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CONTENTS OF VOLUME IX.

LIST OF ILLUSTRATIONS IN VOLUME IX.

CORRIGENDA.

VOLUME viii.

p. 121, line 14 for *iodina* read *iodinea*.

p. 123, line 21 for forshadowed *read* foreshadowed.

VOLUME ix.

p. 14, line 17 for *Myotesta fruhstorfferi* read *M. fruhstorferi*.

p. 49, head-line for Marsnall *read* Marshall.

p. 63, lines 17 and 31 for Lesson *read* Lessona.

p. 78, line 10 for fig. 24 *read* fig. 15.

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A CLASSIFIED LIST OF THE HELICOID LAND SHELLS OF ASIA.

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

DURING the last thirty years enormous numbers of land shells have been collected in almost every part of the world, and have been described by malacologists of many countries, in memoirs scattered through innumerable publications. It thus happens that, with some exceptions, it is impossible, without much labour, to form an adequate idea of our present knowledge of the molluscan fauna of any given region.

Having concentrated much attention during the last fourteen years upon the Helicoid land shells, it has appeared to me to be desirable to catalogue these molluscs, which, fortunately enjoy great popularity among the bulk of collectors.

In the present series of articles it is proposed to attempt to draw up systematic lists of all the known Helicoids of Asia. For the sake of convenience the arrangement proposed will coincide with political divisions, except in the case of islands and archipelagoes. From present consideration, however, the following divisions will be excluded: 1.—The Philippine Islands, which have recently been treated of by Dr. O. F. von Möllendorff (Abh. Naturf. Gesell. Görlitz, 1898, xxii., p. 26); 2.—the Japanese Empire, the Helicoids of which have been enumerated by myself (Proc. Malac. Soc. Lond., 1900, iv. p. 8., ib., p. 70, ib., 1901, p. 191); and 3.—India with Burma and Ceylon, which will be included by Dr. W. T. Blanford in the forthcoming volume of the "Fauna of India."

1. THE CHINESE EMPIRE.

OUR knowledge of the vast majority of Chinese land shells is derived from the labours of missionaries. Foremost must be counted the important work on the Terrestrial Mollusca of the valley of the Blue River by Father Heude, S.J., which forms part of the monumental

work of the Jesuit Fathers of Shanghai "Mémoires concernant L'Histoire Naturelle de l'Empire chinois." Next in importance come the collections made by the brothers Kaspar and Lorenz Fuchs, and Zeno Molltner, enumerated and described by Father Vincenz Gredler in twenty separate papers (1878-1900). Further important collections have been made by the Russian travellers Przewalski, Potanin, and Beresowski, whose shells have been described by Dr. von Martens (Mem. Acad. Imp. Sc. St. Petersb., 1882, xxx, p. 1), and by Dr. O. F. von Möllendorff (Ann. Mus. Zool. St. Petersb., 1899, p. 46). More recently further collections made by Mr. W. A. Obrutschew, have been described by Dr. Rudolf Sturany (Denkschr. Math. Nat. Cl. K. Akad. wiss. Wien, 1900, p. 1); and collections made by Prof. K. Futterer and Dr. Holderer have been provisionally figured, but not described, by Dr. A. Andreae (Mitth. Roemer Museum, 1900, No. 12, p. 1). Several lesser contributions will be found enumerated in the Bibliography.

So far as our present knowledge enables us to judge, the greater number of the Helicoids of this region have a limited distribution, notable exceptions are: *Cathaica fasciola*, Drap., which is found over the whole of north, central, and western China as far south as Kiang-su; *C. pulveratrix*, Mts., which occurs over the whole of northern China, reappearing in Hu-nan, and will possibly be found on further exploration in the intermediate provinces of Ho-nan and Hu-pe. *C. richthofeni*, Mts., also occurs over the whole of North China; and *C. przewalskii*, Mts., in west China, north from Kan-su through Sze-chuen to Yun-nan in the south. The cosmopolitan *Eulota similaris* and its varieties, moreover, inhabit the whole of Central China as far north as Che-kiang, west as far as Sze-chuen, and reappears in the north-west in Kan-su (Sturany), in the variety *stimpsoni*, Pfr.

A. CHINA PROPER.

Family **Zonitidae**.

Subfamily **Ariophantinae**, Pils

Genus BENSONIA, Pfr.

buccata, Hde. Yun-nan.

Genus EUPLECTA, Semp.

rathouisi, Hde. Kiang-su.
eastlakiana, Mdff. Fo-kien.
petasus-chinensis, Hde. Sze-chuen.

Genus TROCHONANINA, Mouss.

laurentiana, Gredl. Hu-pe.

Genus XESTINA, Semp.

chrysoraphe, Mdff. Sze-chuen.

Genus XESTA, Alb.

? indurata, Hde. Sze-chuen.

Subfamily **Macrochlaminae**

Genus MACROCHLAMYS, Bens.

superlita, Mor. Kwan-tung.

v. herziana, Mdff.
politissima, Pfr. North China.
planula, Hde. Ngan-whei.
zikaveiensis, Hde. Che-kiang.
pedisequae, Hde. Yun-nan.
apex, Mdff. Kwang-tung.
simplex, Hde. Yun-nan.
stearnsi Pils Chi-li
amdoana, Mdff. Kan-su, Sze-chuen.
cathaiana, Mdff. Kan-su.
davidii, Desh. Chi-li.
= sinica, Mts.
moupiniana, Desh. Sze-chuen.
= maupiniana, Desh..
= mupingiana, Mdff.
boettgeri, Hilb. Sze-chuen.
fargesiana, Hde. Sze-chuen.
distorta, Hde. Sze-chuen.
unica, Hde. Kwei-chou.
sciadophila, Hde. Sze-chuen.
derelicta, Hde. Sze-chuen.
fellea, Hde. Yun-nan.
rejecta, Pfr. Hu-nan.
= mamillaris, Hde.

Genus KHASIELLA, G.-A.
arata, Blf.
v. minor. Yun-nan.

Genus MICROCYSTINA, Mörch.
minensis, Mdff. Fo-kien.
= glaberrima, Mdff.
planata, Hde. Hu-nan.
microgyra, Hde.
clausa, Hde.
sinensis, Hde.
colombeliana, Hde.
bambusicola, Hde. Ngan-whei.
hunancola, Mdff. Hu-nan.
spelaea, Hde. Ngan-whei.
castaneola, Hde. Ngan-whei.
moellendorffi, Reinh. Chi-li.
sinica Mdff. Kwang-tung.
schmackeriana, Mdff. Fo-kien.
perforata, Desh. Chil-li.

Genus RHYSOTA, Alb.
erratica, Hde. Hu-pe.
fuchsiana, Hde. Hu-nan.
flaveopurpurea, Hde. Yun-nan.
delavayana, Hde. Yun-nan.

Subfamily **Helicarioninae.**

Genus GIRASIA, Gray.
magnifica, G.-A. Yun-nan.
venusta, Theob. Yun-nan.

Genus CRYPTOSOMA, Theob.
imperator, Gould. Kwang-tung.
v. imperatrix, West.

Genus HELICARION, Fér.
setchuanensis, Hde. Sze-chuen.
fargesianus, Hde. Sze-chuen.
globus, Hde. Sze-chuen.
poma, Hde. Sze-chuen.
riparius, Hde. Kwei-chou.
resinaceus, Hde.
umbracultor Hde. Sze-chuen.
bulla, Hde. Sze-chuen.
dux, Hde. Kwang-si.
comes, Hde. Sze-chuen.
eques, Hde. Yun-nan.
miles, Hde. Yun-nan.
pulex, Hde. Yun-nan.
paulina, Hde. Sze-chuen.

Genus SITALA, H. Ad.
turrita, Mdff. Kwang-tung.
trochulus Mdff. Kwang-tung.
trifilaris, Gredl. Hu-pe.
bilirata, Gredl. Kwang-si.

Genus KALIELLA, W. T. Blanf.
costigera, Mdff.
gredleriana, Hde. Hu-nan.
rupicola, Mdff. Kwang-tung.
v. grandior, Gredl.
lamprocystis, Mdff. Kan-su.
cuconus, Mdff. Sze-chuen.
franciscana, Gredl. Hu-nan.

v. planula, Gredl.
monticola, Mdff. Kwang-tung.
imbellis Hde. Ngan-whei.
polygyra, Mdff. Kwang-tung.
sculpta, Mdff. Kwang-tung.
seckingeriana, Hde. Ngan-whei.

Subfamily **Zonitinae**, Pils.

Genus VITREA, Fitz.
crystallodes, Gredl.
perdita, Desh.

Genus EUCONULUS, Reinh.
sphaera, Hde. Sze-chuen.
filovinctus, Hde. Sze-chuen.
cuneus, Hde.
pyramis, Hde. Sze-chuen.
bifilaris, Hde. Sze-chuen.
infracinctus, Hde. Sze-chuen.
fulvus, Drap. Chi-li.
spiriplanus, Gredl. Hu-nan.
loana, Gredl.

Genus ZONITES, Montf.
?? scrobiculata, Gredl. Hu-nan.
v. hupeina, Gredl. Hu-pe.

Genus TROCHOMORPHA, Alb.
samara, Hde. Yun-nan.
borealis, Hde. Sze-chuen, Hu-pe.

Family **Endodontidae**, Pils.

Group **Haplogona**, Pils.

Genus PYRAMIDULA, Fitz.

Section GONYODISCUS, Fitz.
bianconi, Desh. Sze-chuen.
pauper, Gld. Chi-li.
= striatella Mdff. non Anth.
= ruderata, Mdff. non Stud.
potanini, Mdff. Kan-su.
pallens, Gredl. Hu-pe.
atoma, Gredl. Hu-nan.
sanctimonialis, Gredl. Shan-tung, Hu-pe.
orphana, Hde. Chi-Kiang.
? kuangtunensis, Gredl. Kwang-tung.

Family **Helicidae**.

Genus PLECTOPYLIS, Bens.

Section CHERSAECIA, Gude.
andersoni, W. T. Blf. Yun-nan.

Section SINICOLA, Gude.
emoriens, Gredl. Chi-li.
azona, Gredl. Hu-pe.
pulvinaris, Gld. Kwang-tung.
v. continentalis, Mdff.
fimbriosa, Mts. Hu-nan.
v. nana, Mdff.
v. continentalis, Mdff.
reserata, Hde. Sze-chuen.
laminifera, Mdff. Hu-pe.
jugatoria, Anc. Kwei-chou.
diptychia, Mdff. Kwei-chou.
biforis, Hde.
stenochila, Mdff. Hu-pe.
v. basilia, Gude.
alphonsi, Desh. Sze-chuen.
murata, Hde. Sze-chuen.
cutisculpta, Mdff. Fo-kien.
invia, Hde. Sze-chuen.
secura, Hde. Kwang-si.
multispira, Mdff. Hu-nan.
schistoptychia, Mdff. Hu-nan.
vallata, Hde. Sze-chuen.

Genus TRAUMATOPHORA, Anc.
triscalpta, Mts. Hu-pe, Che-kiang.
v. fraterminor, Gredl.

Genus STEGODERA, Mts.
angusticollis, Mts. Kiang-si. Kiang-su.

Group **Epiphallogona**, Pils.

Genus CAMAENA, Alb.

Sub-genus CAMAENA, s.s.
cicatricosa, Müll. Kwei-chou.

Kwang-tung.
= senegalensis, Fér.
= chinensis, Voigt.
= himalayana, Lea.
v. inflata, Mdff. Kwei-chou.
v. ducalis, Anc. Kwei-chou.
vulpis, Gredl. Hu-nan.
leonhardti, Mdff. Kwang-tung.
subgibbera, Mdff. Kwang-tung.
seraphinica, Hde. Kwang-si.
xanthoderma, Mdff. Kwang-tung.
v. polyzona, Mdff.
rugata, Mdff. Sze-chuen.
v. humilis, Mdff.

Genus CHLORITIS, Beck.

Sub-genus TRICHOCHLORITIS, Pils.
hungerfordiana, Nev. Kwang-tung.
percussa, Hde. Hu-pe, Sze-chuen.
franciscanorum, Gredl. Hu-nan.
v. purpurea, Gredl. Hu-pe.
submissa, Desh. Sze-chuen.

