORPHA*, Alb.
lardea, Mart.
- Genus *PLANISPIRA*, Beck.
zonaria v. *nitidiuscula*, Boettg.

k. SAPARUA.

- Genus *XESTA*, Alb.
citrina v. *dimidiata*, Fav.
strubelli, Boettg.
- Genus *MACROCHIAMYS*, Bens.
martini, Schepm.
- Genus *MACROCYCLOIDES*, Mart.
saparuaana, Boettg.
- Genus *KALIELLA*, W. T. Blauf.
miliacea, Mart.
 = *milium*, Mart.
indifferens, Boettg.
- Genus *TROCHOMORPHA*, Alb.
planorbis, Less.
 v. *lessoni*, Mart.
- Genus *PLANISPIRA*, Beck.
zonaria v. *nitidiuscula*, Boettg.
- Genus *CHLORITIS*, Beck.
unguiculastra v. *pilosa*, Mart.

l. KEFFING ISLAND.

- Genus *AMPHIDROMUS*, Alb.
laevus, Müll.
 ? = *kobelti*, Rolle.

m. GORAM.

- Genus *XESTA*, Alb.
citrina v. *praetexta*, Mart.
 v. *velum*, Can.
luctuosa, Beck.
- Genus *PLANISPIRA*, Beck.
zebra, Pfr.

- Genus PAPUINA, Mart.
triumphalis, Reeve.
- Genus HELICOSTYLA, Fér.
Section CRYSTALLOPSIS, Anc.
najas, Pfr.
extensa, Müll.
- D. BANDA GROUP.
1. BANDA NEIRA.
- Genus XESTA, Alb.
citrina v. dimidiata, Fav.
- Genus MACROCHLAMYS, Bens.
amboinensis, Mart.
- Genus LAMPROCYSTIS, Pfr.
ambonica, Boettg.
v. exigua, Boettg.
sinica, Mdff.
subangulata, Boettg.
- Genus SITALA, H. Ad.
bandongensis, Boettg.
- Genus KALIELLA, W. T. Blauf.
doliolum, Pfr.
- Genus ENDODONTA, Alb.
Sub-genus ENDODONTA, s.s.
- Section THAUMATODON, Pils.
philippinensis, Semp.
= philippinica, Boettg.
- Genus PLANISPIRA, Beck.
zonaria v. fulminata, Mart.
2. ROZAGYN OR ROSENGAIN.
- Genus HEMIPLÆCTA, Alb.
inquinata, v.d.B.*
- G. MOLUCCAS (GENERAL; PRECISE
HABITAT NOT RECORDED.)
- Genus MICROCYSTINA, Mörch.
misella, Fér.
- Genus PLANISPIRA, Beck.
Sub-genus PLANISPIRA, s.s.
zebra v. embrechtiana, Mouss.
iaddae, Pils.
chariessa, Pils.
- Sub-genus CRISTIGIBBA, Can.
leptocheila, Can.
- Genus PAPUINA, Mart.
lenta, Pfr.
- Genus AMPHIDROMUS, Alb.
teysmanni, Pfr.
- Genus HELICOSTYLA, Fér.
Section CRYSTALLOPSIS, Anc.
subvitrea, Pfr.

I. ARU ISLANDS.

- Genus XESTA, Alb.
citrina, Linn.
luctuosa, Beck.
trochiscus, Pfr.
- Genus MICROCYSTINA, Mörch.
misella, Fér.
- Genus TROCHOMORPHA, Alb.
planorbis, Less.
- Genus PLANISPIRA, Beck.
Sub-genus CRISTIGIBBA, Can.
tortilabia, Less.
- Genus CHLORITIS, Beck.
Section CHLORITIS, s.s.
circumdata, Fér.
- Section SULCOBASIS, Can.
- sulcosa, Pfr.
rubra, Alb.
- Section AUSTRORHODITIS, Pils.
occulta, Pfr.
- Genus ALBERSIA, H. Ad.
zonulata, Fér.
- Genus PAPUINA, Mart.
pileus, Müll.
blainvillei, Le G.
= gartneriana, Pfr.
arrowensis, Le G.
leucotropis, Pfr.
- a. WOKAN (OR VOKAN).
- Genus MICROCYSTINA, Mörch.

aruensis, Can.	Section AUSTRORHODITIS, Pils.
Genus TROCHOMORPHA, Alb.	occulta, Fér.
demani, Can.	
Genus PLANISPIRA, Beck.	Genus ALBERSIA, H. Ad.
Sub-genus CRISTIGIBBA, Can.	zonulata, Fér.
semirasa, MOUSS.	Genus PAPUINA, Mart.
tortilabia, Less.	pileus, Müll.
Genus CHLORITIS, Beck.	blainvillei, Le G.

K. KEI OR KE ISLANDS.

Genus XESTA, Alb.	Genus PLANISPIRA, Beck.
citrina, Linn.	Section CRISTIGIBBA, Can.
campylonota, Can. Little Kei	semirasa, MOUSS.

L. MYSOL.

Genus XESTA, Alb.	Section CHLORITIS, s.s.
citrina, Linn.	circumdata, Fér.
Genus PLANISPIRA, Beck.	Section SULCOBASIS, Can.
Sub-genus CRISTIGIBBA, Can.	rubra, Alb.
semirasa, MOUSS.	Genus PAPUINA, Mart.
= moluccensis, Pfr.	novoguineensis v. mysolensis, Pfr.
Genus CHLORITIS, Beck.	

M. WAIGIOU GROUP.

a. WAIGIOU.

Genus XESTA, Alb.	aurora, Pfr.
aulica, Pfr.	waigiouensis, H. Ad.
v. gibbosa, Mart.	wallaceana, Sykes.
Genus HEMIPLECTA, Alb.	pyrgus, Sykes.
duta, Pfr.	Genus HELICOSTYLA, Fér.
Genus PLANISPIRA, Beck.	Section CRYSTALLOPSIS, Anc.
kurri, Pfr.	conformis, Fér.
Genus CHLORITIS, Beck.	
Section CHLORITIS, s.s.	b. RAWAK.
circumdata, Fér.	Genus CHLORITIS, Beck.
Section SULCOBASIS, Can.	Section SULCOBASIS, Can.
concisus, Fér.	concisus, Fér.
Genus ALBERSIA, H. Ad.	Section AUSTRORHODITIS, Pils.
granulata, Q. and G.	argillacea, Fér.
zonulata, Fér.	cristula, Fér.
Genus PAPUINA, Mart.	
turris, H. Ad.	c. GAGY OR GAGIE.
	Genus PLANISPIRA, Beck.
	kurri, Pfr.

N. SERWATTY GROUP.

a. DAMMA.

- | | |
|--|--|
| Genus XESTA, Alb.
dammaensis, Smith. | timorensis, Mart. |
| Genus MACROCHLAMYS, Beus.
pseudosuccinea, Smith.
dammeriana, Mdff. | Genus CHLORITIS, Beck.
dammaensis, Smith.
subcarinata, Mdff. |
| Genus OTESIA, H. Ad.
cirrhotropis, Mdff. | Genus EULOTA, Hartm.
subcornea, Smith. |
| Genus LAMPROCYSTIS, Pfr.
consuefa, Smith. | Genus PLECTOTROPIS, Mart.
stenomphala, Mdff. |
| Genus TROCHOMORPHA, Alb. | Genus HELICOSTYLA, Fér.
Section CORASIA, Alb.
tenimberica, Mdff. |

O. TENIMBER (OR TIMOR LAU').

- | | |
|---|---|
| Genus EUPLECTA, Semp.
orientalis, Mdff. | telitecta, Mdff. |
| Genus XESTA, Alb.
micholitzii, Mdff. | rhodochila, Mdff.
micholitzii, Mdff.
tenuitesta, Mdff. |
| Genus HELICARION, Fér.
tenimbericus, Mdff. | Genus AMPHIDROMUS, Alb.
columellaris, Mdff. |
| Genus TROCHOMORPHA, Alb.
planorbis, Less. | Genus EULOTA, Hartm.
hemisphaerica, Mdff.
tenimberica, Mdff.
bitaeniata, Mdff. |
| Genus CHLORITIS, Beck. | Genus HELICOSTYLA, Fér. |
| Section CHLORITIS, s.s.
curychasma, Boettg. | Section CRYSTALLOPSIS, Anc.
tenimberica, Mdff. |
| Section AUSTROCHLORITIS, Pils.
goniostoma, Mdff. | |

SPECIES WHOSE PRECISE HABITATS HAVE HITHERTO
REMAINED UNKNOWN.

- | | |
|---|--|
| Genus XESTA, Alb.
atrorubra, Less.
= ? citrina, var. | ADDITIONS.
BORNEO, p. 56. |
| Genus HEMIPLECTA, Alb.
lennepiana, Pfr.
oblita, Pfr. | Genus TROCHONANINA, MOUSS.
kinabaluensis, Smith. |
| Genus TROCHOMORPHA, Alb.
valenciennesi, Le G.
= guillouii, Pfr. | SULU ISLAND, p. 61.
Genus HELICOSTYLA, Fér.
Section CORASIA, Alb.
puella, v. lais, Pfr. |

INDEX TO ISLANDS, ETC.

The references in Brackets indicate Islands not separately listed.

Adenara. G.h.	Kajan. H.c.6.	Pura. G.i.
Alor. G.k.	Kalantan. A.j.	Queda. A.h.
Amboyna. H.i.	Kalao. F.j.	Rakata. D.e.
Aru Is ^s . I.	Kaledupa. (F.g.)	Rawak. M.b.
Bakuit. (E. a.)	Karemon. E.j.	Riouw. A.c.
Balalac. E.l.	Kedsh. A.h.	Rottj. G.m.
Bali. G.a.	Keffing. Is. H.1.	Rozagyn. H.n.2.
Banca. C.a.	Kei. K.	Salang. A.e.
Banda Group. H.n.	Kelantan. A.j.	Saleyar. F.h.
Banda Neira. H.n.i.	Krakatao. D.e.	Samauw. G.n.
Bangaya. F.e.	Labuan. F.h.	Samui. B.
Banguay. E.f.	Lesser Sunda. Is ^s . G.	Sangir. F.a.
Batehian. H.d.	Ligch. A.k.	Saparua. H.k.
Batu. C.c.	Ligor. A.k.	Serwatty. N.
Bauluan. (F.h.)	Lombok. G.b.	Sibutu. E.g.1.
Bawean. D.b.	Madura. D.a.	Singapore. A.b.
Bilatan. E.g.2.	Makkian. H.c.5.	Sirhassen. E.l.2.
Bilton. C.b.	Malacca. A.a.	Solor. G.g.
Boneratu. F.k.	Malay Peninsula. A.	Sulu Group. F.g.
Bongao. E.g.4.	Mang-d. E.c.	Sulu Is. E.g.5.
Borneo. F.	Mareh. H.c.3.	Sumatra. C.
Buru. H.h.	Moluccas. H. & Ho.	Sumba. G.d.
Busuanga. E.c.	Morotai. H.b.	Sumbawa. G.e.
Buton. F.f.	Mori. H.b.	Sunda, Lesser. Is ^s . G.
Celebes. F.	Motie. H.c.4.	Talaur. F.c.
Ceram. H.g.	Murigi. (E.a.)	Talaut. F.b.
Christmas Is D.g.	Mysol. J.	Tawally. H.e.
Damma. N.a.	Natuna Group. E.l.	Tawi-Tawi. E.g.3.
Dana. G.e.	Nawng Chik. A.l.	Tenimber. O.
Engano. C.d.	Obi. H.f.	Ternate Group. H.c.
Flores. G.f.	Ombai. G.k.	Ternate Is. H.c.i.
Gagy. M.c.	Palawan. E.a.	Tidor. H.c.2.
Gilolo. H.a.	Panalingoan. E.d.	Tiga. E.i.
GORAM. H.m.	Pantar. G.j.	Timor. G.l.
Great Natuna. E.l.1.	Paragua. E.a.	Timor Laut. O.
Halmahera. H.a.	Penang. A.g.	Tomja. (F.g.)
Haruku. H.j.	Perak. A.f.	Tukan Bessi. F.g.
Jalor. A.m.	Popoli. D.c.	Tular. F.e.
Jampea. F.i.	Pottebakkers Is. H.c.3.	Vokan. I.a.
Java. D.	Priners Is. D.d.	Waiglon Group. M.
Johore. A.d.	Pulo Lankawa. A.l.	Waiglon Is. M.a.
Junk Ceylon. A.c.	Pulo Laut. F.k.	Wekan. I.a.
Kafoa. H.c.6.	Pulo Sungian. D.f.	Xulla. F.d.

(To be concluded.)

FIGURES AND DESCRIPTIONS OF SUPPOSED NEW SPECIES AND VARIETIES OF ENNEA, MACROCHLAMYS, COCHLOSTYLA, STROPHOCHEILUS (BORUS), ODONTOTOMUS (MORICANDIA), LEPTOPOMA, CATAULUS, COPTOCHEILUS AND TROPIDOPHORA.

By HUGH FULTON.

(Plate ix.)

Ennea oleacea, n. sp.

Pl. ix, fig. 9.

Shell oblong-oval, very slightly perforated, rather thin, whitish, shining; whorls $6\frac{1}{2}$, very convex, slowly and regularly increasing, first two smooth, remainder distinctly (under the lens) obliquely striated, suture of lower whorls narrowly but clearly margined; aperture oval; peristome white, thickened and narrowly expanded, broadened interiorly at point of insertion, margins connected by a thin callus.

Maj. diam. 12; alt. 22 millim.

Hab.—Ukani, German East Africa.

This shell belongs to the group of *E. ovoidea*, Brug., *obesa*, Gibbons, *minor*, Morelet, and *liberiana*, Lea. Its nearest ally is perhaps *E. chesa*, which is more elongate in form and has less convex whorls, the latter increasing much more rapidly than in *oleacea*.

Macrochlamys bathycharax, Godw.-Aust.

Pl. ix, fig. 6.

Macrochlamys bathycharax, Godwin-Austen: Ann. and Mag. Nat. Hist., 1888, p. 56.

Allied to *M. compluvialis*, Blanf., and *M. convallata*, Bens., it is like the former in regard to its deeply channeled sutural area, but both are larger and not nearly so depressed in proportion to size, the umbilicus being also more open in the latter species.

Dimensions of figured specimen, maj. diam. $11\frac{1}{2}$; alt. 5 millim.

The specimen figured, collected by Mr. Booley at Port Blair, which I at first supposed to be a new species, must be, I think, judging from the description only (my search for the type in Godwin-Austen's collection having been unsuccessful) his *M. cathycharax*, if not, I would propose to name it *M. subconvallata*.

Cochlostyla delicata, n.sp.

Pl. ix, fig. 10.

Shell pyramidally ovate, very slightly perforate, shining, first two and last whorls pure opaque white, middle whorls yellowish with irregular oblique whitish stripes, inconspicuously obliquely striated, and with numerous impressed spiral lines: whorls 6, moderately convex, regularly increasing; suture impressed; aperture sub-ovate, interior white; peristome slightly thickened, behind the peristome is a dark brown band about 2 millim. wide which shows through inside of aperture as a bluish colour, and joins the brown margin of peristome, giving it the appearance of being broadly expanded.