Genus GANESELLA, Blf.
brevibarbis, Pfr. Ngan-whei.
alveolus, Hde. Sze chuen.
ternaria, Hde. Hu-pe.
micacea, Hde. Ngan-whei.
phyllophaga, Hde. Ngan-whei.
dormitans, Hde. Kiang-su.
arbusticola, Desh. Sze-chuen.
v. chrysomphala, Mdff.
bizona, Gredl. Shen-si.
squamulina, Gredl. Hu-nan.
trochacea, Gredl. Hen-san, Sze-chuen.
microtrochus, Mdff. Kwei-chou.
vitreola, Hd. Sze-chuen.
ingloria, Hde. Kwang-si.
subsquamulata, Hde. Sze-chuen.
subparasitica, Hde. Yun-nan.
subgriseola, Hde. Yun-nan.
peraeruginosa, Hde. Yun-nan.
radulina, Hde. Yun-nan.
virilis, Gredl. Hu-pe.
v. subfusca, Gredl.
laurentii, Gredl. Hu-pe.
millepunctata, Mdff. Kan-su, Shen-si.
kutupaensis, Stur. Kan-su.

Group **Belogona**, v. Ihr.
Belogona Euadenia, Pils.

Genus BULIMINOPSIS, Hde.

Section SEMIBULIMINUS, Mdff.
beresowskii, Mdff. Kan-su.

Section BULIMINOPSIS, s.s.
pinguis, Anc. Shen-si.
v. gracilis, Mdff.
buliminus, Hde. Sze-chuen.
= Buliminus helicopsis, Anc.
v. strigata, Mdff.
pseudobuliminus, Hde. Ngan-whei.
= Buliminus macrogonus Anc.
buliminoides, Hde. Ngan-whei.
= Buliminus tropidophorus, Anc.
quaternaria, Hde.? Ngan-whei.
— borealis, Hde.
conoidia, Hde. Sze-chuen.
gracilispira, Mdff. Sze-chuen.
piligera, Mdff. Kan-su.
subcylindrica, Mdff. Kan-su.
cylindrus, Mdff. Kan-su.

Section FUNICULUS, Hde.
hirsuta, Mdff. Kan-su.
delavayana, Hde. Sze-chuen.
squamosula, Hde. Yun-nan.

asbestina, Hde. Yun-nan.
debilis, Hde. Yun-nan.
doliolum, Gredl. Hu-pe.
= rudens, Hde. Yun-nan.
probata, Hde. Yun-nan.
coriacea, Hde. Yun-nan.
larvata, Hde. Yun-nan.
pupata, Hde. Yun-nan.
achatinina, Hde. Kan-su, Sze-chuen.

Section STENOGYROPSIS, Mdff.
potanini, Mdff. Kan-su.

Section SECUSANA, Mdff.
cerasina, Gredl. Hu-pe.

Genus LAEOCATHAICA, Mdff.
christinae, H. Adl. Hu-pe, Kan-su.
filippina, Hde. Hu-pe.
= christinae v. carinifera, Anc.
subsimilis, Desh. Sze-chuen, Shen-si, Hu-pe.
subchristinae, Anc. Sze-chuen.
stenochone, Mdff. Kan-su.
amdoana, Mdff. Kan-su,
distinguenda, Mdff. Kan-su.
tropidoraphe, Mdff. Kan-su.
prionotropis, Mdff. Kan-su.
v. albocincta Mdff. Sze-chuen.
leucoraphe, Mdff. Sze-chuen.
phaeomphala, Mdff. Kan-su.
potanini, Mdff. Kan-su.
odophora, Mdff. Kansu.
pewzowi, Mdff. Kan-su.
polytyla, Mdff. Kan-su.
dityla, Mdff. Kan-su.

Genus METODONTIA, Mdff.
houaiensis, Crosse. Shang-tung, Shan-si, Shen-si, Kan-su, Ho-nan.
= huaiensis, Crosse.
v. obstructa, Hde.
v. hemipleuris, Mdff. Hu-pe, Shen-si.
— moltneri, Gredl. (juv.)
yantaiensis, Cr. and Deb. Chi-li.
v. tetrodon, Mdff.
diodontina, Hde. Sze-chuen.
griphodes, Stur. Kan-su.

Genus EULOTA, Hartm.

Section Eulota, s.s.
acustina, Mdff. Sze-chuen.
billeana, Hde. Sze-chuen.
bocageana, Cr. and Deb. ? China.
burtini, Desh. Sze-chuen, Shen-si.
= phragmitum, Hde.
buxina, Hde. Yun-nan.
dichroa, Pfr. Che-kiang.
fortunei, Pfr. Che-kiang.
v. meridionalis, Mdff.
fuchsi, Gredl. Ngan-whei.
haesitans, Hde. Yun-nan.
impatiens, Hde. Ngan-whei.
improvisa, Hde. Sze-chuen.
inopinata, Desh. Sze-chuen.
jourdyi, Mor. Kwang-si.
= vorticellina, Hde.
latrunculorum, Hde. Sze-chuen.
leprosula, Hde. Sze-chuen.
= leprosa, Hde.
maackii, Gerstf.
v. depressior, Pfr. Manchuria.
= conrauxiana, Hde
miliaria, Gredl. Yu-nan.
mimicula, Hde. Sze-chuen.
mola, Hde. Ngan-whei.
ravida, Bens. Che-kiang.
= helvacea, Phil.

= redfieldi, Hde. non Pfr.
v. lineolata, Mdff. Chi-li.
ravidula, Hde. Kan-su.
redfieldi, Pfr. Kan-su, Che-kiang.
= frilleyi, Cr. and Deb. Kwang tung.
= huberiana, Hde. Kwang tung.
ruppelli, Desh. Sze-chuen.
secusana, Gredl. Hu-pe.
straminea, Hde. Kiang-su.
thibetica, Desh. Sze-chuen.
tourannensis, Soul. Kwang-tung.
uncopila, Hde. Kiang-su.
vagoina, Gredl. Hu-pe
v. aloysii, Gredl.

Section EULOTELLA, Mts.
similaris, Fér. Hu-pe, Kwang-tung, Che-kiang, Fo-kien.
= translucens, King.
= woodiana, Lea.
= squalida, Ziegl.
= addita, Fér.
= epixantha, Pfr.
= striatissima, Desh.
v. hongkongensis, Desh.
v. obscura, Desh.
v. arcasiana, Cr. & Deb.
v. graminum, Hde.
v. arundinetorum, Hde.
v. assimilaris, Gredl. Hu-nan, Hu-pe.
v. nucleus, Desh. Sze-chuen, Che-kiang.
v. cathaiana, Mdff. Hu-pe.
v. stimpsoni, Pfr. Kan-su.
v. infantilis, Gredl. Hu-nan.
magnaciana, Hde. Sze-chuen, Hu-pe.
v. major, Hde.
poecila, Mdff. Sze-chuen, Hu-pe.
diplodesma, Mdff. Sze-chuen or Hu-pe.
constantiae, H. Ad. Sze-chuen.

Section ARMANDIA, Ancey.
davidi, Desh. Sze-chuen.
calymna, Schm. and Bttgr. Sze-chuen.
plicatilis, Desh. Sze-chuen.
sarelii, Mts. Sze-chuen, Hu-pe.
= nora, H. Ad.

Section COCCOGLYPTA. Pils.
dimidiata, Hde.
pinchoniana, Hde. Sze-chuen.

Section MASTIGEULOTA, Pils.
kiangsinensis, Mts. Hu-pe, Ngan-whei.
=maacki v. unizonalis, H. Ad.
v. major, Mdff.
v. cerasina, Gredl.
v. hilberi, Kob. Che-kiang.

Section EUHADRA, Pils.
caspari, Mdff. Hu-nan.
pantheia, Mab.
granulifera, Mdff. Hu-pe.
cyclolabris, Mdff. Kan-su.
renaltiana, Hde. Kwang-si.
schmackeri, Mdff. Kwang-tung.
ammiralis, Pfr.
cecillei, Phil.
moreletiana, Hde. Ngan-whei.
stenozona, Mdff. Fo-kien.
haematozona, Hde. Kwei-chou.
cremata, Hde. Che-kiang.
seguiniana, Hde. Yun nan.

delavayana, Hde.
? sanata, Hde. Kwang-si.
hemiclista, Schm. and Bttgr. Sze-chuen.
latilabris, Mdff. Che-kiang.
tenuitesta, Mdff. Sze-chuen.
v. taeniata, Mdff.
carpochroa, Mdff. Sze-chuen.
stierotaenia, Mdff. Kan-su.
pseudocampylaea, Mdff. Sze-chuen.
strauchiana Mdff. Kan-su.
amphidroma, Mdff. Sze-chuen.
haplozona, Mdff. Sze-chuen.
eris, Mdff. Kan-su.
v. pachychila, Mdff.
v. nana, Mdff.
micromphala, Mdff. Kan-su.
anceyi, nom. nov.
= pseudocampylaea, Ancey non Mdff. Sze-chuen.

Genus CATHAICA, Mdff.

Sub-genus EUCATHAICA, Andreae.
fasciola, Drap. Chi-li, Shen-si, Kan-su, Shan-tung, Shan-si, Ho-nan, Sze-chuen, Hu-pe, Hu-nan, Kiang-su.
= pyrrhozona, Phil.
= striatula, Müll.
cardiostoma, Mdff. Kan-su.
subtilistriata, Andr.
pekingensis, Desh. Chi-li.
= tchiliensis, Mdff.
v. conoidea, Mdff.
transitans, Mdff. Kan-su.
brevispira, H. Ad. Sze-chuen.
anceyi, Mdff.

Sub-genus, PLIOCATHAICA, Andr.
pulveratrix, Mts. Kan-su, Shen-si, Chi-li, Hu-nan, Shan-si.
v. bizona, Gredl. Kan-su Shan-si, Chi-li.
v. shensiensis, Hilb. Shen-si.
orithya, Mts. Ho-nan. Shan-si.
v. confucii, Hilb. Kan-su, Shen-si.
v. montana, Mdff. ? Kan-su.
corrugata, Mdff. Ho-nan.
janulus, Mdff. Kan-su.
richthofeni, Mts. Chi-li, Shan-tung, Shan-si, Ho-nan, Shen-si, Kan-su.
= buvigneri, Desh.
v. kalganensis. Mdff.
— subrugosa v. minor, Mdff.
subrugosa, Desh. Chi-li.
gansuica, Mdff. Kan-su.
perversa, Stur. Kan-su.
nodulifera, Mdff. Kan-su.

Sub-genus XEROCATHAICA, Andr.
kreitneri, Hilb. Kan-su.
v. subangulata, Mdff.
v. nana, Mdff.
siningfuensis, Hilb. Kan-su.
nanschanensis, Mdff. Kan-su.
pulveratricula, Mts. Kan-su, Shen-si.
= loczyi, Hilb.
samarella, Hde. Yun-nan.
iacosta, Mdff. ? Kan-su.
ochthephiloides, Mdff. Kan-su.
lutuosa, Desh. Chi-li.
sempriniana, Hde. Hu-nan.

Sub-genus PSEUDIBERUS, Ancey.
tectum-sinense, Mts. Shang tung.
futtereri, Andr.
zenonis, Gredl. Shan-tung.
plectotropis, Mts. Tien-shan.
mongolica, Mdff. Chi-li.
dejeana, Hde. Sze-chuen.

Sub-genus CAMPYLOCATHAICA, Andr.
przewalskii, Mts. Kan-su, Sz

chuen, Yun-nan.
= mencii, Hilb.
v. minor, Andr.
v. bizona, Andr.
v. gredleri, Hilb. Kan-su, E. Thibet.
= stoliczkana, Hilb. non Nev.
= mencii, var Hilb.
= buddhae, Hilb.
v. carinata, Andr.
v. exigua, Andr.
v. gracillima, Andr.
v. heudei, Hilb.
v. depressa, Andr.
connectens, Mdff. Kan-su.
polystigma, Mdff. Kan-su.
v. amdoana, Mdff. Sze-chuen.
obrutschewi, Stur. Kan-su.

Genus Platypetasus, Pils.
innominata Hde. Sze-chuen, Hu-pe.
? = mariella v. aquila, H. Ad.
v. duplicata, Mdff. Hu-pe.
mariella, H. Ad. Hu-pe.
v. submariella, Pils.
castanopsis, Mdff. Hu-pe, or Sze-chuen.
trochomorpha, Mdff. Sze-chuen.
causia, Mdff. Sze-chuen.
obrutschewi, Stur. Kan-su.
encaustochila, Mdff. Kan-su.
striophostoma, Mdff. Kan-su.