Maj. diam. 19; alt. 40 millim.

Hab.—?

This distinct species (probably from New Ireland or New Britain) is allied to *C. hindei*, Cox, and *C. heimbürgi*, Braunsik.

It bears a superficial resemblance to some varieties of *C. calobapta*, Jonas.

Strophocheilus (*Borus*) *separabilis*, n.sp.

Pl. ix, fig. 12.

Shell oblong-ovate, imperforate, yellowish-brown below, darker on embryonic whorls which are margined above with golden-yellow; whorls 5, rapidly increasing; embryonic portion consisting of 3½ whorls, clearly marked off and obliquely striated except first whorl which is smooth, the last 1½ whorls strongly malleated; aperture sub-ovate, brown within; peristome thickened and slightly expanded at basal and columellar margins, pinkish fading to whitish at point of insertion, margins connected by a very thin, well-defined, whitish callus.

Maj. diam. 36; alt. 63 millim.

Hab.—? (probably Peru).

Easily distinguished from other species known to me, by its strongly malleated surface and thin substance.

Odontostomus (*Morieandia*) *toleratus*, n.sp.

Pl. ix, fig. 2.

Shell narrowly but deeply rimate or umbilicate, fusiform, rather thin, slightly polished, light yellowish brown with indentations darker, upper part almost smooth, lower whorls distinctly malleated and crossed by microscopic close-set impressed spiral lines only visible under the lens: suture of lower part sub-crenulate; whorls 8½, slightly convex, tapering at the base, aperture narrowly oblong, interior with a blackish stripe bordering the peristome, and continued at back of columellar fold, white in the throat; peristome slightly pressed outwards, white mar-

joined, deflected backwards somewhat at basal termination, columellar portion gradually widening to point of insertion, margins connected by a thin transparent callus.

Maj. diam. 9; alt. 32 millim.

Hab.—Brazil.

This bears great resemblance to the figure of *O. willi*, Dohrn, but according to Dohrn's description that species is "*delicately and sharply striate longitudinally*," a character not present in our species. From *O. nasutus*, Mts., it can be distinguished by its strongly malleated surface and the absence of the rather conspicuous white spiral hair-lines seen in that species.

***Leptopoma placidum*, n.sp.**

Pl. ix, fig. 7.

Shell almost imperforate, subconical, thin, pellucid, light yellowish colour, ornamented by numerous somewhat interrupted narrow golden-coloured spiral bands, lower whorls with microscopic spiral waved striae, middle whorls with four more conspicuous thread-like keels; whorls $5\frac{1}{4}$, moderately convex, last rounded; aperture very oblique, subcircular, opaque white for a short distance within, then transparent; peristome expanded except at columellar margin which is much thinner and almost straight; operculum normal.

Maj. diam. 10; alt. 11 millim.

Hab.—S. Flores Island, lowlands under 500 ft. (Everett).

The narrow conical form of this species and the almost closed umbilicus distinguishes it at once from any other species known to me from that region.

***Leptopoma albicans*, n.sp.**

Pl. ix, fig. 5.

Shell globosely conic, narrowly perforate, white, sometimes with a pale reddish band at the periphery continued at suture above, apex reddish-brown, with usual microscopic waved striae, on middle whorls about seven or eight spiral threads; whorls $5\frac{3}{4}$, moderately convex above, last whorl subcarinate in front, last half rounded; aperture somewhat oblique, subcircular; peristome white, narrowly expanded all round, margins joined by a very thin callus; operculum normal.

Maj. diam. 10; alt. 11 millim.

Hab.—Sumba Island (Everett).

This neat little species of the same gross dimensions as the last described is nevertheless quite distinct, its spire is larger in proportion, its peristome smaller and less oblique, and it differs also in coloration and the emination of its last whorl.

Cataulus connectens, n.sp.

Pl. ix, fig. 4.

Shell fusiformly oblong, solid, narrowly perforate, dark reddish-brown; whorls $9\frac{1}{2}$, obliquely striated, lower slightly convex, earlier whorls almost straight, the last carinated at the base. aperture circular. pale reddish-brown within; peristome continuous, yellow, thickened and reflexed, an egg-shaped opening to basal canal. Operculum normal.

Maj. diam. (including peristome) $8\frac{1}{2}$; alt. 21 millim.

Hab.—Watawala, Ceylon (O. Collett).

Although closely allied to both *blanfordi*, Dohrn, and *decorus*, Bens., it can be readily separated from the former by its yellow peristome and from the latter by its smaller size, more slender form, and from both by the peristome being more in line with, or under, the whorls.

Cataulus greeni v. robusta, n.v.

Pl. ix, fig. 1.

Shell more solid than typical *greeni*, somewhat broader in form, the oblique striae and crenulations at suture more conspicuous, the notch on upper right margin of peristome varies from being almost entirely absent, to specimens having a small but clearly defined V-shaped one.

With reference to the distinct notch supposed to be characteristic of *greeni*, I have before me a specimen of the typical form from Punduloya, which scarcely shows the notch, thus demonstrating the instability of that character.

Maj. diam. $7\frac{1}{2}$; alt. 17 millim.

Hab.—Dimbula, Ceylon, 5,000 ft. (O. Collett).

Coptocheilus perakensis, n.sp.

Pl. ix, fig. 3.

Shell narrowly perforate, moderately solid, reddish-brown, spire elongately-conic, obliquely striated, last two whorls margined at the suture, whorls $7\frac{1}{2}$, slightly convex, aperture circular, brown within; peristome sub-duplicate, expanded, whitish, margins connected by a raised callus, somewhat angular at upper columellar portion; operculum normal.

Maj. diam. (including peristome) 11. long. 23 millim.

Hab.—Perak (Grubauer).

C. perakensis differs from *sectilabrum*, Gld., in having no notch or sinus on its peristome, which is thinner, and also by its less convex whorls; from *anostoma*, Bens., it is distinguished by its smaller aperture, less convex whorls, and its more elongated form. The name *Coptocheilus* being said to be preoccupied, Kobelt has proposed the name of *Schistoloma* for this group.

Tropidophora perfecta, n.sp.

Pl. ix, fig. 11.

Shell globose turbinate widely umbilicated, solid, closely spirally and

obliquely striated on lower whorls, spiral striae wider apart and more conspicuous at umbilical area, yellow at apex, light brown below with numerous narrow spiral bands of a darker colour; whorls 5, rapidly increasing, very convex, last rounded; aperture sub-circular, moderately oblique, almost black within; suture crenulated; peristome white; moderately expanded and shortly reflected, almost continuous, slightly interrupted at place of attachment to whorl. Operculum normal.

Maj. diam. 29; alt. 23 millim.

Hab.—Fort Dauphin, Madagascar (Sikou).

In coloration this shell somewhat resembles *hultenti*, Sowb., and *moulinsi*, Grat., but the latter is a much more depressed form and the former not so depressed; it may be readily distinguished from both by its expanded and reflected peristome and its almost black aperture contrasting so strongly with its white peristome.

Tropidophora plurilirata, n.sp.

Pl. ix, figs. 8a, b.

Shell moderately umbilicate, globose-conic, rather thick, apex smooth, elsewhere covered with close-set spiral lirae crossed by fine oblique striae, about 40 on last whorl, yellowish brown, with rather indistinct oblique stripes of darker colour, sometimes with a narrow dark brown subperipheral band; whorls 5, convex, somewhat channeled at suture of middle whorls; aperture sub-oval, interior with brown spiral thread-like lines on a whitish ground; peristome slightly thickened and narrowly expanded, continuous, angled at upper part at point of attachment to last whorl; operculum normal.

Maj. diam. 16½; alt. 16½ millim.

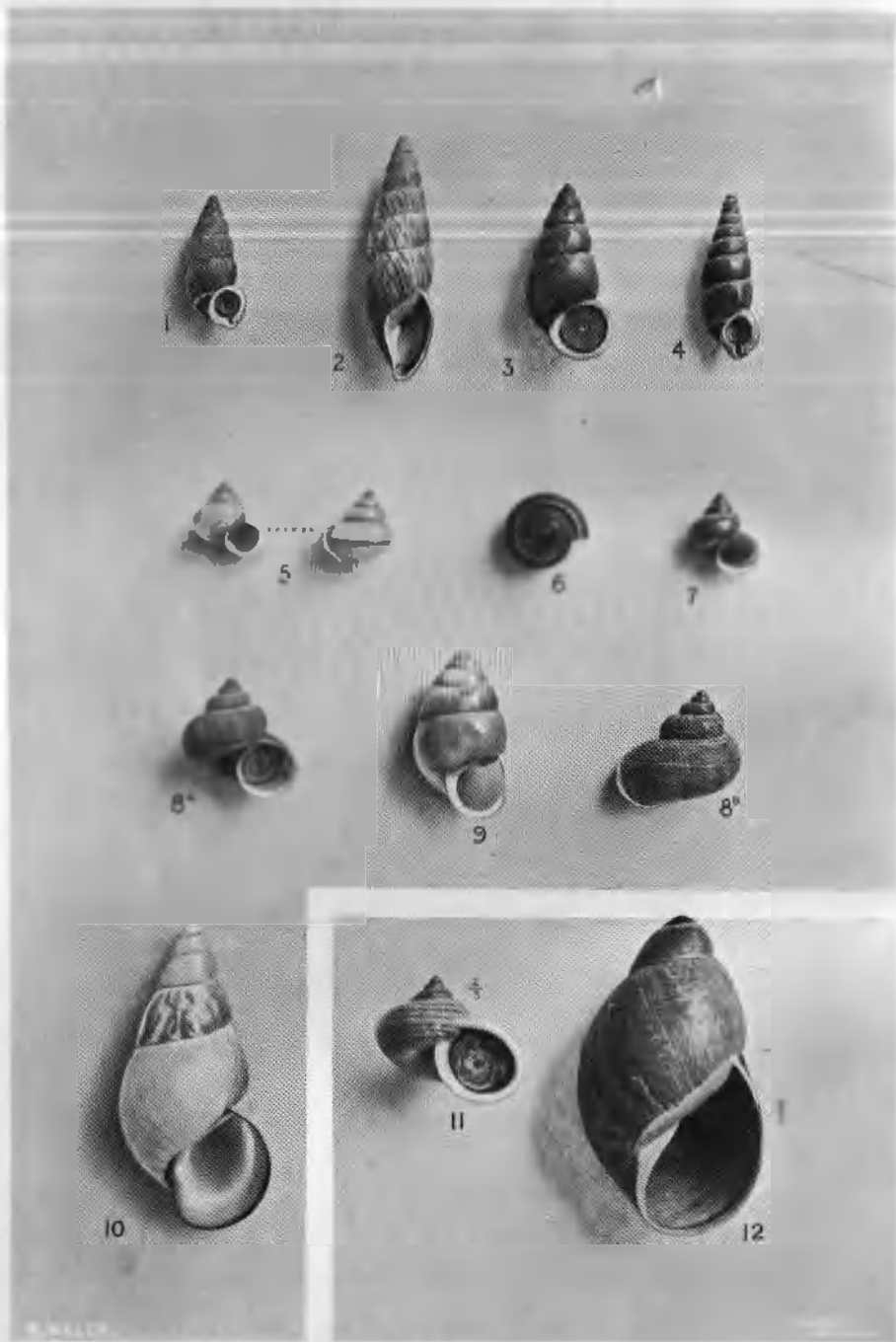
„ „ (banded specimen) 15½; alt. 16 millim.

Hab.—Near Grahamstown, Cape Colony (Miss Leppan).

The spiral lirae are much closer and more numerous than in any of the other S. African forms. *T. plurilirata*, *insularis*, Pfr., and *transvaalensis*, M. and P., are all similar in form and coloration.

EXPLANATION OF PLATE IX.

- Fig. 1. *Catantulus greeni* v. *robusta*, n.v.
- Fig. 2. *Odontostomus* (*Moricandina*) *toleratus*, n.sp.
- Fig. 3. *Coptocheilus perakensis*, n.sp.
- Fig. 4. *Catantulus connectus*, n.sp.
- Fig. 5. *Leptopoma albicans*, n.sp.
- Fig. 6. *Macrochlamys bathycharax*, Godw.-Aust.
- Fig. 7. *Leptopoma placidum*, n.sp.
- Fig. 8 a, b. *Tropidophora plurilirata*, n.sp.
- Fig. 9. *Ennea olivacea*, n.sp.
- Fig. 10. *Cochlostyla delicata*, n.sp.
- Fig. 11. *Tropidophora perfecta*, n.sp.
- Fig. 12. *Strophocheilus* (*Borus*) *separabilis*, n.sp.



NEW SPECIES OF LAND SHELLS.

NOTES.

On the name *Lima elliptica*.—In 1863 Jeffreys described (Brit. Conch., vol. ii, p. 81) a shell from the British Seas under this name. Unfortunately the name had been used in August, 1861, by Whiteaves (Ann. Nat. Hist., ser. 3, vol. viii, p. 146) for a fossil from the "Corallian Oolites of Oxford." Under these circumstances, as I am unable to trace any other name applicable to the recent shell, I propose to name it *Lima gwyni*, nom. nov.—E. R. SYKES.

Note on a Malformed Specimen of *Ceratisolen legumen*.—It may be interesting to state that a short time ago I received a specimen of the above species exhibiting a curious state of development. Nothing is present in the growth of the shell to determine the cause of it, though there is a small deflection of the postero-ventral end of the left valve but this appears to have arisen subsequently through the imperfect growth of the mantle lobe.

The foot is abnormally large. The mantle lobes between the pedal aperture and the proximal parts of the siphon are exceedingly thin, and the pallial muscular bands along this portion are nearly altogether wanting. The free portions of both gills are only slightly developed and are very narrow.—H. H. BROOMER.

CURRENT LITERATURE.

Pilsbry, Henry A.—Tryon's Manual of Conchology, ser. ii, vol. xv (pt. 60), pp. 209-323, pls. 56-65. Philadelphia: Academy of Natural Sciences.

Continuing the account of the *Urocoptidae*, Dr. Pilsbry describes the following new species and varieties: *U. lovelleana* v. *trinidadensis* (Trinidad); *U. fraternata* (Western Cuba), like *U. capillacea* in shape and colour, but more coarsely striate, and the axis bears two spiral lamellae; *U. hibulgoi* v. *brevicervis*; *U. gonzalezi* (Western Cuba), similar to *U. hidalgovi*, but more tapering, neck short, and only one axial lamella; *U. joaquinii* (Western Cuba); *U. discors* v. *lagunillensis* (Western Cuba); *U. diaphana* (Western Cuba); *U. baculum* (Cuba); *U. ischna* (Western Cuba); *U. rugeli* v. *euglypta*; *U. bahamensis* v. *providentia* (Nassau); *Spirostemma belleuensis*, n. sp. for *S. propinqua* (Vend.), non *S. propinqua*, Arango; and *S. ipswichensis*, n. sp., both from Jamaica.

In an Appendix the author gives a short account of the anatomy of *Androspira townsendi*, hitherto known by the shell only. The generative organs resemble those of *Eucalodium* in the long vas deferens, the other characters being common to both *Eucalodium* and *Coecocentrum*. The genus is somewhat intermediate between these two genera. *A. recticosta* v. *townsendi*, Pils. and Gkll. is described as new.

The present part completes volume xv. and contains the contents, and

References to Plates. A key to the genera and subordinate groups of *Urcopidae*, with a general discussion of the affinities and distribution of the family will form the Introduction to volume xvi, the first two parts of which will contain monographs of the remaining genera, and an Index.

Hedley, C.—Studies on Australian Mollusca. Part vii. Proc. Linn. Soc. N.S.W.; 1902, pp. 596-619, pls. xxix-xxxiii.

Mr. Hedley, in the seventh part of these Studies, discusses *Chione lagopus*, Lam., which name supersedes the *Venus australis*, Sby.; an interesting form of *Maetra* is figured and described under *M. abbreviata*, Lam., as a variety, but it appears likely that it will ultimately prove to be a new species. The new species described and figured are: *Purpura pseudamygdala*, *Assiminea pygodela*, *Caecum lilianum*, and eight species of *Triphora*. Notes on the nomenclature and distribution of many other molluscs are given, and figures of *Cylindrobulla fischeri*, A. Ad. and Ang., *Endodonta melbournensis*, Cox, *E. subdepressa*, Brazier, *E. otwayensis*, Petterd, and *E. tamarensis*, Petterd.

Kennard, A. S. and Woodward, B. B.—On the Occurrence of *Neritina grateloupiana*, Fér. (hitherto misidentified as *N. fluviatilis*), in the Pleistocene Gravels of the Thames at Swanscomb. Proc. Malac. Soc. Lond., 1903, vol. v, pp. 320-321.

In 1901 the authors recorded *N. fluviatilis*, L., as occurring in countless numbers in a section of the high terrace gravel of the Thames, at Swanscomb. Examples of these have since been submitted to Dr. Boettger, who identifies them as *N. grateloupiana*, Fér. (= *crenulata*, Klein). The nearest living form is *N. danubialis*, Mli.

The occurrence of this species affords, as the authors point out, an extremely interesting example of the imperfection of the palaeontological record. On the Continent it is unknown in any deposit of later age than the Upper Miocene, in the Thames Valley it appears in the Pleistocene in countless profusion, and is unknown in any later deposits, while the living English species, *N. fluviatilis*, though known from the Miocene of Germany, is unknown in any deposit older than the Holocene in the British Isles.

Godwin-Austen, H. H.—Further description of the animal of *Damayantia carinata* Collinge, showing its similarity to *D. smithi*, Collinge and G.A., with remarks on this genus of Issel, *Collingea* of Simroth, and *Isselentia* of Collinge. Proc. Malac. Soc. Lond., 1903, vol. v, pp. 311-316, pl. xi.

The author contends that the *Collingea smithi*, Clige. and G.A., and *Damayantia carinata*, Clige., are one and the same thing and that *Isselentia*, Clige., is probably a subgenus of *Damayantia*, Issel.

The differences between these three genera are so evident, both externally and internally that any confusion of them can only be due to either woeful ignorance, or a strange incapability to perceive and rightly appreciate their characters. But an author who has described the generative organs of the genus *Girasia* as "in every way similar to those of *Austenia*," and those of *Austenia* as "very similar" to those of *Macrochlamys*, and those of the latter genus as "like species of *Oxytes*," can scarcely expect his writings to be taken seriously.

Stiasny, Gustav.—Die Niere der Weinbergschnecke. Zool. Anz., 1903, Bd. xxvi; pp. 334-344, figs. 1-5.

After pointing out that not a few of the leading text-books are wrong in their account of the kidney of *Helix pomatia*, the author gives a detailed descrip-

tion of this organ, illustrated by capital figures. It consists of the kidney itself, the primary ureter, which latter extends from an aperture at the apex of the kidney to the posterior corner, and the secondary ureter, being the continuance from the posterior corner of the kidney to the external aperture.

Dean, Bashford.—Japanese Oyster-Culture. U. S. Fish Commis. Bull., for 1902, 1903, pp. 17-37, pls. 3-7, and 27 figs. in text.

The author gives an interesting account of the culture and living conditions of the Western Pacific oysters. There are three species of Japanese oysters, viz., a small one, probably a dwarfed salt-water variety of *Ostrea cucullata*, Born., the shell measures about two inches in length, the actual size of the oyster is, however, rarely larger than one's finger nail. The second form, *O. cucullata*, which seems the most important one from the culturist's standpoint, averages the size of a "Blue-Point," or of an English "native." The third form, *O. gigas*, Thunb., is of large size, specimens weighing with the shell 4 or 5 pounds, being not infrequent.

The cultural methods in various districts are described in detail, and the regulations imposed by the Japanese Government. The question of introducing and cultivating the Japanese oyster in the United States is next dealt with, and various practical suggestions are put forward.

Robert, A.—Recherches sur le développement des Troques. Arch. de Zool. exp. et gen., 1902 (3 ser.), T. x, pp. 269-538, pls. xii-xviii, tables xix-xlii.

Professor Robert, already well known for his admirable studies on the anatomy of the genus *Trochus*, here gives an exhaustive and detailed account of the cell-lineage and development of *T. magus*.

Ancel, P.—Histogénèse et structure de la glande hermaphrodite d'*Helix pomatia* (Linn.). Arch. de Biol., 1902, T. xix, pp. 389-652, pls. xii-xviii.

Kennard, A. S. and Woodward, E. B.—The Non-Marine Mollusca of the River Lea Alluvium at Walthamstow, Essex. Essex Nat., 1903, vol. xiii, pp. 13-21, figs. 1-3.

Smith, Herbert H.—An Annotated Catalogue of Shells of the genus *Partula* in the Hartman Collection belonging to the Carnegie Museum. Ann. Carnegie Mus., 1901, vol. i, pp. 422-485.

It is with feelings of deepest regret that we have to chronicle the decease of Dr. O. F. von Möllendorff, of Frankfort-on-Main, whose death occurred on August 17th. His numerous writings on the Land Mollusca of Eastern Asia, and especially on those of the Philippine Islands, have added much to our knowledge of many little known Asiatic regions.

We hope to give a further account and portrait of the deceased in the December issue.—W.E.C.

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VOL. X.

ON THE RESPIRATORY AND LOCOMOTORY HABITS
OF AMPULLARIA GLOBOSA, SWAINSON.

By V. V. RAMANAN, M.A., F.Z.S., ETC.,

TENALI, KISTNA DR., S. INDIA.

INTRODUCTION.

The following observations on *Ampullaria globosa*, Swainson, were made by me by experimenting with the Ampullarian in an aquarium specially constructed for the purpose, and they ranged over a period of nearly two years. At the same time I lost no opportunity of supplementing this method of study, by watching the behaviour of this species in its favourite natural haunts, in and about the city of Madras.

I may mention at the outset, that many of the observations here set forth are completely at variance with those of Fischer and Bouvier¹, and Karl Semper², made on an allied species *A. insulorum*, d'Orb. Fischer and Bouvier would sometimes appear to contradict Semper and *vice versa*, while my own observations often disagree with those of one or the other, and less frequently with those of both. A number of other interesting points that I have been able to bring together respecting the floating and sinking habits of the Ampullarian, are not even alluded to by them. The discrepancies, in their observations, as compared with mine, must be ascribed to the different nature of the species with which they were working, viz., *A. insulorum*, d'Orb., but the serious disagreement between Semper and Fischer and Bouvier, as regards the same species,

1. I had an opportunity of consulting at first-hand Fischer and Bouvier's paper on the habits of breathing in *A. insulorum*, d'Orb., in *Comptes Rend.*, cxi, pp. 200 *et seq.*, included in Tang's *Text-book of Comparative Anatomy* (English Translation), vol. 3, p. 96, so I base my remarks on the summary given by Ceeke, in the volume on Molluscs in the Cambridge Natural History Series p. 125.

2. *Animal Life* (*International Sci. Rev.*), pp. 151, 169, 448 and 449.

would seem to indicate that the results, of one of them at least, were based on a prolonged and close examination of its life-habits. At the same time, my observations on the breathing, sinking, and floating habit of *A. globosa*, Swains., disclose facts which seem to be quite novel as regard the genus, for I have not found any writer making even a remote reference to them.

DESCRIPTION OF *A. GLOBOSA*, SWAINS.

I have thought it might be useful to give a description of the external form of the animal, chiefly because I have not seen a description elsewhere.

Body of a light brownish grey colour above, dotted over with spots of a brilliant black, edged with glowing yellow, and of a pale bluish or slate tint below. Muzzle stout and conspicuous, produced into two long tentacular processes. Tentacles proper, very long and tapering. Eyes prominently stalked. Two nuchal lobes, the left one forming a long siphon at the animal's pleasure. Respiratory cavity divided by a septum, the right chamber having a large monopectinate branchia, while that in the left is vestigial. The left chamber functions mainly as a pulmonary sac, when the animal indulges in aerial respiration. The shape of the foot is roughly triangular, with the angles bevelled and the apical portion situated posteriorly. The foot-sole is of a dirty yellowish hue.

RESPIRATORY AND LOCOMOTORY HABITS, ETC.

About every twenty minutes or so, the animal crawls to the surface from the bottom of the aquarium,³ feeling its way for the air above the water-level by its long, lashing, tapering tentacles. When within an inch from the surface, it extends the siphonal tube formed by the curling over of its left nuchal lobe⁴; thus bringing the orifice of the tube just above the water. Gradually and almost imperceptibly the orifice expands, until at last it comes to have a diameter of 15 millim., and concurrently with the expansion, the tube itself gradually shortens, and the aperture in the centre of the dividing wall between the lung and gill-sacs opens. The nuchal lobe thus diminishes in length, and after attaining the utmost limit of its expansion in breadth, unfolds in such a manner that it assumes the shape of a semi-circle, forming only the lower half of the rim of the siphonal orifice, while the other half of the rim is provided for by the basal part of the peristome, the body of the tube itself consisting solely of the pallial lobes. It is curious, that this phenomenon is not mentioned either by Semper or by Bouvier and Fischer. From what they state, one would be led to understand that the siphonal tube undergoes no change at the surface beyond elongation and amplitude. On the

3. My Aquarium was a small glass tank 24 feet square.

4. In discussing the breathing habits of *A. insularum*, d'Orb., Prof. Semper tells us that the elongated tube is formed by an incurving of the margin of the mantle. If he means by mantle, the pallial lobes as distinct from the cervical lobes, the observation is not applicable to our Madras species. Vide Semper: Animal life, pp. 418 et seq. Of course the pulmonary chamber which becomes the main part of the tube at a later stage, is made up of the pallial lobes.

contrary, the chief feature in the breathing process of our species lies in the fact that the siphonal tube, after it has reached the top, increases enormously in calibre at the expense of length. The orifice maintains this diameter, as a rule, till the completion of the aerial respiration, and slowly contracts afterwards till the lumen comes to be only 5 millim. in diameter. Bouvier and Fischer make out that *A. insulorum*, d'Orb., the same species with which Semper experimented, produces in the pulmonary sac movements of ex- and inspiration, by alternately raising and depressing its head in much the same manner as the Cetacea. But this does not occur in the Madras species. The breathing-in is a process of complete suction, induced or occasioned by the dilatation of the pallial cavity, which, in the absence of aerial respiration, is completely shrivelled up. So far from ever moving its head at all, it lies perfectly quiet, keeping its tentacles loose and motionless, curled either round the margin of the foot or within the constriction between the podial region and the shell. The siphon meanwhile regains its original length, the animal closes the aperture in the oblique septum between the pulmonary sac and the branchial cavity, lowers the siphon and admits water into it for aquatic breathing. Professor Semper, in respect to the aquatic respiration immediately following the aerial one, at the surface of the water, says that the *A. insulorum*, d'Orb., "reverses the margin of the mantle, opening the tube into which the water streams." So far as I have been able to make out, there is no reversion of the rim of the pallial lobes at all in *A. globosa*, Swains. What takes place is briefly this. The extremely broad orifice through which air enters, becomes somewhat contracted, the siphon regains its length by the infolding of the nuchal lobe, and is lowered bodily under the water, and aquatic respiration begins. Another change is restricted to the circular aperture in the roof of the mantle-cavity, communicating with the pulmonary chamber above. It closes when the aerial respiration is over and the animal lets down the siphon. To see this aperture in the living state, one has to suddenly seize an animal crawling on land, and before it has had time to close its operculum, to force the latter the other way, when a circular opening in the septum (lower wall of the pulmonary sac) can be seen, contracting and expanding. As a rule, the animal does not absolutely close the siphonal orifice when lowering it under water, only the diameter of the orifice is lessened. But it closes it at once, if, on account of some external disturbance, it is obliged to suddenly sink to the bottom. The explanation of this is simple: it wants to avoid the ingress of water, through the unclosed aperture in the septum, into the pulmonary cavity, and therefore completely shuts the siphon. There is no doubt that this contraction and expansion of the aperture which takes place when the animal is on land, or when it is in water respiring air, has a respiratory significance. And when the siphonal orifice is diminished in size, and then lowered into the water, it is probably to suit the exigencies of aquatic breathing. After a time, the animal again extends its siphon above the

water, opens the aperture in the roof of the mantle-cavity, repeats all the processes above-noted, and thus prepares itself for breathing air, only still later to reduce the diameter of the orifice in a few minutes and lower down the siphon to respire water. This alternation of aerial and aquatic respiration takes place for from 11 to 12 minutes at the surface of the water, and finally, the animal closes its operculum and sinks to the bottom.

At the surface of the water, alternate respiration is not always the rule. The animal may indulge in aerial respiration alone, to a complete exclusion of aquatic breathing. Altogether three modes of respiration can be recognised in the animal's life-habits. They are (i) complete aquatic respiration when the animal is under water; (ii) complete aerial respiration when it is on land; (iii) rapid alternation of water breathing and air-breathing when it is at the surface of the water. And it is common to find it also (i) at the bottom of the water, without any breathing; (ii) on land, without any breathing; (iii) at the surface of the water, either breathing air alone, or water alone, or doing no respiration. In these cases of non-breathing, the animal feigns death for a few minutes, sometimes a few hours even, and then resumes respiration.

When the animal is in its usual surroundings, the following may be taken to be the normal cycle of its movements for purposes of respiration:—

ON THE BOTTOM.⁽⁵⁾—The animal lazily crawling and indulging in aquatic respiration, 5 minutes.

IN MIDWATER.⁽⁶⁾—Vigorously crawling to reach the top. Aquatic respiration, 3 minutes, 3 seconds.

AT THE TOP.⁽⁷⁾—Alternation of aerial and aquatic respiration, 11½ minutes. 6 aerial respirations at 1½ minutes each. 6 aquatic respirations at 25 seconds each, falling to the bottom after closing its operculum⁽⁸⁾ 2 seconds.

Of the above observations, some are not in agreement with Semper's, while a few others do not fit in with those of Bouvier and Fischer, who, however, were working with a different species of *Ampullaria* (*A. insulorum*, d'Orb.), that has its home in the Malay Archipelago and elsewhere.