Genus Plectotropis, Mts.
mackensii, Ad. and Rve.
v. mystagoga, Mab.
gerlachi, Mdff. Hu-nan.
v. granulosostriata, Mts.
v. abrupta, Mts.
v. hunancola, Gredl.
laciniosula, Hde.
= laciniosa, Hde.
trichotropis, Pfr. Hu-pe.
v. laciniata, Hde. Che-kiang.
v. shanghaiensis, Pfr. Che-kiang.
ciliosa, Pfr. North China.
ningpoensis, Bttgr. Che-kiang.
esau, Gredl. Hu-pe.
patungana, Gredl. Hu-pe.
piligera, Gredl. Kwei-chou.
hupensis, Gredl. Hu-pe.
= orthocheilis, Hde.
barbosella, Hde- Che-Kiang.
lofouana, Mdff. Lo-fou-shan.
subconella, Mdff. Kwang-si.
sterilis, Hde. Hu-pe.
demolita, Hde. Sze-chuen.
lithina, Hde. Hu-pe.
— calculus, Hde.
sedentaria, Hde. Kwei-chou.
parasitarum, Hde. Hu-pe.
parasitica, Hde. Hu-pe.
catostoma, Blf. Yun-nan.
lepidostola, Hde. Hu-pe.
v. trochospira, Mdff.
squamosella, Hde. Ngan-whei
pentagonostoma, Mdff. Kan-su.
diploblepharis, Mdff. Kan-su.
comata, Stur. Kan-su.
pseudopatula, Mdff. Sze-chuen.
? applanata, Mdff. Fo-kien.

Genus Aegista, Alb.
chinensis, Phil. Ngan-whei.
= vermis, Hde. non Rve.
v. minor.
pseudochinensis, Mdff. Hen-san.
= chinensis, Hde. non

Phil.
platyomphala, Mdff. Kwan-tung.
serpestes, Hde. Hu-pe.
herpestes, Hde. Sze-chuen.
furtiva, Hde. Kwei-chou.
aubryana, Hde. Kwei-chou.
accrescens, Hde. Hu-pe, Kwei-chou.
= accedens, Schm. and Bttgr.
v. initialis, Hde.
hupeana, Gredl. Hu-pe. Hu-nan.
megachella, Mdff. Kan-su
v. alticola, Mdff. Sze-chuen.
subcinctula, Hde. Yun-nan.
= subcincta, Hde.
mensalis, Hde. Yun-nan.
thoracica, Hde. Hu-pe.
secundaria, Hde. Sze-chuen.
mellita, Hde. Yun-nan.
mellitula, Hde. Yun-nan.
permellita, Hde. Yun-nan.
rebellis, Hde. Sze-chuen.
languescens, Hde. Sze-chuen.
vicinella, Hde. Hu-pe.
araneaetela, Hde. Sze-chuen.
radulella, Yun-nan.
turbo, Pils. Hu-pe.
= turbinella, Hde. non Morel.
taliensis, Hde. Yun-nan.
= talifouensis, Hde.
puberosula, Hde. Yun-nan.
= pulverulenta, Hde. non Lowe.
amphiglypta, Anc. Sze-chuen.
szechenyi, Anc. Sze-chuen.
tenerrima, Mdff. Sze-chuen.

Genus STILPNODISCUS, Mdff.
vernicinus, Mdff. Kan-su.
euphyes, Stur. Kan-su.
scassianus, Mdff. Kan-su. Sze-chuen.
entochilus, Mdff. Kan-su.

Genus CHALEPOTAXIS, Anc.
infantilis, Gredl. Kwang-si, Hu-nan.

BELOGONA SIPHONADENIA, Pils.

Genus HYGROMIA, Risso.

Section FRUTICIOLA, Held.
subechinata, Desh. Sze-chuen.
tchefouensis, Cr. and Deb. Shan-tung, Sze-chuen.
= tschefouensis, Mts.
= munieriana, Cr. & Deb.
puberula, Hde. Sze-chuen.
horripilosella, Hde. Sze-chuen.
nautarum, Hde. Hu-pe.
semihispida, Anc. Shen-si.
sitalina, Gredl. Hu-pe.
reformata, Gredl. Hu-pe.

Genus VALLONIA, Risso.
costata, Müll. Chi-li.
patens, Reinh. Chi-li.
tenera, Reinh. Che-kiang, Sze-chuen, Kan-su.
declivis v. altilis, Sterki, Sze-chuen.
ladacensis v. tibetana, Mdff. Sze-chuen.

Genus HELICODONTA, Fér.
subobvoluta, Anc. Shen-si.
molina, Hde. Hu-pe.
biconcava, Hde. Hu-pe.
omphalospirum, Mdff. Hu-pe.
diplomphala, Mdff. Hu-pe.
uninodata, Gredl. Hu-pe.
binodata, Mdff. Hu-pe.
bicallosula, Hde. Sze-chuen

Sub-genus MOELLENDORFFIA, An

trisinuata, Mts. Kwang-tung.
v. sculptilis, Mdff.
hensaniensis, Gredl. Hu-nan.
erdmanni, Schm. and Bttgr.
faberiana, Mdff. Sze-chuen.
biscalpta, Hde. Sze-chuen.

SPECIES OF UNCERTAIN POSITION.

Helix keratina, Hde. Kwang-si.
„ ostreola, Hde. Kwang-si.
„ jacob, Gredl. Hu-pe.

ON THE ANATOMY OF THE GENUS MYOTESTA, CLLGE.

BY WALTER E. COLLINGE.

(Plate i.)

THE genus *Myotesta* was established in 1901 [1] for the reception of two interesting slug-like molluscs, received from and collected by, Mr. H. Fruhstorfer of Berlin, in Tonkin.

On further examination, the anatomical characters and general structure prove so very different from any known family of pulmonates, that it has been considered expedient to propose for the reception of this interesting genus a new family, to which the name *Myotestidae* is given.

Until more material is obtained, and the form and structure of the pallial organs, free muscles, and digestive system are worked out, it is not possible to say with any certainty, what relations this peculiar family has to other families of slug-like molluscs. The material at my disposal has not enabled me to investigate satisfactorily these organs, but I am able to give details of the generative organs and a general description of others.

MYOTESTIDAE, n. fam.

Myotesta, Cllge.

Myotesta, Cllge.: Journ. of Malac., 1901, vol. vii., p. 118.

Animal slug-like, with the mantle conspicuously elevated into a non-spiral visceral hump, and completely enclosing a flat, somewhat ovoid, non-spiral, plate-like shell. Dorsum posteriorly sharply keeled, Respiratory orifice in front of the middle of right margin of mantle. Generative orifice below and immediately behind the right upper tentacles. The foot-fringe is continued posteriorly to form the overhanging caudal lobe. Caudal mucous pore. Foot-sole narrow, divided into median and lateral planes. Viscera elevated into a non-spiral dorsal hump, and posteriorly lying in a triangular depression of the dorsum. Body-cavity not extending into the tail portion, which is solid.

1. Journ. of Malac., 1901, vol. viii., p. 118.

Jaw crescentic, with ten broad ribs, slightly denticulating the basal margin.

Generative system crowded into the right anterior portion of the body-cavity, excepting the hermaphrodite gland, which lies embedded in the "liver," in the folds of the intestinal tract, dorso-posteriorly. Well developed penis, passing into an epiphallus. Origin of retractor muscle on the anterior portion of the right body-wall. Receptaculum seminis with duct.

Externally the members of this genus remind one somewhat of those of *Parmarion*, Fischer, and *Mariaella*, Gray, but this is only a superficial resemblance.

When first examined the large shell-cavity seemed to have a small irregular opening, but the examination of further and better material leaves no doubt but that this opening was due to damage. *The cavity is completely closed*, and contains at its anterior end, a flat, non-spiral, plate like shell; it is extremely thin, ovoid in outline, covered by a thin periostracum, and composed of numerous minute, irregularly shaped, calcareous particles. Immediately under this plate-like shell lies the heart, and a little posterior to it, the kidney and ureter; whilst beneath the extreme posterior end of the shell-cavity, the rectum is seen crossing from left to right. The lung is very small, and its exact extent difficult to trace.

Externally one notices that the visceral hump lies in a triangular depression of the dorsum, so that the keel of the dorsum seems to divide anteriorly in a Y-shaped manner. On the right side of the body a deep groove passes from the respiratory orifice to the generative orifice (Pl. 1, fig. 7, *gr.*).

Myotesta fruhstorferi, Cllge.

Pl. 1, figs. 1–4.

Myotesta fruhstorferi, Cllge.: Journ. of Malac., 1901, vol. vii, p. 118.

Animal yellowish-brown, with brown mottling; head and tentacles light-blue; mantle yellowish-brown with faint, net-like, brown markings. Caudal mucous pore small. Peripodial groove very distinct. Foot-fringe deep yellow with a few brownish splashes; lineoles brown, broad and irregular, with finer lighter coloured lines intervening. Foot-sole dirty yellow.

Length (in alcohol) 39 millim., breadth of foot-sole 3 millim.

The Generative Organs (Pl. 1, fig. 4).—The vagina is a thick walled tube, slightly bent and twisted, at its distal end a small receptaculum

seminis opens into it, the receptacular duct imperceptibly passing into the expanded head. The free-oviduct is short. The penis is a long, thick-walled, muscular organ, at its distal end there is a short, thick, retractor muscle which arises from the right body-wall at the anterior end of the body-cavity; beyond the region of insertion of this muscle the lumen of the penis is continued into the epiphallus from which two small diverticula arise (Pl. 1, fig. 4, *div.*), the first and smaller is a simple caecal outgrowth, the second is slightly larger, thicker, and more muscular, both were very carefully examined but were not found to contain anything. Beyond these diverticula the epiphallus expands, into a club-shaped body and contains a few, irregular shaped, calcareous particles. From the inner side of the epiphallus a short vas deferens connects this organ with the prostatic canal. When dissected the penis is seen to have a lumen agreeing closely with its external form. The oviducal portion of the common duct is large and folded upon itself. The hermaphrodite gland lies embedded in the "liver," and occupies a position considerably more posterior than the rest of the generative organs; the duct is short and slightly convoluted. The albumen gland is comparatively small.

Myotesta punctata, Cllge.

Pl. 1, figs. 5—11.

Myotesta punctata, Cllge.: Journ. of Malac., 1901, vol. vii, p. 119.

Animal a deep brown with a few yellowish, somewhat stellate spots; head and tentacles dark blue; mantle brown with few dark blotches and spotted with yellow. Peripodial groove ill-defined. Foot-fringe yellowish-brown with closely set lineoles. Foot-sole, lateral planes brownish with yellow maculations, median plane dirty brown and smooth.

Length (in alcohol) 34 millim., breadth of foot-sole 4 millim.

The Generative Organs (Pl. 1, figs. 8-11)—In this species the generative organs differ considerably from those in *M. fruhstorferi*. There is a wide vestibule into which the short vagina opens on the left, the penis papilla protruding into it on the right (Pl. 1, fig. 9). The receptaculum seminis is much larger than in the preceding species, as also its duct, which is probably due to the fact that here it was fully distended by its contents, and contained a well-developed spermatophore (Pl. 1, fig. 10). This body consists of a spirally wound tube with numerous, and variously shaped, spines studded over its surface; some of these spines are quite simple (Fig. 11a.), while others are much more complicated (Fig. 11 b-f.), the most varied consisting

of three branches rising from a common stem, each branch bifurcating at its free end. The penis, proximally, consists of a wide, sac-like sheath, into which the penis papilla protrudes, beyond this it narrows and just before joining with the epiphallus widens out into a bulbous head. The epiphallus is slightly longer than in *M. fruhstorferi* and it exhibits no diverticula; it is widest about its middle. The vas deferens is longer than in the preceding species. The common duct exhibits two sharp folds. No retractor muscle of the penis could be traced. The hermaphrodite duct is rather longer than in *M. fruhstorferi*, so that the hermaphrodite gland lies embedded in the "liver," close to the side of the intestine, much more dorsally and posteriorly than the remaining portions of the generative organs.

Since the above description was written, I have received from Dr. H. Simroth a short paper[2] on a remarkable new species of Stylommatophora, to which he gives the name *Ostracolethe fruhstorfferi*, gen. et sp. nov., and from his description I am inclined to think that this animal is what I have named *Myotesta fruhstorfferi*, although there are certain features in the anatomy described by him, which I have failed to find in my specimen. In both cases the specimens were received from Mr. Fruhstorfer, and collected in Tonkin.