Being decidedly Amphibian in its habits, the animal is occasionally found taking short trips to the land, away from the watery surroundings. It is sometimes unwilling to return to the water for days together. On its

5. When on the bottom, the animal may occasionally be found at rest with its operculum shut for hours, and sometimes for days together. Whether respiration is going on in any latent fashion or is temporarily suspended at that time, it is impossible to say. The oxygen stored up in the pulmonary cavity might perhaps be then sufficient for the low metabolism.

6. But when crawling on the bottom, bubbles of gas sometimes collect round the siphonal edge. These may either be carbonic acid gas given off by the lung or the branchial sac, or the atmospheric air retained in the pallial cavity for pneumatic purposes. The siphonal aperture is of moderate size and uniform in shape.

6. 3 minutes and 3 seconds is the time it takes for getting up my aquarium, which measures 1 foot and 2½ inches high.

7. When the animal indulges in complete aerial respiration at the surface of the water, the siphonal edge can often be seen contracting and expanding rhythmically and sometimes lying in a uniformly extended state for minutes together. This contraction and expansion may correspond to the expiratory and inspiratory processes of respiration.

8. Instead of sinking, it may occasionally crawl down.

trips to land, it may either be found crawling or at rest with the operculum closed. If it should be crawling, it keeps the siphon fully expanded, and breathes air. We can at the same time see the circular aperture in the lower wall of the pulmonary sac, opening and contracting, as well as the siphonal orifice in rapid alternation. The contractions and expansions taken together average 12 a minute. The expansion is twice as rapid as the contraction. When it is at rest, it is difficult to say if it breathes or not (see note above). Both in this condition and in that mentioned in footnote 5, it is almost certain that metabolism is very low, and that respiration, if any, is extremely feeble. The operculum is so hermetically closed that no air can possibly get in.

I have occasionally seen the animal floating on the surface of the water, with its foot and tentacles spread out. When in this posture, it keeps its siphonal orifice closely shut without exhibiting either sort of breathing. There is no doubt that in order to float like this the animal must, in the first instance, fill its pallial cavity with air. And that this is actually the case, I have ascertained by giving a severe blow with the finger on the shell, when the animal was floating at ease. It at once went down on account of the blow, and as it sank, gave off a series of bubbles which burst as soon as they reached the surface, thus proving the presence of air in the mantle-cavity.

If we do not, on the other hand, disturb the animal when it indulges in this indolent floating, after 10 minutes or more, it either attaches itself to some plant or other object near at hand, and begins taking in air or water, or sinks to the bottom with its foot fully extended, its tentacles spread out, and its elongated siphon closed. I did not find the slightest alteration of form in the tentacles, siphon or foot. No bubbles of air are given off either when it reaches the bottom or afterwards.

The animal, strange to say, is not able to float from the bottom to the surface, however extended it may keep its body, showing thereby that it is not able to displace a sufficient volume of water to proportionately lessen its weight. This fact seems to contradict my first observation that the animal in a fully expanded state is able to float on the surface of the water, and I am unable to explain the apparent discrepancy.

Thus, whenever the Ampullarian wants to ascend to the surface, it invariably crawls, but when descending, it may either crawl, fall straight-way to the bottom after closing its operculum, or, more rarely, may float down. Whenever the animal falls, by suddenly closing its operculum, either voluntarily or on account of interference, bubbles of air are given off; but not when it crawls or slowly sinks down. Of course, the animal, when roaming undisturbed under water, gives off now and then one or two bubbles (foot-note 5); and these are to be carefully distinguished from the series of bubbles given off by the animal, when it is forcibly pushed down. There is little doubt that the Ampullarian keeps within its body some air for pneumatic needs. If we take, for instance, an animal lying

at the bottom of the aquarium and put it suddenly in hot water, it gives off a series of bubbles before dying. The same thing also happens in the case of an animal which has been long out of water. An interesting point in the animal's ascent is that it is able, despite its bulk, to trust itself safely to the very delicate stems or leaves of aquatic plants. These never bend or move from side to side when it is ascending, and it is probable that its expanded condition contributes to the feat. The plants are so thin that, but for the elaborate hydrostatic adjustment of the animal in spreading out its body, they would otherwise bend or give way under the weight of such a heavy body. We must at the same time remember that the animal uses its discretion in making a distinction as to its manner of movement, whether it shall crawl up hard objects, such as the inner side of the aquarium, stones, etc., or ascend the flexible stems of aquatic plants. In the one case, it keeps its foot and tentacles normally spread out, while in the other it produces them to an extraordinary extent, and keeps the body greatly expanded in order to lessen its weight in the water as far as possible, and in order to ascend the leaves of the most delicate and fragile plants, without swaying to one side or the other. In such cases it is easy to observe the laborious caution the animal takes, lest it should slip down. I have found in the aquarium Ampullarians ascending clusters of leaves as easily as single ones. When they ascend collections of leaves, they do so without difficulty. But when they climb a single leaf or stem, they take the utmost precaution, expand their bodies to the greatest limit, and progress gradually. But the most interesting point of all, lies in their careful efforts to extend the foot into a thin leafy expansion and engulf the long narrow leaf or stem within it.

And now marshalling, in conclusion, all the facts we have been able to gather respecting Ampullarian locomotion in water, we get three groups of phenomena, which may be put as follows :--

I.—FLOATING ON THE SURFACE OF THE WATER.

- (A.) *Active*.—Body thoroughly extended or only extended partially. Goes down when disturbed.
- (B.) *Passive*.—Body only partially extended. Nothing short of a sharp prick will make the animal close the operculum and sink. A hard knock on the shell with a heavy nail, sends it down, but as soon as the impulse is exhausted, it floats. The animal behaves like a dried cork immersed in water.

II.—DESCENDING TO THE BOTTOM BY

- (A.) *Sinking*.—By suddenly withdrawing all the soft parts, closing the operculum and giving off a series of bubbles. This may either be (i) Voluntary, or (ii) Involuntary, when necessitated by any external interference or injury.

- (B.) *Sinking Slowly*.—With all the soft parts well-protruded, or only slightly retracted. Not a single bubble is given off.
- (C.) *Crawling*.—All the soft parts normally extended, and no air-bubbles given off.

III.—RE-ASCENDING BY MEANS OF CRAWLING.

- (A.) *Up hard objects*.—Body normally extended.
- (B.) *Up fragile stems or leaves*.—A sort of acrobatic progression, carried out with the greatest deliberation. Body extraordinarily spread out.

Judging from the massive nature of the animal's body, one or two explanations seem at first sight necessary to interpret its widely-diverging modes of locomotion : (A) the animal is able to determine its pneumatical adjustments at particular levels of the water, by secreting the needed amount of air from its own tissues, or (B) it is able to inflate itself with the required quantity, deriving it from either (a) the air which is found dissolved in the water, or (b), the atmospheric air above the water-level. But when closely examined in the light of facts, both of these suppositions fail. For if (A) and (B), (a) were true, it is hard to understand why the animal is not able to float to the surface, but tries to reach it by laboriously crawling up the inner side of the aquarium, or up the plants that may be living in it. (B) (b) breaks down, if we keep in mind the fact that when slowly sinking to the bottom, there is neither the retraction of soft parts, nor the extrusion of bubbles of air, which this theory requires. Thus, it can be shown that a hypothesis which accounts for one set of facts, does not hold good for the other. Another strange fact to crown the confusion with regard to both (A) and (B), is that the animal is unable to float on the under-surface of the water as *Bythinia* and *Lymnaea* are capable of doing. We see, therefore, that the whole phenomenon of Ampullarian locomotion, from the firm adherence of its foot to smooth surfaces, and its slow but steady progression at the surface of the water, down to its mysterious want of power to float to the surface of the pond or aquarium, suggest a series of problems in zoo-mechanics which need thorough investigation. The subject is one also, that does not seem to have been taken up by any of those specialists, who have made the subject of animal mechanics their particular study.

THE ANATOMY OF PHARELLA ORIENTALIS, DUNKER AND TAGELUS RUFUS, SPENGLER.

By H. H. BLOOMER.

(Plate x.)

I wish first to acknowledge my indebtedness to the director of the Natural History Department of the British Museum, Professor E. Ray Lankester, F.R.S., and to Mr. Edgar A. Smith, L.S.O., by whose courtesy I have been enabled to examine a specimen of each of the above species.

Pharella orientalis. Dunker.

EXTERNAL CHARACTERS.

The specimen measures 14.5 c.m. long, 4.7 c.m. deep, and along the dorsal surface is slightly curved upwards. The mantle lobes from a position over the posterior part of the anterior adductor muscle, take a deep curve and pass some distance posteriorly before their concrescence, thus the pedal aperture though lying anteriorly extends over the anterior adductor muscle, and on the ventral surface still further posteriorly. The muscles of the pallial edge (Fig. 1, *P.M.*) form a deep band, and the exterior margins of the lobes are crenulated all round them. The periostracum passes from the pallial edges to the valves of the shell and is abundant at the posterior end. The flaps on the mantle lobes bordering the pedal aperture are very narrow. There is no fourth aperture. The proximal portion of the siphon is strongly developed, while the free portions are extremely short. The tentacles bordering the siphonal openings are very long, particularly the outer ones (Fig. 1, *S.T.*), some measuring as much as 8 millim. long. The smaller tentacular fringe extends a considerable distance anteriorly along the concresced portion of the mantle lobes, both dorsally and ventrally.

The foot (Fig. 1, *F.*) is long, of a nearly uniform depth and axe-shaped at the distal end.

The retractor pedis posterior muscle (Fig. 1, *P.R.P.*) is long, thereby shortening the distance between the posterior adductor and the siphon. At the posterior end the inner parts of the bases of the gills are joined together for about only one-third of the distance between the siphon and the foot.

The labial palps are relatively short and wide, the outer ones being especially wide.

MUSCULATURE.

i. *The Pallial Muscles* (Fig. 1, *P.M.*).—These form a deep band round each mantle lobe, and ventrally lie chiefly at right angles to the pallial edge. They obtain their maximum thickness at the line of adhesion to the valves of the shell. At the posterior end they form the proximal siphonal portion and are much more strongly developed (Fig. 1).

The anterior adductor muscle (Fig. 1, *A.A.*) is a large and nearly circular muscular plate, joined dorsally and anteriorly with the dorsal integument and mantle lobes, and posteriorly with the foot by the muscular ventral integument.

The posterior adductor muscle (Fig. 1, *P.A.*) is a large and deep plate of muscles, curving anteriorly and posteriorly towards the flattened dorsal surface. Anteriorly it is connected with the retractor pedis posterior muscle, and posteriorly with the proximal portion of the siphon and the dorsal integument.

ii. *The Pedal Muscles.*—The muscular arrangement of the foot is similar to that of *Solen* and is strongly developed. The three kinds of muscles found in this genus are also present, but in *Pharella orientalis* there is a large increase in the number of rows of the transverse muscles. Briefly, on each lateral side are two groups of longitudinal muscles, and between these there is a semi-circular band passing from the dorsal to the ventral surface. Between the two inner and much larger layers of longitudinal muscles, are a number of rows of transverse muscles, the fibres of which pass through the longitudinal muscles to the semi-circular layers, and they either continue, or other muscular fibres pass from these latter through the outer longitudinal bundles to the muscular pedal integument.

The pedis retractor anterior muscles (Fig. 1, *P.R.A.*) are short and thick, and in the foot proceed mostly in a postero-ventral direction over instead of under the longitudinal pedal muscles. There does not appear to be any bifurcation of the free portions.

The pedis retractor posterior muscle (Fig. 1, *P.R.P.*) is a comparatively long muscle, narrow at the sides and increasing in depth towards the median line. The bifurcated parts are short and connected with the posterior adductor muscle. Anteriorly the muscle continues as a portion of the longitudinal muscles of the foot.

ALIMENTARY CANAL.

The lips (Figs. 1, 2 and 3, *A.L.* and *P.L.*) formed by the union of the labial palps are wide, especially the upper or anterior one, which is of considerable width. The oesophagus (Figs. 2 and 3, *Oe.*) first runs a little dorsally, then turns posteriorly and opens into the stomach.

The stomach (Fig. 1, *St.*) is a long and irregularly shaped sac, consisting of a number of divisions which, for convenience, I have termed Anterior-oesophagael, Posterior-oesophagael, Cardiac, Central, and Pyloric.

The anterior oesophageal division (Figs. 2 and 3, *A.Oe. St.*) is long and narrow and divided from the posterior oesophageal one by a muscular ridge passing round the stomach.

The posterior oesophageal division (Figs. 2 and 3, *P.Oe. St.*) lies between the anterior oesophageal and the pyloric divisions. At its posterior end is the central division (Fig. 2, *C.D.*) bordered by a muscular ridge (Fig. 2, *C.D.R.*).

The dorsal side of this ridge is more developed and represents the muscular papilla of *Solen* (Fig. 2, *M.P.*). It separates the central from the cardiac division (Figs. 2 and 3, *C. St.*). Continuous with it is also a ridge (Fig. 2, *Oe. C.R.*) which divides the posterior oesophageal from the cardiac division. In the anterior part this muscular tissue extends right across, thus completely separating these two divisions.

The pyloric division (Figs. 2 and 3, *P. St.*) is large and occupies the whole of the posterior portion of the stomach. On the right side is a muscular ridge (Fig. 3, *P.D.R.*) running from the posterior oesophageal ridge nearly round this pyloric division. The ventral portion of the pyloric division narrows and continues as the caecum of the crystalline style (Figs. 1, 2, and 3, *C.C.*). The caecum is very long and large. It first passes ventrally, then curving, extends a considerable distance along the pedal cavity.

The intestine (Figs. 1 and 3, *In.*) leaves the ventral surface of the left anterior part of the pyloric division, the typhlosole commences, and the intestine proceeds first a little anteriorly, curves, and goes ventrally running just anterior to the caecum of the crystalline style, from which it is separated by a row of transverse muscles. It then turns anteriorly and forms a number of large folds, in the last of which the typhlosole disappears and the intestine proceeds posteriorly, passing over the right side of the caecum, then going dorsally, passes in a large loop over the posterior part of the pyloric division, and turning posteriorly continues as the rectum (Fig. 1, *R.*). It is shortly afterwards encircled by the ventricle (Fig. 1, *V.*), then passes over the posterior adductor muscle into the exhalant siphonal chamber, terminating in a bi-lobed anus (Fig. 1, *A.*).

The liver (Fig. 1, *L.*) lies laterally, ventrally, and partly dorsally around the stomach. The large bile duct enters on the ventral surface of the posterior oesophageal division and the smaller bile duct into the central division.

CIRCULATORY SYSTEM.

Apparently closely resembles that of *Solen*.

As regards the gill structure, Dr. Ridewood⁽¹⁾ states:—"In the five species of *Solen* examined the lamellæ are heterorhabdic and plicate, the plication being shallower in *Solen orientalis* than in the others. The numbers of filaments in a plica are nearly the same in the two demi-

1. Phil. Trans. Roy. Soc., 1903 (ser. B), vol. 195, pp. 147-234.

branches and run approximately 26 in *Solen vagina*, 17 in *Solen ensis*, 12 in *Solen fonesi*, 22 in *Solen (Solena) rudis* and 16 in *Solen (Phorella) orientalis*. . . . The two or three filaments at the apex of the plica are enlarged in *Solen fonesi* and *Solen orientalis*. . . . In *Solen orientalis* there is every gradation from a shallow frontal groove to a shallow frontal ridge, even in filaments cut at the same horizontal level. In all five cases the frontal groove disappears at the ventral edge of the demibranch, where the principal filament presents a distinct frontal ridge."

NERVOUS SYSTEM.

The cerebro-pleural ganglia lie lateral to the mouth, under the retractor pedis anterior muscles, and between them and the ventral integument. The commissure connecting the two ganglia goes in front of the mouth. Each ganglion apparently gives rise to only one anterior nerve, the anterior pallial nerve, which passes gradually outward to the postero-ventral edge of the anterior adductor muscle, but divides shortly before reaching it, the inner branch going underneath and innervating the muscle, the outer one passing across the mantle lobe and again dividing, the anterior part once more proceeds and divides; both branches join the outer circumpallial nerve, while the posterior part goes posteriorly as the inner circumpallial nerve.

Posteriorly each cerebro-pleural ganglion communicates with the visceroparietal ganglion by a connective. The connective first proceeds between the retractor pedis anterior muscle, and the pedal wall, then emerging, runs between the latter and the viscera, and, reaching the anterior portion of the retractor pedis posterior muscle, passes through the pedal integument to the lateral surface of the muscle and then underneath to the visceroparietal ganglion.

The cerebro-pedal connective leaves the cerebro-pleural ganglion on the inner side of the cerebro-visceral connective, and passing partly through and then along the pedal muscles, gives off a nerve to the viscera and afterwards joins the pedal ganglion.

The pedal ganglia are situated in the centre of the foot, midway between the dorsal and ventral surfaces, just over the anterior end of the anterior folds of the intestine. The ganglia give off on each side a number of nerves which innervate the foot.

The visceroparietal ganglia are situated under the posterior adductor muscle. From each ganglion arises a branchial nerve which first goes some distance anteriorly and curving outwards passes to the gills. Posteriorly each visceroparietal ganglion gives off a nerve, the posterior pallial nerve. It passes latero-posteriorly across and under the posterior adductor muscles, then there arises from it a nerve which crosses the mantle lobe and joins the inner circumpallial nerve, and afterwards the outer circumpallial nerve. The main nerve goes along the proximal

portion of the siphon, innervating it and the dorsal integument, and apparently joining the outer circumpallial nerve.

Tagelus rufus, Spengler.

EXTERNAL CHARACTERS.¹

The specimen measures 5.7 c.m. long and 2 c.m. deep. The mantle lobes (Fig. 4, *M.L.*), which take a slight curve forwardly from the anterior margin of the anterior adductor muscle, are not concresced along their ventral surface, but are joined together below the extreme siphonal end by a round transverse muscle (Fig. 4, *M.C.*), the ends adhering to the valves of the shell, and thus resembling the adductor muscles, consequently the pedal aperture extends from the anterior adductor muscle to the siphon. There is no fourth aperture. At the posterior end the mantle lobes proceed some distance beyond the proximal portion of the siphon, giving off close to their posterior edges lateral processes (Fig. 4, *P.L.P.*) which encircle and are connected, with the siphon, thus completely enclosing the posterior end of the pallial chamber.

The teeth of the shell are not very prominent, and do not penetrate into the viscera as in *S. strigillatus*. The proximal portion of the siphon is short, while the free portions (Fig. 4, *In. I.* and *Ex. S.*) are of considerable length, the exhalent being longer than the inhalent one, but the openings by which they communicate with the pallial chamber are small. Large siphonal retractor muscles (Fig. 4, *S.R.M.*) are present and from a large surface adhere to the valves of the shell. The edges of the mantle lobes and the siphon are not characterised by carrying a tentacular fringe. The foot (Fig. 4, *F.*) is large, comparatively short, and very deep. The inner parts of the bases of the gills are joined together.

MUSCULATURE.

i. Pallial Muscles.—The muscles of the pallial edge commence at the anterior adductor muscle as a deep band. This band, after taking a slight curve, anteriorly, passes posteriorly and gradually decreases in depth until it reaches the proximal siphonal end, where the two mantle lobes are joined together by a round transverse muscle, the musculus cruciformis (Fig. 4, *M.C.*) described by von Ihering², and stated by him as being an important character of the super-family *Tellinacea*, confirming the views of Dall. He believes this cruciform muscle is a special development of the fibres of the mantle edge, and functionally may serve as a secondary adductor.

The siphonal retractor muscles (Fig. 4, *S.R.M.*) run a short distance anteriorly along the mantle lobes, they pass through them, and spreading

2. Proc. Acad. Nat. Sci. Philad., 1900, pp. 460, 481, 2 figs.

out dorsally and ventrally, extend in a deep semi-circular direction, forming large surfaces from which they adhere to the valves of the shell.

The anterior adductor muscle (Fig. 4, *A.A.*) is a plate of muscles of greater length than depth, and divided into two unequal parts by the ventral integument passing between them to the dorsal surface. Anteriorly the muscle is connected with the mantle lobes, and posteriorly with the pedal and the dorsal integument.

The posterior adductor (Fig. 4, *P.A.*) muscle is a deep plate of muscles flattened anteriorly, and from this side is joined with the bifurcated parts of the retractor pedis posterior muscle and dorsal integument, and at the posterior side with the proximal portion of the siphon, the *dorsal integument and the mantle lobes*.

The pedis retractor anterior muscles (Fig. 4, *P.R.A.*) run ventrally, apparently over the longitudinal pedal muscles. There is no bifurcation of their free parts.

The pedis retractor posterior muscle (Fig. 4, *P.R.P.*) is very narrow and of considerable length, the posterior parts of the bifurcated portions being connected with the posterior adductor muscle.

From the specimen examined it was not possible to trace the pedis elevator or branchial retractor muscles, present in *S. strigillatus*.

ALIMENTARY CANAL.

The lips (Figs. 5 and 6, *A.L.* and *P.L.*) formed by the junction of the labial palps, point anteriorly. The oesophagus (Figs. 5 and 6, *Oe.*) is very short, it passes posteriorly and soon opens into the stomach. In shape the stomach (Fig. 4, *St.*), though similar to that of *S. strigillatus*,⁽¹⁾ is longer, shallower, and the divisions are not so pronounced. I have, however, used the same terminology for the respective divisions. In the left part of the stomach and anterior to the centre lies the central division (Fig. 5, *C.D.*), bordered by a muscular ridge (Fig. 5, *C.D.R.*), which on its dorsal side is developed into a muscular papilla (Fig. 5, *M.P.*). From this central ridge, proceeds another one (Figs. 5 and 6, *A.D.R.*) which separates the dorso-central from the anterior division, then passing around the stomach in an irregular manner, divides the anterior from the posterior division.

The anterior (Figs. 5 and 6, *A.D. St.*) is larger than the posterior division (Figs. 5 and 6, *P.D. St.*), and its dorsal surface consists of a very muscular layer. The dorso-central division (Fig. 5, *D.D.*) is shallower and not so readily distinguished. The posterior division (Figs. 5 and 6, *P.D. St.*) is larger, depressed dorsally, and deeper at the posterior end.

From its ventral surface proceeds the caecum of the crystalline style (Figs. 5 and 6, *C.C.*), which goes ventrally, then curving terminates near the dorsal surface of the pedal cavity. As in *S. strigillatus* the intestine

(Fig. 5, *In.*) is only partly separated from the caecum and appears as an irregular groove on the side of the latter. Near the distal end of the caecum the intestinal walls unite, thus completely enclosing it. The intestine (Fig. 4, *In.*) returns along the dorsal surface, and becoming free passes to the posterior part of the proximal portion of the foot, and makes a large number of folds (Fig. 4, *F.In.*) at and over the posterior division, then turning posteriorly continues as the rectum (Fig. 4, *R.*). It passes round the posterior adductor muscle, and on the postero-ventral surface ends at the anus (Fig. 4, *A.*). The liver (Fig. 4, *L.*) surrounds the anterior portion of the stomach with a considerable part lying underneath it. The large bile duct enters on the ventral surface of the anterior division, just in front of the intestine, and the smaller bile duct into the central division.

CIRCULATORY SYSTEM.

The circulatory system generally resembles that of *S. strigillatus*.

As regards the structure of the gills, Dr. Ridewood remarks⁽¹⁾:

"The gills of the three species of *Solenocurtus* examined agree tolerably closely in their general structure. The lamellæ are highly plicate, the plicæ being flattened antero-posteriorly so as to resemble the leaves of a book. The number of filaments in a plica are about 30 in the outer and 40 in the inner demibranch in *Solenocurtus strigillatus*, and *Solenocurtus (Tagelus) rufus*, while in *Solenocurtus (Macha) philippinarum* the numbers are about 21 and 30. In *Solenocurtus rufus* all the interlamellar septa rise high up the demibranch but in the other two species alternate septa are of small vertical extent. *Solenocurtus rufus* also has in the apex of the plica, a blood tube which is not noticeable in the other two."

NERVOUS SYSTEM.

The nervous system is very similar to that of *S. strigillatus*, the chief differences being in *T. rufus*, a smaller number of branches of the posterior pallial nerves and more particularly the absence of the large ones crossing the siphonal retractor muscles.

REFERENCE LETTERS.

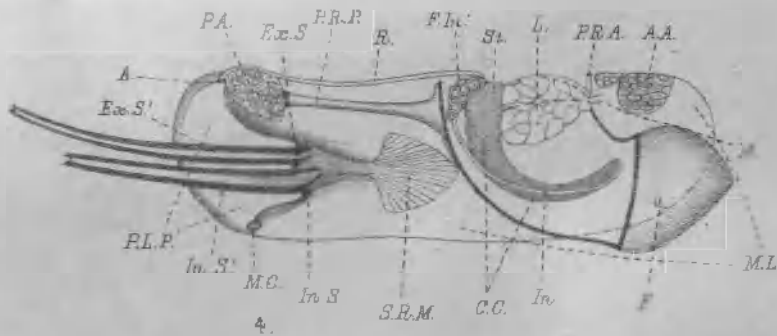
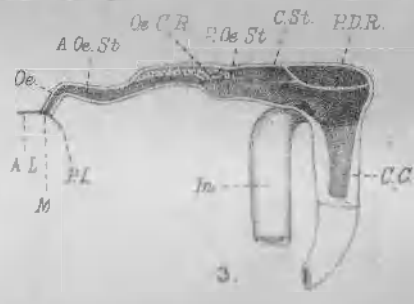
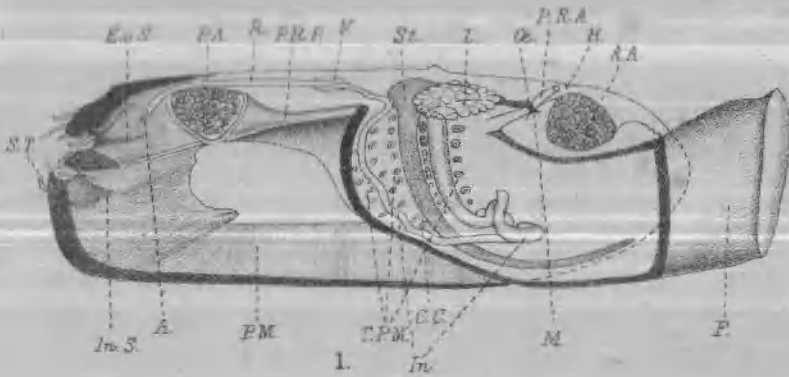
<i>A.</i>	Anus.	<i>C.C.</i>	Caecum of the crystalline style.
<i>A.A.</i>	Anterior adductor muscle.	<i>C.D.R.</i>	Muscular ridge bordering the central division of the stomach.
<i>A.L.</i>	Anterior or upper lip.	<i>C.D.</i>	Central division of the stomach.
<i>A.D.R.</i>	Ridge separating the anterior from the other portion of the stomach.	<i>C.St.</i>	Cardiac division of the stomach.
<i>A.D.St.</i>	Anterior division of the stomach.		
<i>A.Oc.St.</i>	Anterior oesophageal division of the stomach.		

1. *Op. cit.*

<i>D.D.</i>	Dorso-central division of the stomach.	<i>P.A.</i>	Posterior adductor muscle.
<i>Ex.S.</i>	Proximal portion of the exhalent siphonal chamber.	<i>P.D.St.</i>	Posterior division of the stomach.
<i>Ex.S'</i>	Free portion of the exhalent siphonal chamber.	<i>P.L.</i>	Posterior or lower lip.
<i>F.</i>	Foot.	<i>P.M.</i>	Muscles of the pallial edge.
<i>F.In.</i>	Folded portion of the intestine.	<i>P.D.R.</i>	Muscular ridge of the stomach running from the oesophageal ridge nearly around the pyloric division.
<i>H.</i>	Point where the dorsal integument is connected with the teeth of the shell.	<i>P.I.P.</i>	Lateral processes from the posterior edges of the mantle lobes, which encircle and are connected with the siphon.
<i>In.</i>	Intestine.	<i>P.Oe.St.</i>	Posterior oesophageal division of the stomach.
<i>In.S.</i>	Proximal portion of the inhalent siphonal chamber.	<i>P.R.A.</i>	Retractor pedis anterior muscle.
<i>In.S'</i>	Free portion of the inhalent siphonal chamber.	<i>P.R.P.</i>	Retractor pedis posterior muscle.
<i>L.</i>	Liver.	<i>P.St.</i>	Pyloric division of the stomach.
<i>M.</i>	Mouth.	<i>R.</i>	Rostrum.
<i>M.C.</i>	Musculus cruciformis, a transverse muscle, situated ventrally to the siphon.	<i>S.T.</i>	Tentacles bordering the siphonal apertures.
<i>M.P.</i>	Developed portion of the muscular ridge, representing the muscular papilla of <i>Salen</i> .	<i>St.</i>	Stomach.
<i>M.L.</i>	Left mantle lobe.	<i>S.R.M.</i>	Siphonal retractor muscle.
<i>Oe.</i>	Oesophagus.	<i>T.P.M.</i>	Transverse pedal muscles.
<i>Oe.C.R.</i>	Ridge dividing the posterior oesophageal from the cardiac portion of the stomach.	<i>V.</i>	Ventricle.

EXPLANATION OF PLATE X.

- Fig. 1. *Pharella orientalis*, Dunker. View from the right side, showing the alimentary canal, &c., $\times 4$.
- Fig. 2. *Pharella orientalis*, Dunker. Longitudinal section of the stomach, showing the internal structure of the left side. $\times 14$.
- Fig. 3. *Pharella orientalis*, Dunker. Longitudinal section of the stomach, showing the internal structure of the right side. $\times 14$.
- Fig. 4. *Tagelus rufus*, Spengler. View from the right side, showing the alimentary canal, &c. $\times 14$.
- Fig. 5. *Tagelus rufus*, Spengler. Longitudinal section of the stomach, showing the internal structure of the left side. $\times 2$.
- Fig. 6. *Tagelus rufus*, Spengler. Longitudinal section of the stomach, showing the internal structure of the right side. $\times 2$.



H.B. del. et nat.