Describing the generative organs Dr Simroth writes, "The vas deferens has, before it passes into the penis, three short, thick flagella; the penis resembles that of the *Parmarion* group, such as *Microparmarion*. Its retractor originates neither on the left, nor by the diaphragm, but further forward, quite close to the inner root of the right ommatophore. The vas deferens, after running separately for a time near the oviduct, enters and is blended with it. This portion, which is attached by muscles to the right-wall of the body, is I regret not clearly defined in this specimen, although it has been most carefully dissected. However, the following facts are clear: From the point of origin there proceed two cords, of which one is the normal seminal duct, which can be traced as far as the near end of the penis, the other turns to thick muscle underneath and penetrates to the distal extremity of the penis. This muscle seems to contain a fine canal, which may serve for internal impregnation, as is the case with many other robber pulmonates, but in a somewhat different fashion. But the most remarkable peculiarity lies in the fact that, near the point of origin, in the adhering muscle, there are a number of plate-shaped discs

[2] Zool. Anz., 1901 (Dec. 10), Bd. xxv, pp. 62—64.

(14) which can best be likened to trowser buttons, which are concave on one side. They are arranged on one base. Each disc has a narrow central, cloven lumen, and arises out of cruciform muscle fibres, of which the radiating bundles are enclosed. One might very well imitate this structure, by dissecting out in large portions a number of cross sections of the thick penis muscle and by placing them close to each other upon a flat surface. It is this penis muscle which I wished to bring into connection with the attraction and dart-glands of the *Vitrinae*, which species together with others of the Atlantic members of this genus, discharge upon themselves from the penis, and must necessarily be more or less permeated by the seminal fluid. Although it is quite certain that the lumenae of the discs must be connected by a canal, I have as yet unfortunately failed to distinguish any such canal in the muscular tissue. The functions of the organ are presumably the same as in other muscular penes. Still we do not know precisely whether it performs the function of discharging the spermatozoa, or whether it brings about impregnation by some specialised fluid; we can only conjecture that its function is of some such nature judging from its form and structure."

On reading the above description, I re-examined the material I have, but was unable to trace the disc-like bodies. The retractor of the penis, when carefully dissected away and teased, was similar to that in other molluscs. Further, Dr. Simroth, is very definite in his statement respecting the perforation of the mantle by the shell, he writes (p. 62) "at the hinder end on the posterior of the [shell] sac, somewhat to the left, a very fine cleft is observable, which cannot, however, with certainty be traced as far as the opening of the mantle. *But the striking peculiarity is, that, through this cleft, there projects outward in the perfect snail, the fine point of the conch-like shell.** The enclosed shell is composed of an anteriorly situated calcareous plate, on which an extraordinarily, thin, wide, and structureless conch-like shell fits close, and covers the sac."

In *Myotesta* there is no conch-like shell, nothing beyond the flat, plate-like shell, and this, in perfect specimens, is entirely covered and enclosed by the mantle.

Possibly *Myotesta* and *Ostracolethe* are distinct, but no doubt Dr. Simroth will later give figures and a further description.

I have to acknowledge with grateful thanks a grant from the Royal Society, which has enabled me to obtain the material here described and figured.

* The italics are mine. W.E.C.

EXPLANATION OF PLATE I.

Myotesta fruhstorferi, Cllge.

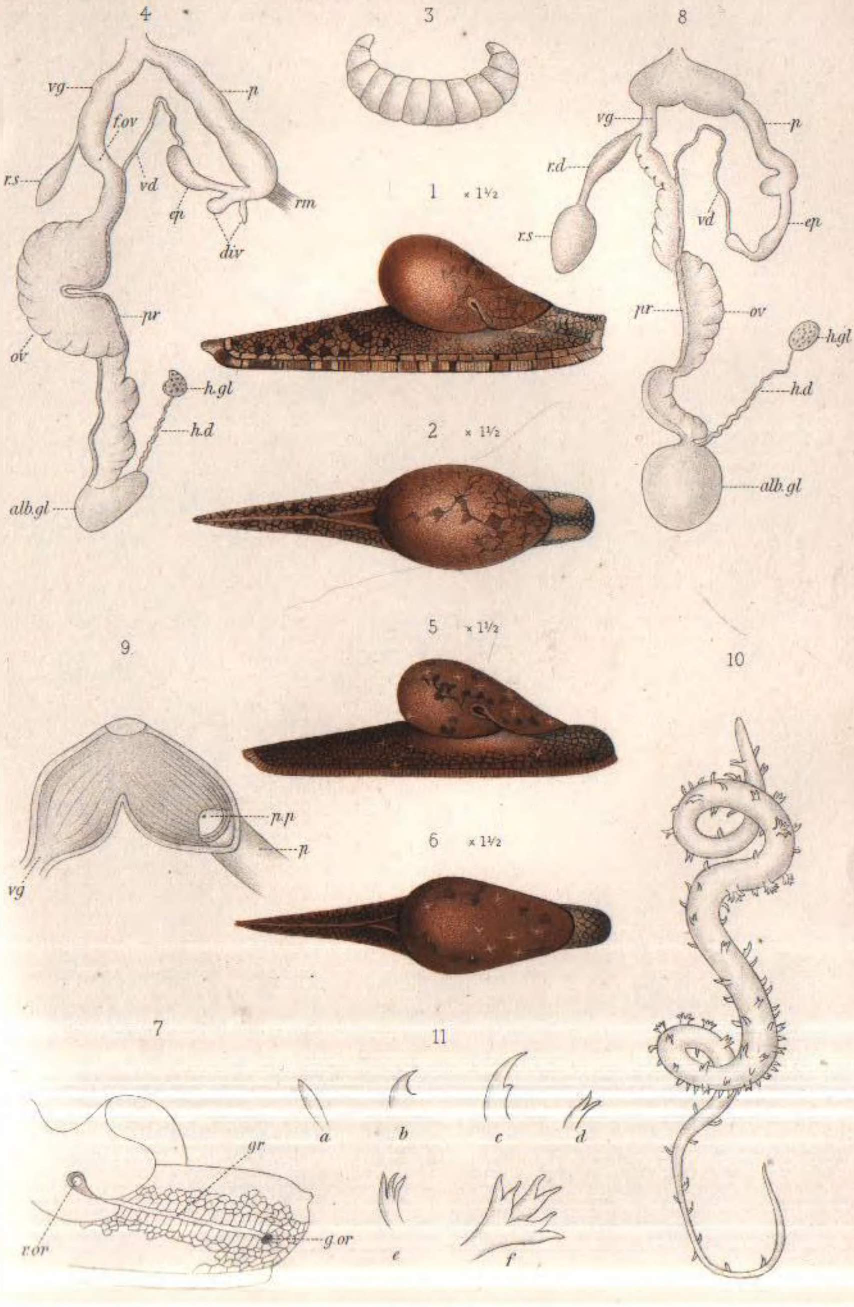
Fig. 1. View of the animal from the right side. × ½.
Fig. 2. Dorsal view. × ½.
Fig. 3. Jaw, considerably enlarged.
Fig. 4. Generative organs.

Myotesta punctata, Cllge.

Fig. 5. View of the animal from the right side. × ½.
Fig. 6. Dorsal view. × ½.
Fig. 7. Anterior end of body showing lateral groove and genital orifice.
Fig. 8. Generative organs.
Fig. 9. Proximal portion of penis opened to show penis papilla.
Fig. 10. Spermatophore.
Fig. 11. Different forms (a-f,) of spines on the spermatophore.

REFERENCE LETTERS.

alb. gl.	Albumen gland.	*p.*	Penis.
div.	Diverticula of epiphallus	*p.p.*	Penis papilla.
ep.	Epiphallus.	*pr.*	Prostate.
f. ov.	Free-oviduct.	*r.d.*	Receptacular duct.
gr.	Groove.	*r.s.*	Receptaculum seminis.
g.or.	Generative orifice.	*r.m.*	Retractor muscle.
h.d.	Hermaphrodite duct.	*r. or.*	Respiratory orifice.
h. gl.	Hermaphrodite gland.	*v. d.*	Vas deferens.
ov.	Oviduct.	*vg.*	Vagina.



A. H. [illegible] del. et pinx. ad nat.
Lith. Werner & Winter Frankfurt a/M.

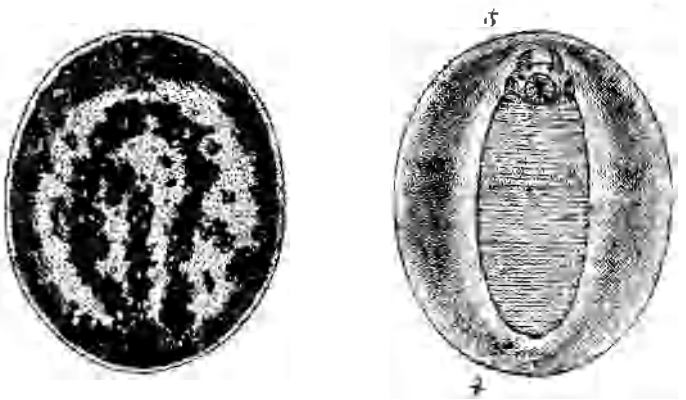
DESCRIPTION OF A NEW SPECIES OF ONCHIDIUM FROM SOUTH AFRICA.

By WALTER E. COLLINGE.

The only species of *Onchidium* at present known from South Africa, is the *O. peroni* of Cuvier.

In November 1900, Mr. Henry C. Burnup very kindly sent me two examples of a small species, which upon examination prove to belong to a new species. It gives me much pleasure to name this addition to the South African fauna after Mr. Burnup, as a mark of appreciation of the valuable assistance he has at all times so willingly rendered me, in connection with my studies on the slug fauna of South Africa.

Onchidium burnupi, n. sp.



1 2

Onchidium burnupi, n. sp.

Fig. 1—Dorsal view, Fig. 2—Ventral view,

Notum finely granulated, yellowish irregularly blotched with blackish-green, these blotches being most prominent at the edge and in the middle of the notum. Dorsal eyes irregularly scattered. Head large. Hyponotum greenish-grey. Foot-sole greyish-yellow, faintly marked with fine transverse wrinkles. Male generative orifice on the right side of the head, on the inner side of the right upper and lower tentacles. Female generative orifice, in front of the anus, partially hidden by the posterior border of the foot-sole. Anal aperture slightly to the right of the median line.

Length of notum (in alcohol) 11 millim.; breadth 9; hyponotum 3 *millim. broad*; *foot-sole 8-5 millim. long*, 3 *broad*.

Hab.—Umlaas Lagoon, Natal.

THE ANATOMY OF THE BRITISH SPECIES OF THE GENUS SOLEN. Pt. iii.*

By H. H. BLOOMER.

(Plate ii.)

Nervous System.

Solen ensis, L. (Pl. ii., figs. 18—20.

The cerebro-pleural ganglia (Figs. 18-19, *C. P. G.*) are situated under the anterior bifurcated parts of the anterior retractor pedis muscles, just in front of the mouth. The two ganglia can be seen *in situ* through the transparent ventral integument. They lie some distance apart, but are connected by a commissure (Figs. 18 and 19, *C. P. C.*). Anteriorly each ganglion gives rise to an anterior pallial nerve (*A. P.N.*) running in an antero-lateral direction, towards the posterior edge of the anterior adductor muscle; some distance before reaching the latter, a large branch (*V. A. N.*) leaves the nerve on its inner side, and traverses the whole length of the ventral surface of the muscle close to the lateral edge, innervating it with a number of small branches. About one-third of its course along the muscle it gives off a large branch which passes along the transparent portion of the mantle-lobe. Both nerves eventually join the outer circumpallial nerve (*O. C. N.*).

When the anterior pallial nerve reaches the transparent portion of the mantle-lobe, a large branch leaves it and crosses the mantle in a ventral direction and divides, both portions joining the outer circumpallial nerve. This latter nerve, shortly after leaving the main pallial nerve is connected with the inner circumpallial nerve (Fig. 18, *I.C.N.*), which proceeds in a posterior direction, and curving ventrally joins the posterior pallial nerve.

The main anterior pallial nerve (A.P.N.) pursues an anterior direction. From it four large branches originate, all of which pass ventrally and eventually join the outer circumpallial nerve (O.C.N.).

Each cerebro-pleural ganglion also gives rise to another anterior nerve (Figs. 18 and 19, *D.A.N.*), which passes along the ventral surface of the anterior bifurcation of the retractor pedis anterior muscle, and then along the dorsal surface of the anterior adductor muscle, on its course giving a number of small branches to both muscles, the liver, and the dorsal integument. The ganglia also give off several small nerves which pass direct to the muscles and viscera.