Huth, Litho London.

ANATOMY OF PHARELLA & TAGELUS.

OTTO FRANZ VON MOELLENDORFF.

By DR. W. KOBELT.*

(Plate xi.)

There are men who, born collectors, are predestined to be systematists, who from earliest childhood pick up anything in nature which seems remarkable, and try and give it the right place. Such a man was Dr. Otto Franz von Moellendorff, who on the 17th of August of this year was taken away from science much too early by a malicious cancerous disease. Born on the 24th of December in 1848, at Hoyerswerda, he had a leader from the first years of his childhood in his father, who was a Commissioner of Agriculture, and later President of the *Natural History Society in Görlitz*. The museum of that Society was the envious boy's dearest abode, and when in 1866 he went to the University of Halle, it was quite natural that he should take up the study of Natural Science. As circumstances did not permit of his taking up a scientific career, he devoted his time to the study of Chemistry, but his heart never left Zoology, and the desire to visit foreign countries. Therefore he seized, in 1870, the chance by accepting an offer from Dr. Blau, General Consul at Scrajewo, to accompany him as a teacher for his children to Bosnia.

Bosnia, which was at that time still Turkish and uninvestigated, found Moellendorff, besides his position, which was very suitable to his teaching powers, and later his wife, who was an unwearied companion in his work, a rich field for investigation.

Already at that time he was a member of the German Malacological Society, and corresponded with me, an intercourse which has continued without a break for more than thirty years. In his "*Fauna of Bosnia*," written in 1872, as a thesis for his degree of Doctor of Philosophy, the land and fresh water molluscs constitute the chief part. Dr. Blau, knowing the teacher's uncommon gifts, induced him to take up the Consulate's career. The only prospects at that time lay in the extreme East, especially in China, so the new doctor of Philosophy reported himself for China, and in 1873 went as Interpreter to Peking. His great talent for languages, and his capability of adapting himself to foreign circumstances and of understanding foreigners, made him advance quickly. We find him

* Translated and communicated by Herr D. F. Heynemann, from the *Nachr. Deutsch. Malak. Gesell.*, 1898, pp. 101-107.



DR. OTTO FRANZ VON MOELLENDORFF.

BORN DECEMBER 24TH, 1848

DIED AUGUST 17TH, 1909

till 1880 in Peking, Tientsin, and Shanghai; afterwards as Consul in Canton, Hong Kong, and again at Canton. But for higher positions two things stood in his way—an old family failing, a too stubborn nature, and his love for natural science, which latter seemed to competent judges inexplicable and very suspicious—so, being a master of the Chinese language and intimate with their circumstances, he was transferred to Manila.

In China he had already collected with unwearied perseverance, and made several converts to Malacology, increasing our knowledge in quite an unexpected manner. In the Philippines such results were scarcely to be expected; for, according to the general opinion, the islands had been thoroughly searched by Cuming, Semper, Jäger, and Quadras, and small species there were totally unknown. This, however, seemed to the new Consul, after his experiences in the South of China, simply impossible, in spite of the assertions of Quadras. Indeed, Moellendorff soon had the opportunity of proving he was in the right. It gave him much pleasure to tell how on the first trip with Quadras to Montalban, near Manila, and face to face with the lime rocks, he said to his companion if there be no small species here, he would confess that he was in the wrong, and throwing themselves full length on the ground at the foot of the rocks, Quadras was the first to find a small operculate, which proved to be a new species. Thereupon, the spell was broken, and quite an unthought-of abundance of minute forms rewarded the collecting. For eleven years, from 1886 to 1896, Moellendorff kept on, so far as his official duties permitted, and not only Quadras as well, but some German friends also. Moellendorff added to the molluscan fauna of the Philippines, directly or indirectly, some eight hundred species. No sacrifice seemed too great to him, in view of his aim—the exact knowledge of the Archipelago.

Alas! he could not escape the consequences of his lengthened stay in a tropical climate; anaemia and heart weakness laid hold of him, and in the autumn of 1896 no other choice was left him but to look out for a cooler climate. The German Empire had for a man who had spent twenty-three years' service in the tropics sacrificing his health, no other position than the Consulship at Kowno. No choice was left him in consideration of a large family, and so from 1896 until 1901 he had to remain in that remote forlorn place, severed from any intellectual impulse. Here also he did not rest, for he succeeded in rousing some interest for investigation of the home country, and in founding a Natural Science Club.

Then a happier fate appeared to beckon him. The new Frankfurt Academy of Commerce was to be inaugurated, and a man with experience in Consular office was sought for to undertake the lectures on Consulate business and commercial geography. As soon as attention was directed to Moellendorff, who by reason of his great experience and wide learning was particularly adapted for the position, he had only to accept the position with pleasure: and so in October, 1901, he settled at Frankfurt. The dream of his life was accomplished, an independent scientific employment

was won in a place where intellect and science reigned as in few Universities.

Moellendorff threw himself with all his might into the new circumstances, not only in the Academy but also in the Senckenbergischen Naturforschenden Gesellschaft, whose corresponding member he had been for many years; in the Verein für naturwissenschaftliche Unterhaltung, and in the Anthropological Society, established under his co-operation, he exhibited an ardent and stimulating activity. He undertook in my place the direction of the Malacological Department of the Senckenberg Museum, and commenced to re-arrange the rich collections. But only one happy year was to be granted him. Already in the autumn of 1902 the symptoms of a mysterious disease announced themselves, insignificant in the beginning, but becoming worse and worse. From the first days of 1903 he was obliged to keep to his bed. It was pitiful to see that strong man, in spite of his healthy lively mind, growing bodily weaker and weaker. On the 17th of August a quiet death released him from his sufferings, which had been endured with exemplary patience.

The masterpiece of Moellendorff's life was his conchological collection. Nine large double cabinets were filled with the treasures which he had collected, partly himself, and partly by exchanging on a large scale in the course of more than thirty years. The collection had been worked through as few have been, and contains the types of at least 1,500 species and local forms described and named by him; also innumerable specimens obtained from other authors (co-types), who had very willingly exchanged with the owner of this magnificent collection.

Success has attended the efforts to acquire this collection, as well as all the scientific materials he left behind, for the Senckenbergische Gesellschaft, and thus preserve the same for science. It will thus be possible to complete the Land Molluscan Fauna of the Philippines with the help of the list which appeared in 1901. Likewise, I also hope to supply the continuance of the Monograph on the Agnatha for the Conchylienkabinet of Martini and Chemnitz. But the plans which we made together for a Zoogeography of the Philippines on a large scale, have entirely fallen through, for only a man who has a practical knowledge of the country could execute it. Gone are many other intentions which we both thought to accomplish together. For me the hope is entirely gone, that the man eight years my junior, would one day fulfil what I myself can scarcely expect to perform.

Moellendorff was a man of firm principles, of a straightforward and honest nature, perhaps somewhat too sure of his own opinion, and not easy for everyone to get on with, but absolutely true towards his friends. His power for work was of the first order, and his knowledge was astonishingly many-sided; there were few branches of knowledge he was a stranger to, and to many men he could be a teacher. During the first decade of his stay in China he wrote several linguistic and geographical papers of importance. His map of the North of China proved of considerable service

in the campaign against Peking, and by his communications the birds and mammals of the North of China have been more accurately made known. Later he concentrated his attention more and more on the Land Shells, but even in the Philippines he continued to collect all kinds of animals which did not require a troublesome preparation, and willingly and most unselfishly placed his material at the disposal of amateurs. Even his investigations of New Guinea, and later of Indo-China, have proved of great service. His last work, during which death itself took the pen out of his hand, was the working up of the collections made by Russian investigators in the centre of China and Tibet. The examination of travellers' collections of this kind he was very fond of.

His papers appeared, for the greater part, in the "Jahrbucher" and "Nachrichtsblatt" of the German Malacological Society, as well as in the Jahresberichten of the Senckenberg Society, some in English periodicals, as the Proceedings of the Zoological and Malacological Societies of London, the Annals of the Calcutta Museum and of the East Asiatic Society, and the Annals of the St. Petersburg Museum. Of the Molluscan Fauna of the Philippines, a supplement to Semper's Fauna, and as a part of Semper's great work, he only accomplished the Agnatha and *Naninae*; and only the two first parts, containing the *Rhytididae*, of the monograph of the Agnatha for the second edition of Martini and Chemnitz.

SOME NOTES ON THE SO-CALLED APPENDIX OF *HELICELLA BARBARA* (L.).

By H. OVERTON.

Some short time ago I communicated to the Midland Malacological Society, a paper dealing with various points in the anatomy of *Helicella barbara* (L.) = *Helix acuta*.

There are many points of interest, and they have formed the subject of various papers by different writers. Thus Schmidt, in 1854⁽¹⁾, described a small calcareous organ at the base of the penis; Fischer, in 1856⁽²⁾, described and figured the spermatophore; Ashford, in 1885⁽³⁾ gave a figure of the generative organs; as also Moss and Paulden, in 1892⁽⁴⁾, the latter authors giving a short description.

With reference to the calcareous organ described by Schmidt, I am of opinion that this is a provision to assist in holding the organs together during copulation, so as to ensure the transference of the spermatozoa. As can easily be seen in dissection, the true penis is very short.

There is no true dart-gland in this mollusc, but a small, glandular diverticulum, which has been very differently interpreted by various authors. Moquin-Tandon termed it a simple mucous gland, which, as pointed out by Ashford, can scarcely be correct. Moss and Paulden refer to this organ as a gland of doubtful function; while Mr. J. W. Taylor⁽⁵⁾ describes it as an appendix, and regards it as probable that its affinities are with the semi-independent flagellum in *Bithynia*, *Buliminus*, etc.

While this organ cannot be regarded as a simple mucous gland, it certainly is not, in my opinion, homologous with the flagellum of *Bithynia*, etc.

The gland in question opens into the vestibule on the left-hand side, close to the opening of the short vagina. It is 4.5 millim. in length, with a maximum diameter of .5 millim. and a minimum diameter of .2 millim., and lies coiled upon the vestibule and vagina. Near to the distal end of this organ there is a small muscle, which attaches it to the common duct, opposite and just above the point where the vas deferens is given off (Fig. 1).

1. Geschlechtsapparat der Stylomatophoren.

2. Journ. de Conchyl., 1856.

3. Journ. Conchyl., 1885, vol. iv, p. 976.

4. Trans. Manchester Microsc. Soc., 1892, pp. 1-7, pl.

5. Monog. l. & F. Mus., 1900, vol. iv, p. 363.

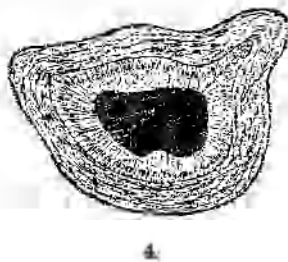
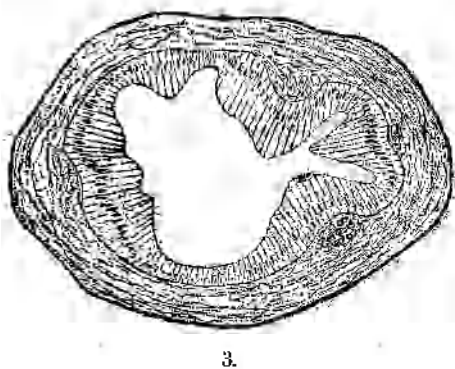
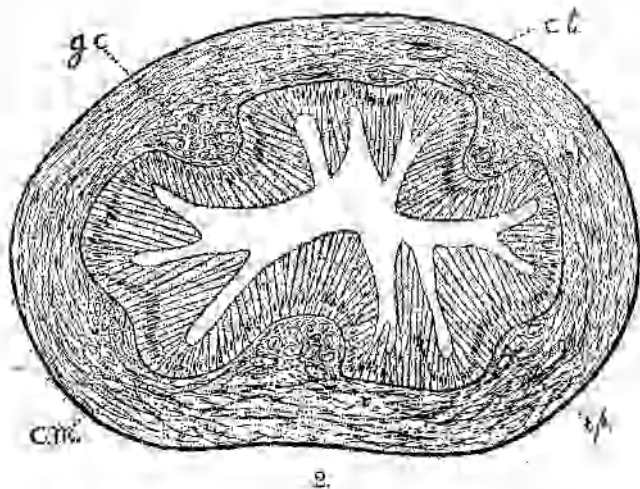
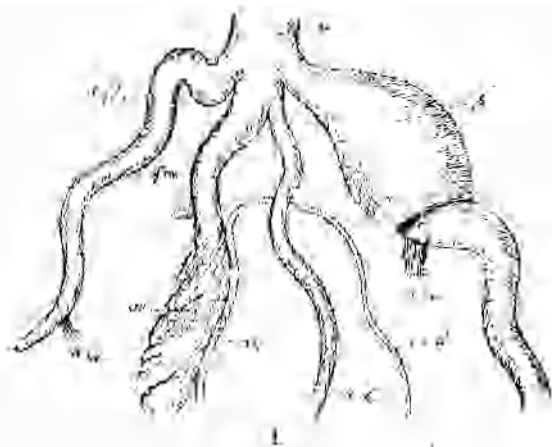
In the absence of any detailed account of the structure of this organ, Mr. Walter E. Collinge has very kindly had prepared for me a series of sections, which, I think, offer evidence of the relationship of this gland with the dart gland of other *Helices*.

In a transverse section through the proximal end (Fig. 2), the external wall is seen to be made up of a connective tissue sheath and a series of circular muscle fibres, which constitute the greater portion of the organ. Within this, at intervals, are groups of small gland cells and a lining layer of columnar epithelial cells. The lumen in this region has a somewhat stellate appearance, owing to the wall being thrown into a series of large and small longitudinal ridges. Towards the middle of the gland these ridges become less pronounced (Fig. 3); otherwise a transverse section through this region differs very little from the condition observed in Fig. 2. In a section through the distal end the gland cells appear to be absent, as also any indication of the longitudinal ridges, and the lumen contains a mass of mucous (Fig. 4).

After comparing the histological structure of this gland with that of other dart-glands, and, taking into consideration its position in relation to the other terminal ducts of the generative organs, I am inclined to regard it as a degenerate dart-gland rather than an appendix or mucous gland.

EXPLANATION OF FIGURES.

- Fig. 1. *Helicella barbara* (L.). The terminal ducts of the generative organs.
Reference Letters.—d.gl. Dart-gland. f.ov. Free-oviduct. ov. Oviduct.
p. Penis. pr. Prostrate. r.m. Retractor muscle. r.d. Receptacular
duct. v. Vagina. v.d. Vas deferens.
- Fig. 2. Transverse section through the proximal end of the degenerate dart-gland.
c.m. Circular muscle fibres. c.t. Connective tissue. ep. Epithelium.
g.c. Gland cells.
- Fig. 3. Transverse section through the middle of the gland.
- Fig. 4. Transverse section through the distal end of the gland.



A CLASSIFIED LIST OF THE HELICOID LAND SHELLS OF ASIA.

(PART VIII. *)

(Conclusion.)

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

CORRECTIONS.

VOLUME IX.

Page 4, 1st col., after *Kalicella monticola*, Müll., add = *raymondi*, Tryon.