Posteriorly a connective joins each cerebro-pleural with the

* See ante, vol. viii., p. 97.

viscero-parietal ganglion. The direction of the connective after leaving the ganglion is, for a short distance, between the retractor pedis anterior muscle, and the ventral integument, then close to the side of the muscle, and crossing over it continues along the side of the viscera, afterwards passing through the wall of the retractor pedis posterior muscle, and finally under the bifurcated portion of the muscle, to the viscero-parietal ganglion (Figs. 18 and 20, *V.P.G.*).

On the inner side of each cerebro-visceral connective runs a cerebro-pedal connective (Figs. 18 and 19, *Ce. P.*). On leaving the cerebro-pleural ganglion, the cerebro-pedal connective traverses a short distance under and then on the inner side of the retractor pedis anterior muscle, it then buries itself in the tissues of the foot, and emerging into the pedal sinus, passes close to the longitudinal muscle to the pedal ganglion. From this connective a nerve arises which passes to the viscera.

The pedal ganglia (Fig. 18, *P.G.*) are situated in the proximal part of the foot, near its dorsal surface, and close to the most ventral fold of the intestine. From them a number of nerves radiate which innervate the viscera and the muscles of the foot. Passing along the latter are four pairs of nerves, four nerves traversing each side, between the longitudinal and transverse muscles, to the distal end. From these a number of small branches arise.

The viscero-parietal ganglia (Fig. 18 and 20, V.P.G.) are situated between the bifurcated portions of the posterior retractor pedis muscle, and anterior to the posterior adductor muscle; like the cerebro-pleural ganglia they can be seen through the transparent ventral integument. Anteriorly they give rise to two branchial nerves (Figs. 18 and 20, *B.N.*), one curving to the right and the other to the left, passing to the base of the inner gills. They run immediately beneath the afferent branchial vessels.

From the posterior part of the ganglia the two posterior pallial nerves arise (Figs. 18 and 20, P.P.N.). Each nerve passes underneath the posterior adductor muscle, and along the inner surface of the dorsal portion of the muscular part of the mantle lobes, formed by their concrescence. On their way each gives off a large inner nerve, and from both a series of smaller branches pass to the surrounding tissue.

Near the muscular fringe of the posterior pallial band the posterior pallial nerve divides, the outer branch crossing the mantle lobe ventrally and first joining the inner circumpallial nerve, and afterwards the outer circumpallial nerve. The other branch, in all probability, passes around the base of the siphon, sending out branches to it and the muscles of the mantle, and then joins the outer circum

pallial nerve, but I have not been able to trace the complete connection.

The posterior portion of the outer circumpallial nerve joins the anterior portion close to the fourth aperture (Fig. 18, F.A.).

The inner circumpallial nerve proceeds from a branch of the anterior pallial nerve, and passes in a curved direction to the posterior pallial nerve.

The outer circumpallial nerves and the nerves of the anterior adductor muscle converge and apparently join at the point where the dorsal integument is connected with the teeth of the shell (Fig. 18, D.I.S.).

S. siliqua, L.

The nervous system of this species is similar to that of *S. ensis*, and only differs from it in minor details.

S. marginatus, Pult. and Don.

The cerebro-pleural ganglia are not discernable through the ventral integument, owing to the forward projection of the lips formed by the labial palps. Anteriorly each ganglion only gives rise to one nerve, the anterior pallial nerve. It proceeds to the posterio-lateral edge of the anterior adductor muscle, then along the ventral surface of the muscle near its lateral edge, but when about one-third of the distance it divides, the inner branch continuing under the muscle, and eventually reaching the point where the dorsal integument is attached to the teeth of the shell. The outer branch passes along the transparent portion of the mantle lobe, and joins the circumpallial nerve.

The pedal ganglia are similar in position to those of *S. ensis*, but owing to the position of the viscera in the foot, a portion of the intestine and the caecum of the crystalline style lie distal to them. A number of nerves radiate from the ganglia to the viscera and the muscles of the foot.

The position of the viscero-parietal ganglia is discernable through the transparent ventral integument as in *S. ensis*. Passing from them posteriorly are two large pallial nerves, each of which, shortly after passing under the posterior adductor muscle, bifurcates, the inner branch of the one converging towards the inner branch of the other, and both proceed to the base of the siphon. The outer branch pursues a ventro-lateral direction across the muscular portion of the mantle lobe. Both nerves apparently join the circumpallial nerve, though I have not been able to clearly trace the connection. There is evidently only one circumpallial nerve, the same being equivalent to the outer circumpallial nerve of *S. ensis*.

EXPLANATION OF PLATE II.

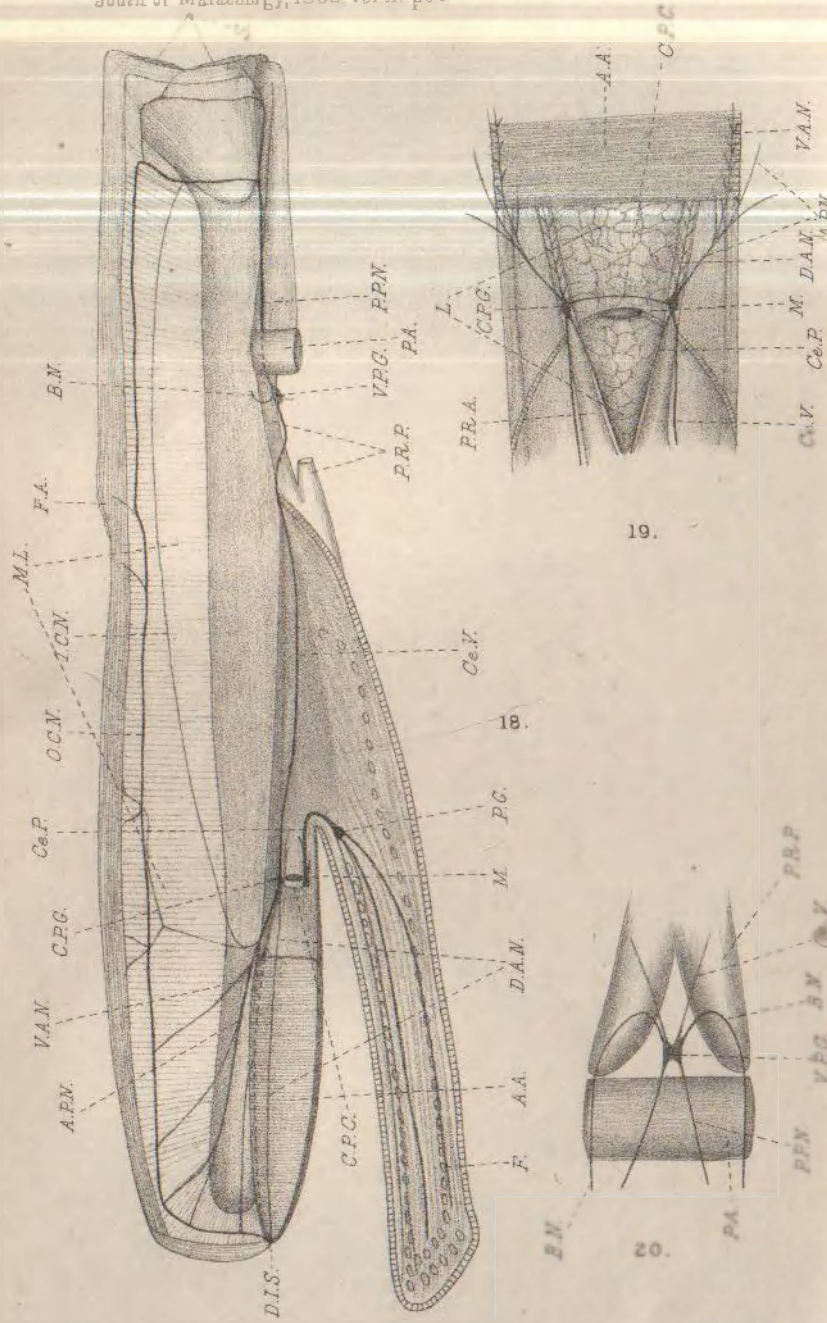
Fig. 18. *Solen ensis*, L. Semi-diagrammatic figure of the nervous system, seen from the left side.

Fig. 19. do The Cerebro-pleural ganglia, viewed from the ventral surface. ×2.

Fig. 20. do The Viscero-parietal ganglia, viewed from the ventral surface. ×2.

Reference Letters.

A.A. Anterior adductor muscle.
A.P.N. Anterior pallial nerve.
B.N. Branchial nerve.
Ce.P. Cerebro-pedal connective.
Ce. V. Cerebro-visceral connective.
C.P.C. Cerebro-pleural commissure.
C.P.G. Cerebro-pleural ganglion.
D.A.N. Dorsal nerve of the anterior adductor muscle.
D.I.S. Point where the dorsal integument is connected with the teeth of the shell.
F. Foot.
F.A. Fourth aperture.
I.C.N. Inner circumpallial nerve.
L. Liver.
M. Mouth.
M.L. Mantle lobe.
O.C.N. Outer circumpallial nerve.
P.A. Posterior adductor muscle.
P.G. Pedal ganglion.
P.P.N. Posterior pallial nerve.
P.R.A. Bifurcated parts of retractor pedis anterior muscle.
P.R.P. Bifurcated parts of retractor pedis posterior muscle.
S. Siphon.
V.A.N. Ventral nerve of the anterior adductor muscle.
V.P.G. Viscero-parietal ganglion.



H.H.B del ad nat.

A.S.Huth.Lith. London.

ANATOMY OF SOLEN.

DESCRIPTIONS OF SIX NEW LAND SHELLS FROM THE MALAY PENINSULA.

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

The following are bare diagnoses; it is proposed that figures shall follow later.

Rhodina (?) mirabilis, n. sp.

Shell recalling in form *Rhodina perakensis*, de Morgan, but the earlier whorls increase more rapidly, and the lower half of the shell has a more cylindrical appearance. The columella is twisted, and a revolving keel encircles the base and ascends spirally into the shell, about half way up the columella wall; in addition, another keel is visible from the junction of the suture line and the outer lip until, revolving round the periphery, it fades out where it bisects the outer lip. Whorls 13, earlier ones smooth, later ones strongly striate.

Alt. 24.5; diam. max. 3.5 millim.

Hab.—Kelantan, Malay Peninsula.

Streptaxis collingei, n. sp.

Shell openly umbilicated, well depressed, costulated, the costae being fine and regular, hyaline or yellowish white; whorls, 6½–7, somewhat convex, suture well marked, the last whorl being considerably distorted. Aperture oblique, sub-quadrate, peristome expanded and reflected; parietal lamella oblique and curved, palatal teeth generally four, sometimes only three, the uppermost and lowest being the largest.

Alt. 5; diam. max. 9 millim.

Hab.—Kelantan, Malay Peninsula.

A well-depressed shell, which, in the form and position of the teeth, recalls *S. siamensis*, Pfr.

Opisthostoma laidlawi, n. sp.

Shell ovate-conic, pale reddish horn-colour, apex obtuse; whorls 6-6½, strongly convex, the lower ones being regularly, but finely and somewhat distantly, marked with lamellae. The last whorl is solute, rounded, and bent backwards nearly to the suture of the fourth whorl.

Alt. 2; diam. max. 2.5; diam. min. 1.5 millim.

Hab.—Kelantan, Malay Peninsula.

Recalls in form several of the Bornean species, but the apex is much depressed, the shell is not so pyramidal, and the whorls very conic.

Clausilia (Pseudonenia) kelantanese, n. sp.

Shell elongately fusiform, dark chestnut brown, with 11-11½ whorls; protoconch large, cylindrical, and smooth, the later whorls being closely, finely striate, with traces of spiral sculpture crossing the striae;

suture well marked; last whorl very slightly narrower than the preceding one. Mouth ovate-pyriform, chestnut within, the peristome being solute, thickened and reflexed. Parietal lamella nearly vertical and reaching to the lip, columellar lamella moderately deeply seated, twisted, and ascending fairly rapidly; plica principalis medium in size, with two small palatal plicae (upper one the largest) below.

Alt. 31.8; diam. max. 5 millim.; alt. apert. 6.5, lat. apert. 4.8 millim.

Hab.—Kelantan, Malay Peninsula.

Related to *C. filicostata*, Stol., and *C. kajayanensis*, de Morgan; from the latter it may readily be separated by its size, and from the former, in addition to the characters of the plicae and lamellae, the much larger protoconch will readily separate it. The specimens were collected with *C. filicostata*.

Platyrhaphe chrysalis, n. sp.

Shell moderately depressed, with $4\frac{1}{2}$ whorls, largely and openly umbilicated, horny brown in colour, but incrusted all over with a yellowish covering, which nearly fills the umbilical area. The suture is very deep, the whorls being strongly convex, and the protoconch acute. The aperture is round, thickened within, and not reflected. Compared with *P. loui*, de Morgan, the species differs in the greater diameter of the mouth in proportion to the width of the shell, and the last whorl is not solute. Judging from de Morgan's figure, the present shell is also not so widely umbilicated.

Alt. 9; diam. max. 4.5; diam. apert. 3.8 millim.

Hab.—Kelantan, Malay Peninsula.

Opisthoporus dautzenbergi, n. sp.

Shell much depressed, whitish, irregularly dotted and streaked with reddish brown; whorls $4\frac{1}{2}$, protoconch smooth, the residue of the shell being closely and regularly striate, umbilicus large and open, suture deep. The last whorl descends in front; the lip is double, the edge of the incrassated portion being dark brown, while the reflected portion is white. The operculum is solid, many-whorled, white outside and horn-colour within. The tube is narrow, situated about 2 millim. from the outer lip, and bends backwards.

Alt. 5; diam. max. 13, min. 10.5 millim.

Hab.—Kelantan, Malay Peninsula.

Related to *O. penangensis*, Stol., of which I have specimens from Kinta Valley, and which I suspect will prove to equal *O. rostellatus*, Pfr., but the present species is larger, more solid, differs in ground colour, also the pattern of the colour marking is not carried all over the shell, and the lip is larger and more reflected.

OBITUARY.

O. A. F. WEIGMANN.

We regret to note the death of F. Wiegmann which occurred at Jena on November 9th, 1901.

Carl Arend Friedrich Wiegmann, was born at Berlin on March 1st, 1836, and was son of the well-known Professor of Zoology, Dr. A. F. Aug. Wiegmann. He prepared himself for the career of apothecary, studied at the University of Berlin, and travelled afterwards in different countries of Europe and in the United States of America. In 1866 he bought a dispensary at Jüterbog, near Berlin, and settled in 1877 at Jena in order to devote his time exclusively to zoological studies.

Wiegmann was an ardent student of malacology, and all his zootomical researches are distinguished by accuracy and thoroughness. Besides numerous short articles in scientific periodicals, he published the following works :

Beitraege zur Anatomie der Landschnecken des Indischen Archipels, in W. Weber, Zool. Erg. einer Reise nach Niederl. Ind., 1893 vol. ii., pp. 112-259. 8 pls.

Landmollusken Zootomischer Theil. Abh. d. Senckenberg. Nat. Ges., Frankfurt, 1898, vol. xxiv., 3, pp. 289-557, 11 pls.

Voyage of Kükenthal. Land u. Süsswasser-Mollusken der Seyschellen. II. Zootomischer Theil. Mitth. aus d. Zool. Samml. des Mus. f. Naturk. Berlin, 1898, pp. 37-96, 2 pls.

Binnenmollusken aus Westchina und Centralasien. Zootomische Untersuchungen. I. Die Heliciden. Ann. d. Mus. Zool. Acad. Imp. des Sci. St. Petersb., 1900. II. Die Buliminiden. Ibid., 1901.

O.F. v. M.

PROCEEDINGS OF THE MIDLAND MALACOLOGICAL SOCIETY.

33RD (ANNUAL) MEETING, DECEMBER 13TH, 1901.

The President in the chair.

In the absence of any demand for a ballot, Mr. Hugh McClelland was elected a member of the Society.

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

The Secretary reported that as no amendments had been received to the Council's nominations, the following would constitute the Council and Officers for 1902 :—

President—Walter E. Collinge.
Vice-President—E. R. Sykes, B.A., F.L.S.
Treasurer—H. H. Bloomer.
Hon. Secretary—H. Overton.
Librarian and Curator—Guy Breeden.
Other members of the Council—Messrs. G. Breeden, H. Willoughby Ellis, F. J. Partridge, and Bromley Peebles.

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

EXHIBITS.

By Mr. Bloomer: Sixteen species of foreign Clausiliae.

By Mr. Breeden: *Unio margaritifer* from Barnstaple.

By Mr. Overton: *Amalia gagates* and *Acicula lineata* from Sutton Coldfield.

ANNUAL REPORT, 1901.

In presenting their Fourth Annual Report your Council have again to record a satisfactory year's work.

During the year one new member has been elected, and three have resigned.

Eight meetings have been held, at which four papers have been read, whilst the exhibits have been numerous and some of great interest.

The financial condition of the Society stands as follows: there is a balance due to the Treasurer of 2s. 10d., and the outstanding subscriptions amount to £1 5s. 0d.

Donations to the Library have been received from Professor L. Plate and Mr. H. H. Bloomer, the number of works and pamphlets now numbering 91. Your Council regret that no additions to the Society's Collection of British Molluscs have been received during the year.

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

34TH MEETING, FEBRUARY 21ST, 1902.

The President in the chair.

PAPERS READ.

"Some Aspects and Problems of Malacology."
By Walter E. Collinge.

"A Preliminary account of the minute anatomy of *Helix acuta*."
By H. Overton.

EXHIBITS.

By Mr. Overton: Anatomical preparations and drawings illustrating his paper, also specimens of *Paludestrina taylori*, E. A. Smith.

CURRENT LITERATURE.

Pilsbry, Henry A.—Tryon's Manual of Conchology, ser. ii., vol. xiv. (pt. 54), pp. 129—192, pls. 22—36. Philadelphia: Academy of Natural Sciences.

Continuing the "Appendix to Bulimoid Snails," the following genera are dealt with, and the undermentioned new species, etc., described:—*Plekocheilus*, Guild, *Auris*, Spix, *Xenothauma*, Fult., *Bulimulus*, Leach, with *B. stilbe*, n. sp. from Brazil, *Xeopetractus*, Marts., *Oxychona*, Mörch, *Drymaeus*, Albers, with *D. cognatus*, n. sp. from Colombia, a species closely related to *D. zoogeographicus*, Orb., and *D. membielinus*, Crosse. *D. succinea*, n. sp. from the Amazon river, resembling in contour *D. colmeiroi*, Hid., but differing from that species in sculpture and colour. *D. roscatus* var *montanus*, nov. and *D. sanctaemarthae*, n. sp., both from Colombia, the latter, in the spotted pattern of the spire recalls some forms of *D. trigonostomus*, but in the structure of the aperture and columella it is near *D. castus*. Other genera are *Porphyrobaphe*, Shuttl., *Oxystyla*, Schlüter, *Bothriembryon*, Pils., *Placostylus*, Beck, *Amphidromus*, Alb., and *Odontostomus*, Beck., with *O. gemellatus*, Ancey, n.sp. from Goyaz, Central Brazil. The Appendix concludes with a list of undetermined *Bulimulidae*.

In the present part the *Cerionidae* are commenced. The genus *Cerion*, "Bolton," Mörch, has by most authors, been associated with the *Pupidae*, but Dr. Pilsbry shows that there is little in the anatomy to justify such an association, while the pallial and generative organs show it to belong to a widely different group.

The genus is diagnosed as follows:—"Lung macroscopically plain except for the pulmonary vein. Kidney oblong, with large cavity, and excreting apparently by a secondary ureter. Genital system having a wide atrium, short penis with terminal retractor, *the epiphallus entering near or below the middle* of the penis sac. *Vas deferens extremely long.* Spermatheca on a long duct which bears *a long diverticulum*. A vaginal retractor *arises from the right tentacular muscle*. Free retractor muscles independent to their posterior ends except the right tentacular and tail retractors, which are shortly united. Jaw smooth. Teeth of the normal type in Holopoda, the ectocones developed. External anatomy as in Holopoda generally; the labial processes well developed." Type *C. uva*, L.

The species are subject to a remarkable range of individual and local variation, both in size, colour and external markings, and this has led to an undue multiplication of species and sub-species.

The following sub-genera are recognised:—*Cerion*, s.str., *Strophiops*, Dall, *Diacerion*, Dall, and *Ecstrophia*, Dall; the species therein being classified in fifteen groups.

Biedermann, W.—Untersuchungen über Bau und Entstehung der Molluskenschalen. Jena. Zeit., 1901, Bd. xxxvi., pp. 1—164, Tafn. i—vi.

The author of this bulky paper starts with the postulate that it is a question of fundamental importance what may be the nature of the process by which, through incalculable time, vast masses of carbonate of lime have been formed by plants and the frame work of animals, accumulations such as we meet with in every geological formation, and in the sediments of the sea-floor. He then proceeds to discuss the derivation of the lime by organisms from the sea-water, and announces his intention of furnishing an opinion, to be based on his own

researches, on the most noteworthy examples of shell formation among the Mollusca. To this end he passes in review the researches of previous writers on (1) the intimate structure of the shells of *Anodonta*, *Pinna* and *Meleagrina*, (2) the origin of the "prisms" in *Anodonta*; (3) the physical and especially the optical characters of the "prisms" and pearly-layer; (4) the intimate structure of the Gastropod shell; (5) the character and growth of the Gastropod shell; and finishes with a lengthy summary.

In the concluding paragraphs of the summary he points out that the deposition of carbonate of lime on the part of an animal organism is less than ever to be regarded as the result of a simple chemical reaction, but is manifestly a question of highly complicated chemical processes on the part of living cells without, however, a direct formative influence on the part of the latter. It is further beyond doubt that each shell layer having a special structure arises as a specially constituted secretion derived from special cells: the conditions under which these characteristic structures arise is at present by no means sufficiently clear, but have nothing to do with any albuminoid replacement consequent on putrefaction.

In a subsequent paper the author intends to treat of the artificial production of shell-structure.

We have failed to find anything new in this treatise which, however, appears to form an admirable summary of the present state of our knowledge on the subject of molluscan shell structure, and as such to be of value. The plates which illustrate it reproduce many familiar figures, and there is a useful little bibliography, which, however, is not, and evidently does not pretend to be, as complete as that given by Moynier de Villepoix, whom the author cites, or by Dr. Stempell (Biol. Centralbl., Bd. xx.), to whose interesting and important paper, the author strangely enough does not allude.—B. B. WOODWARD.

Kowalevsky, A.—Sur le genre *Chaetoderma*. Arch. Zool. exp. et gen., 1901 (s. 3), T. ix., pp. 261—283, pl. x—xii.

The author describes two exceedingly interesting new species of *Chaetoderma*, dredged in the Sea of Marmara. The first, *C. radulifera*, is characterised by a complex radula, bearing nine rows of teeth, which is described and figured in great detail. The second species, *C. gutturosum*, so named from a curious habit it has of inflating the head-region, which aids the animal in burrowing, resembles externally, both *C. productum* and *C. nitidulum*, but differs from both of these species in the structure of the radula.

Simroth, H.—Ueber die Raublungenschnecken. Naturwissensch. Wochensch., 1901, Bd. xvii., pp. 109—114, fig. 1—14, pp. 121—127, fig. 15—18, pp. 137—140, fig. 19.

As is well known to all malacologists, there are certain families of molluscs which, according to some authors, are widely separated from one another structurally, but contain genera possessing certain characteristic features in common. One such group, continental malacologists have termed "Raublungenschnecken" (Agnathous Pulmonates).

In the present important series of papers, Dr. Simroth has brought together an enormous mass of facts, and has attempted a classification of these particular molluscs. Further he has put forward certain views as to the affinities of the different genera and their phylogenetic origin, and generally summarised our knowledge of numerous rare and imperfectly known genera.

The subject is dealt with in the author's usual masterly manner; his long experience and erudite grasp of the many perplexing problems in malacology, render him peculiarly fitted to deal with so difficult a subject as the present one.

Commencing with a brief historical resumé, the author passes on to the consideration of the food and digestive organs, the muscles of the buccal cavity, the shell, the metamorphoses of the soft body, the generative organs, the geographical distribution, and the phylogeny.

As the author points out, we have to deal with a group not of like origin, but one illustrating the phenomenon of convergence.

The absence of any accessory reproductive organs is regarded as due to the habits and habitat of the different forms. Where the conditions to fertilisation are so unfavourable, by reason of the individuals not meeting each other in worm-burrows, etc., it would not be practical to waste time in preliminaries, further, it seems very probable that self-fertilisation is very common. Among the many peculiar characters common to these molluscs, may be mentioned the presence of a free pedal-gland in the body-cavity, a third pair of feelers or lips, the reduction and position of the shell and mantle, and (in *Testacella*) the presence of a sense-organ—osphradium—in the lung. (Plate).