Page 56, 8th line, 1st col., for *louaannensis*, read *tourannensis*.

18th line, 1st col., for *bacca* v. *pancala*, S. and B., read *batanica* v. *pancala*, S. and B. = *bacca* v. *sinistrorsa*, S. and B.

Page 57, 9th line, for decent read descent.

10th line, after impossible add reference to Footnote 1.

11th line, 2nd col., for *Sinicola* read *Sinicola*.

24th and 25th line, 1st col., for v. *imperator*, Gld., *imperatrix*, West, read *imperator*, Gld., v. *imperatrix*, West.

Page 97, 10th line, for seven read nine.

Page 100, 19th line, for eight read nine.

Page 101, 36th line, 2nd col., for *supersonata* read *subpersonata*.

Page 103, 20th line, 1st col., delete comma after Arabia.

Page 104, 13th line, 1st col., after *semisculpta* for Mart. read Mouss.

23rd and 24th line, 2nd col., delete *Euparyppha subdentata*. This shell has been proved to be Moroccan.

Page 112, 20th line, 2nd col., for *globula*, Kryn. v. *nana*, Boettg., read *selecta*, Klika v. *nana*, Boettg.

Page 121, 19th line, 1st col., after *pyramidata* add Drap.

Page 125, 28th line, 1st col., Owing to a printer's error *Jacosta andrewi*, Rolle, and *J. usticensis*, Calc., appear on one line. The latter is a distinct species, and not a synonym, as might be inferred.

Page 126, 32nd line, 2nd col., for *erdelli* read *erdeli*.

Page 128, 14th line, 1st col., *schotti* is out of alignment.

17th line, 1st col., for *onchynina* read *onychina*.

* See ante, p. 88.

VOLUME X.

Page 7, 38th and 39th line, 2nd col., delete Sub-genus *Angasella* and Section *Trachiopsis*.

Page 10, 33rd and 34th line, 2nd col., for Sub-genus *Angasella*, Section *Trachiopsis* read Sub-genus *Trachia*. Alb.

Page 13, 37th line, 2nd col., after *gradata*, Mdff., add *haiphongensis*, Dautz., Haiphong.

Page 15, 11th and 12th line, 1st col., for Sub-genus *Angasella*, Section *Trachiopsis* read Sub-genus *Trachia*. Alb.

39th line, 1st col., delete *Kaliella haiphongensis*, Dautz.

44th line, 2nd col., for Genus *Moellendorffia*, Anc., read Genus *Helicodonta*, Fér., Sub-genus *Moellendorffia*, Anc.

Page 58, 10th line, 1st col., *accepta* place under *Kaliella*.

Page 90, 6th line, 2nd col., for Genus *Dendrotrachus* read *Trochona-rina*. Mouss.

ADDITIONS.

Page 88, k. Alor.

Xestina rugosissima, Mdff. Is. Roma.

Chloritis romaensis, Mdff. Is. Roma.

Amphidromus laevis, Müll. v. *romaensis*, Rolle. Is. Roma.

v. *kissuensis*, Rolle Is. KISSU.

A. inconstans v. *rollei*, Gude, n.n. = v. *gracilis*. Rolle, not of Mart.; and forms *subsimplex*, *viridistriata* and *subporcellana*, Rolle. Is. Roma.

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ON A SMALL COLLECTION OF MARINE SHELLS FROM SURPRISE ISLAND.

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

Recently I received, through the kindness of Mr. H. Suter, some shells which, he stated, "were collected at Surprise Island (Huon Group, N.W. of New Caledonia, 18° 31' S., 163° 8' E.), where Guano is taken and brought to Auckland." The shells are dead, and many of them are not in good condition; while, therefore, a list of the species identified is of considerable interest from the point of view of the student of molluscan distribution, it appears wiser to refrain from describing any new forms, even though names cannot be given to several of the species.

I have, therefore, given a bare catalogue, with a few notes at the close of the list.

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| <ul style="list-style-type: none"> *1. <i>Siphonaria</i> sp. 2. <i>Solidula sulcata</i> (Gmel.). 3. <i>Tornatina olivula</i>, Adams. 4. <i>Atys naucum</i> (L.). 5. <i>Atys debilis</i>, Pease. 6. <i>Haminea cairnsiana</i>, M. and St. *7. <i>Conus</i> sp. 8. <i>Cithara apicalis</i> (Montrz.). 9. <i>Cithara roeveana</i> (Desh.). 10. <i>Cithara anglostoma</i>, Pease. *11. <i>Drillia</i> sp. *12. <i>Drillia</i> sp. *13. <i>Ancilla</i> sp. *14. <i>Marginella lifouana</i>, Crosse. (?) *15. <i>Marginella caledonica</i>, Jons. (?) 16. <i>Pisania fasciculata</i>, Reeve. 17. <i>Sistrum tuberculatum</i>, Blvle., var. 18. <i>Columbella marquesana</i>, Gask. | <ul style="list-style-type: none"> 19. <i>Columbella plicaria</i>, Montrz. 20. <i>Columbella cumingi</i>, Rve., var. 21. <i>Columbella varians</i>, Sby. 22. <i>Columbella poecila</i>, Sby. 23. <i>Columbella discors</i>, Gmel. *24. <i>Colubraria</i> sp. 25. <i>Cypraea coffea</i>, Sby. 26. <i>Cypraea limacina</i>, Linn. 27. <i>Cypraea cicercula</i>, Linn. 28. <i>Terebellum subulatum</i>, Lam. 29. <i>Cerithium piperitum</i>, Sby. *30. <i>Cerithium novae-herbinae</i>, Ad. (?) *31. <i>Cerithium zebrum</i>, Kiener. 32. <i>Cerithium</i> (?) <i>sinon</i>, Bayle (clathrata, A. Ad.). 33. <i>Planaxis cingulatus</i>, Ad. 34. <i>Littorina undulata</i>, Gray. 35. <i>Torinia cylindraceum</i> (Chemn.). |
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| 36. <i>Torinia variegatum</i> (Gmel.). | 44. <i>Euchelus ampullus</i> , Tate. |
| 37. <i>Capulus incurvus</i> (Gmel.). | *45. <i>Stomatella sanguinea</i> , Ad. |
| 38. <i>Scala</i> sp. | 46. <i>Haliotis</i> sp. juv. |
| 39. <i>Nerita novae-guinacae</i> , Lesson. | *47. <i>Glyphis nigriradiata</i> (Rve.). |
| 40. <i>Nerita albicilla</i> (L.). | 48. <i>Psammobia pennata</i> , Desh. |
| 41. <i>Clanculus thomasi</i> , Crosse. | 49. <i>Cryptodon bullula</i> , Rve. |
| 42. <i>Clanculus stigmatarius</i> , A. Ad. | 50. <i>Tellina robusta</i> , Hanley. |
| 43. <i>Chrysostoma paradoxum</i> (Born.). (?) | 51. <i>Tellina obliquaria</i> , Desh. |
| | *52. <i>Tellina</i> sp. |

NOTES.

1. May be a young *S. siphon*, Sby.
7. Probably the young of *C. glans*, Hwass.
- 11, 12. Two species, in poor condition, which I am unable to identify.
13. Probably a new species, white with a chalky zone at the suture, and smooth; recalling in form *A. sinensis*, Sby., as figured in the 'Thesaurus.' It differs from *A. tricolor* in colour, and is also more elongate.
14. Worn, with no trace of the colour markings and a trifle more slender than the typical form.
15. More compressed at the base and with a narrower mouth; it is a marked variety, and may prove to be a species.
24. Very close to *C. reticosa*, Ad., but may be a new species.
30. Only one specimen, and immature, but I am unable to separate it from this species.
31. See Vignal's careful study of this species (Journ. d. Conchyl., vol. li, p. 21); the form found appears to belong to his variety *attenuata*.
45. Both *S. notata*, Ad., and *S. speciosa*, Ad., are mere varieties.
47. Typical specimens of this shell, which was described without any locality being given, and is, I think, distinct from *G. rüppellii*, Sby., with which it has been united.
52. A single small specimen, which appears to belong to a new species; allied to *T. sericata*, Melvill.

PROCEEDINGS OF THE MIDLAND MALACOLOGICAL SOCIETY.

President—Walter E. Collinge, M.Sc.

Vice-President—E. R. Sykes, B.A., F.L.S.

Honorary Members—Dr. Henry Fischer, Prof. L. Plate, Prof. W. C. McIntosh, M.D., LL.D., F.R.S., Prof. H. Simroth, Prof. H. A. Pilsbry, Sc.D., and Edgar A. Smith, I.S.O.

Treasurer—H. H. Bloomer.

Librarian and Curator—Guy Breeden.

Council—Guy Breeden, H. Willoughby Ellis, F.E.S., H. McClelland, and Bromley Peebles.

39TH (ANNUAL) MEETING, DECEMBER 12TH, 1902.

The President in the chair.

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 above-mentioned Council and officers were elected for 1903.

EXHIBITS.

On behalf of Professor T. D. A. Cockerell, the following shells were shown and distributed amongst the members present:—*Ashmunella hyporhyssa* v. *edentata*, Ckll., from Cloud Croft, New Mexico; *A. thomsoniana* v. *porterae*, Pils. and Ckll.; *Vallonia cyclophorella*, Ancy; *Pupa blandi*, Morse; *Pyramidula cockerelli*, Pils., all from Beulah, N.M. By Mr. Breeden. Specimens of *Amphipeplea glutinosa* from the River Bann, Ireland, and sinistrose examples of *Helix nemoralis*, from Belfast.

40TH MEETING, JANUARY 9TH, 1903.

The President in the chair.

PAPERS READ.

Some notes on the young of *Helicigona lapicida* (L.). By Walter E. Collinge.

EXHIBITS.

The President exhibited a series of examples of *Helicigona lapicida* (L.), illustrating the various stages of development from the very young to the adult; also a malformed specimen.

By Mr. Breeden: Darts of *Helix nemoralis*.

41ST MEETING, FEBRUARY 13TH, 1903.

The President in the chair.

The evening was devoted to the examination of a large series of Asiatic Land Mollusca.

42ND MEETING, MARCH 13TH, 1903.

The President in the chair.

The following nomination for membership was read:—Rev. A. Hann.

PAPERS READ.

Review of Dr. Ridewood's recent paper on the Structure of the Gills of the Lamellibranchia, by A. D. Imms; On the Generative Organs of *Helicella barbara* (L.), by H. Overton.

EXHIBITS.

By Mr. Bloomer: *Teredo fimbriata*, Jeff., from Southport; *T. megotara*, Han., from Guernsey, and the variety *subericola*, Jeff., from Jersey; *T. norvegica*, Spengler, from Torbay; *T. navalis*, L., from Yarmouth, and its variety *occlusa*, *T. pedicellata*, Quatref., from Alderney, and *Xylophaga dorsalis*, Turton, from the West of Ireland.

By Mr. Overton: *Teredo megotara*, Han., from Piracombc; *T. norvegica*, Spengler, from Deal, and pieces of timber from Deal, with holes in made by the latter species. He also exhibited an example of *Helix aspersa* with the winter epiphragm *in situ*.

43RD MEETING, APRIL 17TH, 1903.

The President in the chair.

In the absence of any demand for a ballot, the Rev. A. Hann was unanimously elected a member of the Society.

EXHIBITS.

By Mr. H. McClelland: A very fine series of shells of *Achatina zebra*, Lam., and other land shells recently collected in South Africa.

By Mr. H. Overton: A series of banded forms of *Helix pomatia*, from Charing, Kent.

44TH MEETING, MAY 8TH, 1903.

The President in the chair.

PAPER READ.

Classification of the British species of the genus *Solen*, L., by H. H. Bloomer

EXHIBITS.

Mr. H. McClelland sent specimens of *Veronicella natalensis*, Rapp., and *Drocyclus favesicens*, Kist., from Durban.

By Mr. Overton: A series of varieties of *Helix hortensis* and *nemoralis*, from Christchurch, Kent, etc.

By Mr. Breeden: *Helix nemoralis*, *H. hortensis*, *Caecilioides aricula*, *Vitrea vogersi*, *cellaria*, *nitidula*, *Zonitoides nitidus*, and *Cochlicopa lubrica* var. *pellucida*, all from Looe, Cornwall.

45TH MEETING, JUNE 12TH, 1903.

The President in the chair;

EXHIBITS.

By the kindness of Professor T. W. Bridge, Sc.D., F.R.S., the members were invited to devote the evening to an examination of a series of drawers from the "Archer Collection" in the University Museum. The following families were illustrated:—*Solenidae*, *Clavagellidae*, and *Tercedinidae*.

46TH MEETING, OCTOBER 9TH, 1903.

The President in the chair.

EXHIBITS.

By the President: Specimens (in alcohol) of *Apera burnupi*, E. A. Sm., *A. gibbonsi*, W. G. Binn., and two other specimens of *Apera*, all from Zululand; three species of *Urocyclus* and three of *Veronicella*, also from Zululand.

By Mr. Overton: *Helix aspersa*, *ncmoralis* and *hortensis*, *Helicigona arbutorum*, *Hygromia rufescens*, *Valtonia pulchella*, *Pyramidula rupestris*, and *Ena obscura* and *montana*, all from Birdlip.

On behalf of Mr. H. McClelland, 43 boxes of *Patella*, *Helcion*, and *Fissurella*, from South Africa, were shown.

CURRENT LITERATURE.

Pilsbry, Henry A.—Tryon's Manual of Conchology, ser. ii, vol. xvi (pt. 61), pp. 1-64, pls. 1-18. Philadelphia: Academy of Natural Sciences.

Dr. Pilsbry commences volume xvi with an account of the genus *Anoma*, Albers, enumerating twenty species and twenty-two varieties, of which the following are new: *A. adamsi*, *A. jarvisi*, *A. nitens* (Chitty), v. *simpsoni*, *A. levis* (C.B.Ad.), v. *baltcata*, and *A. nigrescens* (C.B.Ad.), v. *leucostoma*. There is a useful "Key to Species," and many of the forms are figured for the first time.

Passing next to the genus *Brachypodella*, Beck (Type *B. antiperversa*), a short account is given of the anatomy. The generative organs are similar to typical *Urocoptis*. In *B. chemnitziana* and *agnesiana* the penis is moderately developed, with the vas deferens and retractor muscle apical. The vagina is at least as long as the penis. The receptaculum seminis is sub-globular, and its duct long and slender. In the viviparous *B. chemnitziana* the uterus (the orificial portion of the common duct) is capacious. The pharynx and salivary glands are similar to those in *Urocoptis*, but the radular sheath is enormously lengthened, stretching far into the visceral cavity. The free retractor muscles are also not unlike those in *Urocoptis*, only they are united further at the proximal end.

There is no character of the shell common to all the forms of *Brachypodella*, which will serve to separate the genus from all forms of *Urocoptis*.

A key, founded upon shell-characters, to the various sub-genera of the genus is given, and a new sub-genus *Brevipodella* (type *B. imitatrix*, n.sp.), is described, then follow the following sub-genera: *Amphicosimia*, Pils. and Van., *Strophina*, Mörch, with *B. laterradii* (Grat.), v. *strophina*, nov., *Liparotes*, Pils., *Siphonolacmus*, Pils., and *Gyraxis*, Pils., with *B. gouldiana* (Pfr.), v. *sericata*, nov.