Assuming that all land molluscs were originally carnivorous, Dr. Simroth explains the changes which have taken place in the "Robber-Slugs," by presuming that they had an inate capacity for evolutionary modification, while at the same time special characteristics, which involve vital changes in the organism, have been acquired and transmitted, so as to conform to the new environment.

Very interesting are the author's views as to the ancestral groups from which the various Agnathous genera have arisen. The *Glandinidae*, a very primitive family, are of Achatinoid origin. The origin of the *Helicoidae*, owing to their great variety of form, and their extreme divergence from the *Helicidae*, is difficult to determine, it can, however, be asserted that they have sprung from the primitive groups of the Southern Hemisphere. The Selenites are derived from *Zonites; Plutonia* from the Atlantic *Vitrinae; Daudebardia* possibly from *Hyalinia*. The origin of the Limacoids is more clearly indicated, excepting perhaps that of the genus *Selenochlamys*. *Hyrcanolestes*, *Phrixolestes*, *Pseudomilax*, and *Trigonochlamys*, all show relationship with *Parmacella* and *Amalia*. *Apera* (which is wrongly stated to have no shell) is thought to belong to one of the scattered heterogenous branches of primitive molluscs, possibly related to the *Janellidae; Atopos* and *Veronicella* probably belonging to the same category.

Widely differing opinions are naturally held by different malacologists, as to the phylogenetic relationships of these different genera, and not until more detailed researches have been made can the majority of them be regarded as other than very wide guesses, still Dr. Simroth's views are sure to command the careful consideration they undoubtedly deserve.

Simroth, Heinrich.—Über eine merkwürdige neue Gattung von Stylommatophoren. *Zool. Anz.*, 1901, Bd. xxv., pp. 62—64.

Dr. Simroth describes an interesting slug-like mollusc to which he gives the name *Ostracolethe fruhstorferi*, gen. et sp. nov. It was received from Mr. Fruhstorfer, who collected it in Tonkin. It measures 2·6 cm. in length, and is remarkable on account of the shell, the relative position of the pallial organs to the mantle, and partly on account of an obscure appendage of the generative

organs. Externally it somewhat resembles a *Parmarion*, but here the mantle-sac is more prominent. The mantle is perforated on the left posterior surface, and through the opening the shell projects. The shell consists of a basal, calcareous plate, upon which an extraordinarily thin, wide, and structureless conch-like shell fits close. The hermaphrodite gland lies embedded in the liver, much more posteriorly than the remaining parts. Before the vas deferens passes into the penis it gives off three short, thick flagella. The retractor muscle originates quite close to the inner root of the right ommatophore. From the point of origin proceed two cords, one the normal semiral duct, the other a thick muscle, consisting of a series of plate-shaped discs, perforated by a canal (?)

The author proposes a new family for the reception of this peculiar genus, the *Ostracolethidae*.

Dean, Bashford.—Notes on living *Nautilus*. Amer. Nat., 1901, vol. xxxv., pp. 819–837, 15 figs.

The author contributes some very welcome and interesting notes, made whilst on a visit to Negros. In the straits between this island and that of Cebu, Nautilus seems to flourish in abundance.

In examining fresh specimens the author noticed that there appeared to be sexual differences in the shells, although in as many instances as three out of ten these were not distinguishable. The irregular growth lines frequently exhibit an undulation of a somewhat regular pattern, reminding one of the markings present at the septal rims in Ceratite or Goniatite. It is suggested that, although these cannot be directly related to those of the fossil forms, they may represent "a tendency during special periods of shell-forming activity, . . for the mantle to contract in crenulate lines, a tendency which during the decent of the tetrabranchs may well have been seized upon by selection and made of use in the formation of the specialised margins of the septa. And from this standpoint the recent markings may be regarded as related to the curiously expressed lines on the ancient shells."

The general appearance of the living animal is next described, and illustrated by capital figures, also the tentacles and their movements. Although Professor Dean was not able to induce the animals to feed, from observations on the living and dead specimens, he thinks that there is little doubt but that the jaws can be used in a position which one would hardly be led to expect from an examination of preserved specimens. Accordingly he infers that the tentacles are of less importance in the mechanical operation of feeding than is popularly believed.

If the information supplied by the fishermen in the region of the southern Negros is to be relied upon, there should be no difficulty in securing the eggs and embryos of *Nautilus* in abundance.

Dupuis, P. et Putzeys.—Diagnoses de quelques espèces de coquilles nouvelles et d'un genre nouveau provenant de l'état indépendant du Congo, suivies de quelques observations relatives a des espèces déja connues. Ann. Soc. roy. Malac. Belgique. 1901, T. xxxvi—xlii., figs. 1—18.

The new species and varieties are *Perideropsis formosa* and var. *pallida*, *P. humicola*, *P. diaphana*, *Subulina (Subulona) martensi*, *Ceras* (gen. nov.) *dautzenbergi*, *C. manyemaense* and var. *cingulata*. The following three

varieties of *Perideriopsis umbilicata*, Putz., v. *usendweensis*, *albida* and *lowaensis*, are described, also var. *cingulatus* of *Cycloph. intermedius*, Marts.

Baker, F. C.—Some interesting molluscan monstrosities. Trans. Acad. Sci. St. Louis, 1901, vol. xi., pp. 143—146, pl. xi.

The author describes certain abnormal shells of *Lampsilis alata*, Say, *L. ligamentina*, Lam., and *Unio gibbosus*, Barnes.

Robert, A.—Sur la ponte des Troques. Compt. Rendus, 1901, vol. cxxxii., pp. 850, 851.

The author draws attention to the interesting fact that whereas in certain species of *Trochus* (*T. granulatus*, Born., *T. striatus*, L., *T. conuloides*, Lam., and *T. exasperatus*, Penn.) the eggs are deposited in agglomerated masses, the matrix being a mucous secreted by an ampulla-like swelling on the excretory duct of the right kidney, in the females; in other species (*T. magus*, L., *T. cinereus*, L., and *T. crassus*, Pult.) the eggs are deposited singly.

Hedley, C.—Studies on Australian Mollusca. Part iv. Proc. Linn. Soc. N.S.W., 1901, pp. 16—25, pl. ii.

The following new species are described and figured: *Liotia venusta*, *L. devexa*, *Teinostoma vesta*, and *Lima brunnea*. Illustrations of some hitherto unfigured species are also given. Discussing the "Challenger" Station 164B, Mr. Hedley thinks that possibly "164B" might be a mistaken label for "64," in any case it seems to us that he is perfectly justified in eliminating the series from the Australian fauna.

Hedley, Charles.—A Revision of the Types of the marine shells of the "Chevert" Expedition. Rec. Aust. Mus., 1901, vol. iv., pp. 121—130, pls. xvi—xvii.

Mr. Hedley points out that since the collection made by the Staff of the "Chevert," and now in the Macleay Museum, Sydney, was described, later writers have failed to identify the species, and have complained of the inadequate descriptions. He now amplifies these descriptions by giving dimensions and figures, and corrects the synonymy.

Hedley, Charles.—The Marine Wood-borers of Australasia and their work. Austr. Assoc. Adv. Sci., 1901, vol. viii., pp. 237—255, pls. vii—x.

The author gives an interesting account of what are popularly termed ship-worms, designed rather for the engineer and general student than the zoologist.

Knight, G. A. Frank.—Marine Mollusca and Brachiopoda. Brit. Assocn. Handbk. on the N.H. of Glasgow, 1901, pp. 189—208.

The author records no less than 393 species of molluscs, of these 23 are doubtful or insufficiently attested. A bibliography containing 43 titles prefaces the list, and useful notes are appended to the various species. To all interested in the distribution of the Marine Mollusca of the West of Scotland this valuable, but unpretentious publication, will prove of great service.

Fischer, H. Liste des coquilles recueillies par M. de Gennes à Djibouti et Ali-Sabieh, avec la description de plusieurs formes nouvelles. Journ. de Conchyl., 1901, vol. xlix., pp. 96—130, pl. iv., et 9 figs.

The author enumerates 65 species, of which the following species and varieties are new: *Marginella gennesi*, *Clanculus gennesi*, *Pinna cochlearis*, *Basterotia* (*Anisodonta*) *caledonica*, P. Fisch. v. *djiboutiensis*, *Cerithium caeruleum*, Sby. v. *minima*, Fisch. et Vignal, *C. yerburyi*, E. A. Sm. v. *djiboutiensis* F. et V., *C. petrosum*, *Wood*, v. *gennesi*, F. et V. Emended descriptions and figures are given of *Rissoina bertholleti*, Aud., and *R. rissoi*, Aud.

Bouvier, E. L. et Fischer, H.—Sur l' organisation interne du *Pleurotomaria beyrichii*. Hilg. Compt. Rendus, 1901, vol. cxxxii., pp. 845—847.

Continuing their studies upon this interesting mollusc, the authors deal in the present paper with the digestive tract and nervous system. The former in general resembles that of other Diotocardia, but it is characterised by a number of peculiar twists, and buccal and oesophageal pouches of a very primitive nature. The hind part of the intestine has a remarkable branch, which extends forward and lies at the side of the oesophagus. In the main the nervous system agrees with that of *P. quoyana*, the essential characters are: (i.) The absence of all differentiation in the pallial ganglia, and the concrescence of pedal and pallial cords, as in *Chitonidae*: (ii.) the origin of the visceral commissure on the cerebro-pallial connectives, and not, as in other Diotocardia, on the ganglionated pallial cords; (iii.) the development of a very large ganglion at the origin of the osphradial cord, representing, in part, the point of origin of the pallial nerves; (iv.) the very feeble development of the secondary pallial nerves; and (v.) the strong development of the primary pallial nerves.

Collinge, Walter E.—On a further Collection of South African Slugs, with a Check-list of known Species. Ann. S. Afr. Mus., 1901, vol. ii., pp. 229—236, pl. xiv.

In this interesting paper we find much new information about the peculiar genus *Oopelta*, with excellent illustrations. The little-known *O. aterrima* (Gray) is re-described, and *O. polypunctata* is proposed as a new species, making the fifth species of the genus. The *Oopeltinae* are ignored in Pilsbry's (1898) paper on the phylogeny of the *Arionidae*, and the author of the present paper does not inform us how he would place them in the Pilsbryan scheme; it is to be presumed that something on this subject will be forthcoming later, as our author must certainly have had it under consideration. We should suppose that *Oopelta* might be the end of a series of forms diverging from *Arion*, and it is interesting to speculate on the possibility of several of the links of the chain being still extant in the vast regions of Africa so-far unexplored for slugs.

A new *Apera* (*A. purcelli*) from Table Mountain is described and illustrated. We wonder that such an interesting animal should so long have been overlooked in this locality. The Cape forms of *Limax maximus* and *Amalia gagates* are found to differ somewhat from European examples. It is of much interest to inquire whether (as the present writer is quite willing to suppose) these differences may have arisen since the introduction of the slugs into South Africa. If so, we have proof of the rapidity of evolution under suitable conditions. We may recall in this connection that Allen and Chapman (1897) have had the courage to describe and name a new subspecies of *Mus musculus* from Jalapa, Mexico; this animal is of course the descendant of mice introduced by man, no true *Mus* existing in America except through introduction.

In the Check-list 28 S. African slugs are catalogued, but some of these are very imperfectly known. "*Urocyclus*" *kraussianus* is almost certainly not of

the genus *Cyrcyclus*, which appears not to occur in Cape Colony proper. Krauss gave a very poor description, but he stated the mantle had *no shell*, and that the creature was abundant in gardens in Cape Colony. Possibly it was an *Oopelta*; its colour was said to be greyish-black.—T. D. A. COCKERELL.

Collinge, Walter E.—On the Anatomy of a Collection of Slugs from N.W. Borneo; with a List of the Species recorded from that Region. Trans. Roy. Soc., Edinr., 1901, vol. xl., pp. 295—312, pls. i—iii.

The present communication, the author points out, is to be regarded more in the light of a preliminary notice of species, which, as further material is obtained will receive more exhaustive treatment.

After a short introduction on the Bornean Slug-fauna, the author redescribes the genus *Damayantia*, Issel, and gives coloured figures of *D. dilecta*, Issel; a new species, *D. carinata*, is described and figured, as also the generative organs and dart. *Wiegmannia* is a new genus containing *W. dubius*, Wgin., *W. gigas*, *W. ponsonbyi*, and *W. borneensis*, nn. spp. The generative organs of *Collingea smithi*, Cllge. and Godw.-Aust., are next described and figured. A further new genus, *Isselentia*, containing two new species, *plicata* and *globosa*, is next dealt with, and *Veronicella shelfordiana*, *V. exima*, and *Onchidium ponsonbyi*, nn. spp. are figured and described.