Kunkel, Karl.—Zuchtversuche mit linksgewundenen Weinbergschnecken (*Helix pomatia*). Zool. Anz., 1903, Bd. xxvi, pp. 656-664.

As a result of a series of experiments upon the propagation of sinistral *Helix pomatia*, the author finds that after waking up from their winter sleep they absorb a large quantity of water, equal to about an increase of 40-48 %. Under favourable conditions they then proceed to copulate, and again after the eggs have been laid. The young snails copulate in their first year. Darts are not absolutely necessary for copulation. As a rule *H. pomatia* copulates during, or after, warm rain and under favourable conditions eggs are laid twice in the same summer, on the other hand many do not lay eggs in the same summer. The laying of eggs takes place from the middle of June to the middle of August, and almost always after the warm rain. Given moderate moisture and warmth nearly all the eggs develop after about 25 or 26 days, and for 8-10 days remain in the earth, leaving it when rain falls. If the eggs develop under pressure, flat forms arise, but no sinistral ones, and normal growth ensues when the pressure ceases. Sinistral specimens produce dextral ones. Given warmth, moisture and food, the snails are active until the end of November.

Nierstrasz, H. F.—Neue Solenogastren. Zool. Jahrb. (Abth. f. Morph.), 1903, Bd. 18, pp. 359-386, T. 35. 36.

Dr. Nierstrasz describes three new species of *Chaetoderma*, viz., *challengeri*, *normanni*, and *canadense*, also *Uncinemia neapolitana*, gen. et sp. nov.

Murdoch, R.—On the Anatomy of *Paryphanta busbyi*, Gray. Trans. N.Z. Inst., 1902, vol. xxxv, pp. 258-262, pl. xxvii.

An account of the anatomy of *Paryphanta busbyi*, Gray, has long been looked forward to, and Mr. Murdoch is to be congratulated on having at last obtained an example of the interesting mollusc.

The alimentary canal, so far as it is described and figured, does not appear to differ much from that of *P. hochstetteri*, Pfr., and the same may be said of the kidney, lung, and pedal gland. The buccal mass and pedal retractors are fused together posteriorly, where they unite with the columella of the shell. The buccal retractor is a broad, powerful, band, lying on the dorsal side of the pedal muscles, branching from the latter are the ocular retractors, which bifurcate towards the anterior ends. The pedal retractors are continuously attached to the foot.

The generative organs differ from the condition which obtains in *P. hochstetteri*, Pfr., *P. edwardsi*, Suter, and *P. urnula*, Pfr., in the extreme reduction of the male organs, and the absence of a receptaculum seminis, and exhibit a remarkable resemblance to the generative organs of *Schizoglossa novoseelandica*, Pfr.

Melville, J. Cosmo and Standen, R.—Descriptions of Sixty-eight new Gastropoda, from the Persian Gulf, Gulf of Oman, and North Arabian Sea, dredged by Mr. F. W. Townsend, of the Indo-European Telegraph Service, 1901-1903. Ann. and Mag. N. H. (s. 7), vol. xii, pp. 289-324, pls. xx-xxiii.

Two years ago the authors published the first part of a Catalogue of the Mollusca of the Persian Gulf, etc., enumerating 935 species, of which 77 were new; to this they now add 68 new Gastropoda.

Most of the specimens are of small size, though a few—e.g., *Murex marjorise*, *Trichotropis pulcherrima*, and the superb *Pleurotomu naxosicus*—are more conspicuous. Special mention may be made of the two new species of *Homalaxis*, a *Pluxina*, the first recorded from the Old World, a curious *Rissoina* (*registomoides*), a new species of *Metula* and many *Pleurotomidae*, while the occurrence of *Kleinella sympyesta*, adds a new genus to this region.

Sykes, E. R.—The Zoological Record, 1902, vol. xxxix. Division vii. Mollusca. pp. 85. London, 1903:

Mr. Sykes, assisted by Mr. E. A. Smith, again presents us with another year's valuable record, and we should like to direct the attention of all Malacologists to the fact that the Division treating of the Mollusca may now be obtained separately, and at a trifling cost.

Kunkel, Karl.—Zur Locomotion unserer Nachtschnecken. Zool. Anz., 1903. Bd. xxvi, pp. 560-566.

The author's observations on the locomotion of slugs corroborate Simroth's view, that the species of *Arion* are slower and more sluggish than the species of *Limax*. His experiments lead him to the following conclusions: *a.* In decapitated slugs the wave-play does not only remain in the foot, but also in the excised pieces. The explanation of this phenomenon is due, as pointed out by Simroth, to the fact that, "the ganglia in the meshwork of the pedal musculature are sympathetic, and the wave-play is automatic." *b.* If the wave-play has ceased in individual pieces, it is possible to set these going again by mechanical and light stimuli. The stimulus probably being conducted through certain nerve fibres connecting the ganglia in the pedal nerve-network with the integumentary nerve cells. *c.* In the individual pieces of *Arion* mechanical stimuli produced energetic contraction, while light stimuli produced the wave-play. *d.* The pieces of *Limax* exhibited a stronger wave-play. *e.* If the slugs are divided into three or more parts, the middle piece exhibits less power of movement than the head and tail-pieces. *f.* Pieces of the head and tail of *Limax* divided into smaller pieces move more quickly than uninjured animals. *g.* The young *Limacæ* move more quickly than the adults.

Sykes, E. R.—Notes on some British *Eulimidae*. Proc. Malac. Soc. Lond., 1903, vol. v, pp. 348-353, pl. xiv.

All who have at any time attempted the identification of the smaller forms of British *Eulima*, know how very difficult it is to arrive at a satisfactory decision; such will welcome Mr. Sykes' timely notes and figures.

A new species is described and figured, *E. collinsi*, from Guernsey. This is the *E. incurva* var. *monterosatoi* of Mr. J. T. Marshall. *E. platyacme*, n. nom., for *E. solida*, Jeffreys, should also be noted.

Sykes, E. R.—On the Land Operculate Mollusca collected during the "Skeat Expedition" to the Malay Peninsula in 1899-1900. Proc. Zool. Soc. Lond., 1903, pp. 194-199, pl. xx.

The author records 23 species, of which 8, and 1 variety, are new, viz., *Lagochilus kobelti*, *Ditropis cavernae*, *Pterocyclos subalatus*, *Rhiostoma jalorensis*, *Rhaphaulus ascendens*, *R. perakensis*, Smith, var. *jalorensis*, *Opisthostoma annandalei*, *Diplommatina skeati*, and *D. laidlawi*.

Baker, F. C.—Rib Variation in *Cardium*. Amer. Nat., 1903, vol. xxxvii, 481-488, figs. 1-7.

Mr. Baker has studied the rib variation of *Cardium robustum*, *isocardia* and *muricatum*, and finds that *robustum* is the least variable and *muricatum* the most, *C. isocardia* standing midway between these two species. He is of opinion that the number of ribs is not a safe character upon which to found species.

Woodward, B. B.—List of British Non-Marine Mollusca. Journ. Conch., 1903, vol. 10, pp. 352-367.

Mr. Woodward is to be congratulated upon the publication of, and malacologists in at last possessing, a List free from personal bias, and one which is stamped with a genuine attempt to deal in a scientific manner with the many difficulties surrounding such a task.

Whether one agrees or disagrees with the author in all points, but few will be found who will not welcome a List free from the burden of varieties, sub-varieties, mutations, monstrosities, etc., and one in which the nomenclature is at least in keeping with that adopted by malacologists throughout the world.

The List is accompanied by eleven pages of explanatory notes, and should be in the hands of every malacologist who takes an intelligent interest in the British Non-marine Mollusca.

Davis, J. R. A. and Fleure, H. J.—*Patella* (The Common Limpet.) L.M.B.C. Memoirs, 1903, vol. x, 76 pp., 4 pls.

The authors are to be congratulated on the completion of this interesting memoir, which brings together in a very concise manner the leading structural features of *Patella vulgata*. So much has been written upon the anatomy of this species, that it was scarcely to be expected that any important discoveries would be made, still the authors believe the following points to be new: (1) A lateral glandular streak has been found along each side of the foot of young specimens; resembling that found in *Nacella* and its allies. (2) A muscular zone, to which the term internal pallial zone is applied, has been found extending in the mantle between the tips of the shell muscle. (3) The structure of the Crop, and inferences consolidation of the visceral hump. (4) The respiratory function of the nuchal cavity as regards damp air. (5) Discussion of the evolution of the present topographical relations of rectum, kidneys, pericardium and heart. (6) Details of mantle innervation and pallial tentacles.

The reproduction of the figures is poor, they would prove much more useful if in the text and if, in some cases, they were larger. An almost entire absence of references to the literature, seriously detracts from the value of the work, besides being scarcely fair to previous workers.

Dall, W. H.—Synopsis of the family *Astartidae*, with a review of the American species. Proc. U.S. Nat. Mus., 1903, vol. xxvi, pp. 933-951, pls. lxi-lxiii.

The *Astartidae* are an ancient group of molluscs, from which the *Crassatellitidae* have diverged in the later Mesozoic and taken definite form in the Eocene. The two families are chiefly discriminated by the character of the ligament, which in the former family is external as well as the resilium, while in the *Crassatellitidae* it is separated from the resilium, which, excepting in *Eriphyla*, is deeply immersed. It would seem that each family has an exceptional and peripheral group. Thus in *Eriphyla* the process of immersion of the resilium has only begun, but the remaining characters of the shell are so close to *Crassinella*, that the two must obviously be associated in the same family. On the other hand, in *Lirodiscus* of the *Astartidae*, the resilium is separated from the ligament, but still remains external, while the other characters link it to *Astarte* similarly to those which bind *Eriphyla* to *Crassinella*.

Lists of the species of the Eastern and Western coasts are given and reviewed, and six new species described.

Sturany, R.—Gastropoden des Rothen Meeres. Denk. Akad. Wien. 1903. Bd. lxxiii, pp. 209-283. Tin. i-vii.

In a valuable and interesting paper Dr. Sturany records 294 species, of which the following are new: *Fusus bifrons*, *Nassa thurmasia*, *steindachneri*, *xesta*, *munda*, *sporadica*, *stiphra*, *lathraia*, *Mitra gonatophora*, *Columbella erythraeensis*, *nomanensis*, *Conus aculeiformis*, Rvc. form *toarensis*, *C. planiliratus*, Sby. var. *batheon*, *Pleurotoma potti*, *inchoata*, *siebenrocki*, *nannodes*, *beblammena*, *Mangilia pertabulata*, *epicharis*, *Sclariella illustris*, *Emarginula harmilensis*, *Alys thomensis*, *Clathurella dichroma*, *Capulus camavanensis*, *Eulima muelleriae*, *orthophyes*, *Stylifer thielei*, *Syrnola trivittata*, *Elusa halalibensis*, *Triforis senafirensis*, and *Euchelus erythraeensis*. All the new species, etc., are beautifully figured, in addition to many of the other species.

Möllendorff, O. von.—Neue Landschnecken von Niederländisch Indien. Nachr. Deutsch. Malak. Gesell. 1903. p. 156.

Chloritis romaensis and *Xestina rugosissima*, nn. spp.

Sykes, E. R.—Description of *Cerastus dīnshawi*, n. sp. from Aden, with a note on *Otopoma clausum*. Sby., and *O. yemenicum*. Brgt. Proc. Malac. Soc. Lond., 1903, vol. v, pp. 338, 339, 2 figs.

Cockerell, T. D. A.—Variation in the Snail-genus *Ashmunella*. Proc. Ac. Nat. Sci. Philad., 1903, pp. 615, 616.

Andrussoff, N.—Studien über die Brackwassercardiden. Mém. l'Acad. Imp. Sci. St. Petersb., 1903 (s. viii), T. viii, T. xiii, pp. 1-82, T. i-vii.

Perrier, E. et Gravier, Ch.—Sur les causes physiologiques qui ont déterminé la constitution du type Mollusque. Compt. Rendus. 1903, T. cxxxvi, pp. 727-731.

Smith, Edgar A.—On *Xylophaga praestans*, n. sp., from the English coast. Proc. Malac. Soc. Lond., 1903, vol. v, pp. 328-330, figs. i-iv.

Smith, Edgar A.—Note on *Macron trochlea*. Journ. Conch., 1903, vol. 10, p. 351.

Smith, Edgar A.—A new species of *Modiola* from Malacca. Journ. Conch., 1903, vol. 10, p. 368.

Smith, Edgar A.—A List of Species of Mollusca from South Africa, forming an Appendix to G. B. Sowerby's "Marine Shells of South Africa." Proc. Malac. Soc. Lond., 1903, vol. v, pp. 354-402, pl. xv.

GENERAL REVIEWS.

A Treatise on Zoology. Edited by E. Ray Lankester. Pt. i, second fascicle. Introduction and Protozoa. By J. B. Farmer, J. J. Lister, E. A. Minchin, and S. J. Hickson. 8vo. pp. vi + 451. London, 1903. Adam and Charles Black.

We welcome a further volume of this valuable work, which forms the second fascicle of Part i., and treats of the Structure of Animal and Vegetable Cells, the Foraminifera, Sporozoa, and Infusoria.

In the small space of 46 pp. Dr. Farmer gives an admirable account of the structure of animal and vegetable cells, incorporating many of the latest investigations in cell mitosis. All the articles which have so far appeared have had

a useful bibliographical appendix, and the absence of such to this section is much to be regretted.

Dr. Lister's lucid article on the Foraminifera, will be welcomed as a succinct and clear account of this interesting class.

The most complete, and by far the most important, section is Professor Minchin's most timely and valuable treatise on the Sporozoa, which is far and away the finest text-book on the subject. Finally, Professor Hickson gives an admirable account of the Infusoria.

As in the previous volumes, the illustrations, many of which are original, are remarkably good, and the general method of treatment leaves nothing to be desired.

A Manual of Zoology. By Richard Hertwig, translated and edited by J. S. Kingsley. 8vo, pp. xi + 704. London, 1903. George Bell and Sons.

This is a translation of the fifth German edition of Professor Hertwig's well-known "Lehrbuch der Zoologie," edited and modified by Professor Kingsley.

The work is intended for beginners, and no more admirable summary of the history and general principles of zoology could be put in the student's hands than that contained in the first 181 pages. If for no other reason, this alone places the work as one of the best of its kind, and very much superior to the majority. This section is characterised by a clearness and breadth hitherto unknown in any English text-book, and will undoubtedly prove of great value to the class of students for whom the work is written.

The remaining portion reviews the whole of the animal kingdom, and is remarkably well illustrated.

EDITOR'S NOTES.

On completing the tenth volume, the Editor tenders his grateful thanks to all who have in any way furthered the interests of the Journal during 1903.

The Journal has no permanent endowment; and, excepting one year, there has been an annual deficit on each volume. During the past year a number of subscribers have been struck off the list, all reasonable efforts having failed to obtain their subscriptions to volumes viii, ix, and x. This, of course, has largely increased the deficit on volume x.

We have again to appeal to those subscribers whose subscriptions are in arrear to kindly forward the same.

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