A list of the species of slugs recorded from Borneo, twenty-seven in number, with the original references concludes the paper.

Williamson, M. Burton.—How *Potamides (Cerethidea) californica*, Hald., travels. Naut., 1901, vol. xv., pp. 82, 83.

Mrs. Williamson has noticed that in travelling over the mud-flats, this mollusc leaves a zig-zag pattern, which is made by the apical whorls of the shell as it is dragged forward, or sideways. From a series of observations upon its mode of crawling, the authoress concludes that the foot movement is somewhat secondary. The animal pushes its head forward, expands its tentacles to their full extent, then with an effort raises the body whorl, and the shell is propelled forward before the foot advances. Immediately following these movements, the foot is spread out and drawn forward.

Kennard, A. S. and Woodward, B. B.—The Post-Pliocene non-marine Mollusca of the South of England. Proc. Geol. Assoc., 1901, vol. xvii., pp. 213—260, figs. 32—37.

This valuable and important paper is, apart from its geological interest, full of interest to the student of recent shells. While endeavouring to avoid alterations in the nomenclature, a few wise changes have been made, thus we read *Pomatias reflexus* (L.), in lieu of *Cyclostoma elegans*, Müll., *Paludestrina stagnalis* (Bast.), in place of *Hydrobia ulvae*, Penn.; *Sphyradium edentulum* (Drap.), is removed from *Vertigo*, while *Helicella barbara* (L.) replaces *Bulimus acutus*, Müll.

In all the authors' list 138 species of non-marine Mollusca as existing in this country, and 10 extinct forms, of these 129 occur in the South of England, and 7 of the extinct forms.

In this and preceding papers the authors have accumulated a large mass of evidence, which now enables them to speculate on the origin and distribution in this country of the various constituents of our molluscan fauna. It must, however, be borne in mind that these speculations are only tentative. The

oldest inhabitants of these islands are *Paludestrina ventrosa* and *stagnalis*, with which may be associated *Bithynia tentaculata* and *Valvata piscinalis*, all of which probably had their origin in the Aralo-Caspian basin. The Lusitanian is also regarded as one of the oldest in these islands, no evidence of boreal species being found until the later Red Crag of Butley. The Southern Group is composed of species with various sources of origin. Finally, such forms as *Hygromia fusca*, *Acanthinula lamellata*, *Vitrea excavata*, *V. altiaria*, and *Azeca tridens*, may be endemic; all as yet being unknown in a fossil state on the Continent.

A bibliography and table of the distribution complete this very welcome memoir.

Dall, W. H. and Simpson, C. T.—The Mollusca of Porto Rico. U. S. Fish Commis. Bull for 1900, 1901, pp. 351—524, pls. 53—58.

This valuable and interesting work treats of, in a very full manner, the mollusca of the island of Porto Rico, and forms the most complete account yet published. The total number of species recorded is 653, of which 42 are new. The land-snail fauna is not especially striking. The solitary *Circinaria concolor*, if it be a genuine *Circinaria*, is a remarkable case of geographical distribution. Equally remarkable is the *Clausilia bicanaliculata*, found only in Porto Rico, and the only representative of this genus known from the West Indian region. Very fine and large species of *Pleurodonte*, a single species of *Sloastoma*, four species of *Gaeotis*, and nine species of *Planorbis*, are also present.

Numerous changes in nomenclature have been made, but the law of priority has not in all cases been adhered to.

A brief description of the different genera and species, with references to the original descriptions and figures, greatly adds to the value of this work. While several species hitherto unfigured, have now been figured from the authors' types.

Dall, W. H.—Mollusks from the vicinity of Pernambuco. Proc. Wash. Acad. Sci., 1901, vol. iii., pp. 139—147.

Dr. Dall here enumerates 91 species obtained during Dr. J. C. Branner's expedition to Brazil. Deducting from them four species confined to land or fresh water, there remain 87, of which 13 alone are peculiar to the eastern coast of South America south of the West Indies, and 74 are common Antillean shells. Two new species are described, viz. *Mulinia branneri* and *Drillia greeleyi*.

Andreae, A.—Untermiocäne Landschneckenmergel bei Oppeln in Schlesien. Mitth. a. d. Roem.-Mus., Hildesheim, 1902, nr. 16, pp. 1—8, figs. 1—5.

The new species described and figured are: *Daudebardia praecursor*, *Archaeozonites subangulosus* (Benz) var. *conica*, n.v., *Helix (Galactochilus) silesiaca*, and *Cyclostoma schrammeni*. *Clausilia (Triptychia) suevica*, Sandberger, and *Craspedopoma leptopomoides* (Reuss) are also recorded.

Dall, W. H.—Synopsis of the *Lucinacea* and of the American species. Proc. U.S. Nat. Mus., 1901, vol. xxiii., pp. 779—833, pls. xxxix—xlii.

Continuing his valuable series of synopses Dr. Dall here treats of the *Lucinacea*, a group of families, apparently of very ancient lineage if the Silurian type referred to it is really allied. The systematic arrangement of the group, appears to be exceptionally confused. Many of the commonest species the

author states, go by names to which they have no sufficient claim, and it is surprising how unlike things have been lumped together.

In the present revision the following families are included: the *Thyasiridae* (with 35 species), the *Diplodontidae* (with 20 species), the *Lucinidae* (with 63 species), the *Corbidae* (Exotic?—Eastern Tertiaries), and the *Cyrenellidae* (with 2 species); 81 of these 120 species belong to the Atlantic, 45 to the Pacific, and 5—or possibly 6—are common to the two sides of the American continent.

Many new species are figured and described, and numerous changes have been made in the nomenclature.

Hall, T. S.—Growth stages in modern *Trigonias*, belonging to the section *Pectinatae*. Proc. R. Soc. Victoria, 1901, vol. xiv., pp. 17—21, fig.

Steinach, E.—Studien über die Hautfärbung und über den Farbenwechsel Cephalopoden. Nebst Versuchen über die autogene Rhythmicität der Chromatophoren-Muskeln. Arch. ges. Physiol., 1901, Bd. 87, pp. 1—37, T.

Rottmann, G.—Ueber die Embryonalentwicklung der Radula bei den Mollusken, Theil i. Die Entwicklung der Radula bei den Cephalopoden. Zeit. f. wiss. Zool., 1901, Bd. lxx, pp. 236—262, Tfn. xi-xii.

Simroth, H.—Über das Problem früheren Landzusammenhangs auf der südlichen Erdhälfte. Geograph. Zeitsch., 1901, pp. 665—676. T. v.

Meek, A.—The Mussel Experiment on the Coquet. Rpt. Northumberland Sea Fish Comm., 1901, pp. 35, 36.

Lebour, Marie V.—The Marine Mollusca of Northumberland. Ibid., pp. 49—53.

Tobler, Max.—Zur anatomie von *Parmophorus intermedius*, Reeve. Jena. Zeit., 1901, Bd. xxxvi., pp. 220—274, Tafn. xiii—xv.

Kennard, A. S. and Woodward, B. B.—Further notes on the British Pliocene non-marine Mollusca. Proc. Malac. Soc. Lond., 1901, vol. iv., p. 183.

EDITOR'S NOTES.

Only quite recently have we learnt of the death of Carl Arend Friedrich Wiegmann of Jena, which took place on November 7th, 1901. His decease robs us of a valued correspondent, and malacology of a patient, diligent, and gifted worker.

We should like to remind those Subscribers who have not yet sent us their subscriptions for volumes 7 and 8, that they are considerably over due. It would greatly assist us if all subscribers would forward their subscriptions at the commencement of each year.

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NOTES ON THE BRITISH SPECIES OF BUCCINUM, FUSUS, ETC.

BY J. T. MARSHALL.

CASSIDARIA TYRRHENA, Chemn.—Since my account of this species was published (1), Mr. F. W. Wotton has obtained several very fine living specimens which were obtained by trawling off the south-west of Ireland in 50-60 fathoms, two of which he very generously presented to me. His largest specimen measured 3½-in. by 2½-in., and contained the animal still showing signs of life. I have another fine specimen exceeding 3-in. by 2-in., dead but perfect, trawled in 50 fathoms south of the Scilly Islands in 1900. A fragment was dredged by the "Porcupine" Expedition of 1870 on the Channel slope off the Scillies in 539 f., and another fragment of *C. echinophora* by the 1869 expedition off Donegal Bay in 183 f. Mr. E. A. Smith has conclusively shown (2) that *Morio*, Montf., has the preferential claim for recognition over *Cassidaria*, if the coleopterists will only adopt some other name than the former for the beetles.

BUCCINUM UNDATUM, L.—This is a most instructive species, no other affording better evidence of the effects of environment. Any one interested in the variation of species will find the study of this one most fruitful and interesting, while a series from various localities and depths will impart a good-object lesson in the variability of species.

(1) Journ. Conch., 1893, vol. vii, p. 260, and 1894, p. 280.
(2) Journ. Malac., 1895, vol. iv, p. 11.

These variations and mutations are without end, and all graduate one into the other. The form, texture, size, sculpture, etc., appear to depend entirely on habitat, and an experienced collector can readily tell, from the appearance of the specimen, the nature of the sea-bottom and the probable depth from which it had been procured. The Rev. Professor Gwatkin gives the radula of *Buccinum* a very bad character as a help to specific distinction; he writes me that "the radula varies so much in *Buccinum* that consider it, for that family, worthless as a character, the individual variations being greater than the specific." *B. undatum* is very scarce in the Channel Islands except at one part of Jersey facing the French coast, and I have never met with a specimen from the other Islands; it is equally scarce in the Scillies. Pure white specimens occur occasionally, but they are rare.

Var. *flexuosa*, Jeffr.—Very variable in size and texture, sometimes attaining a length of 5½-in. in the West Orkneys and off Wick, while a small thin form lives in the former district and in the Shetlands with the var. *zetlandica*, and has the same silky epidermis.

Var. *littoralis*, King.—The interior of this variety is sometimes orange coloured, but more frequently purplish-brown.

Var. *pauperculu*, Jeffr.—Specimens from Southampton Water do not exceed an inch in length; many are smaller.

Var. *striata*, Penn.—Off Cork Harbour (Wotton)! off Aberdeen, (Simpson)! North Rona, 45 f.; Doggerbank, 30 f.

Var. *pelagica*, King.—Aberdeenshire (Simpson)! off Unst (Coulson); Shetlands (coll. Mac Andrew). In this variety the last whorl is smaller and narrower proportionally, hardly projecting beyond the penultimate, and in British specimens the longitudinal ribs are evanescent or wholy wanting. My largest examples exceed 6½-in. in length. It occurs in Norway, but of a smaller size and strongly ribbed.

Var. *zetlandica*, Jeffr.—Gwyn Jeffreys has described this variety as "destitute of ribs," whereas he figures it with rather prominent ones, and this has given rise to some doubts as to whether the var. *zetlandica* is ribbed or not, especially as he compares it with *B. humphreysianum*, which is ribless, while this is rendered more confusing by its living on the some fishing-grounds with a dwarf and thin form of var. *flexuosa*, which is ribbed, in the Orkneys and Shetlands. But the real truth is, that the presence or absence of ribs is not a criterion of this variety, its only permanent characters being that it is dwarfed and thin. It is almost as variable as the type, and really runs into many forms when collected from different parts of the Shetland seas. It is seldom without traces of longitudinal ribs, especially on the upper whorls, and there is considerable variation in the size, comparative length of spire,

and degree of sculpture. To give an idea of its extreme variability, I may say that I have specimens of it corresponding not only to the ribbed type, but to the var. *striata*, the var. *flexuosa*, the var. *pelagica*, and the var. *acuminata*. In rare instances it is as finely striated as *B. humphreysianum*, while on the other hand I have examples which are as much ribbed as any typical shell. Nor is Gwyn Jeffreys' white specimen at all singular; I have a series of them; while a very pretty form from the East Shetlands, 60-90 f., is also white, very finely striated, extremely thin, with a cinereous, silky, deciduous epidermis, a form which also occurs at Vardö, Finmark, in 100-150 f.; this is *B. schneideri*, Verk. The same form was also trawled off S.W. Ireland, in 55f., by the Rev. W. S. Green, and off the south and west of Ireland, in 90-180 f., by the "Porcupine." *B. parvulum*, Verk., is different from this, and is a white variety of *B. grœnlandicum*, its specific identity being indicated by the size, contour, spire, embryo, and micro-sculpture. Jeffreys' figure is much too large and the spire too long for var. *zetlandica*; that figure more correctly represents the thin deep-water form of var. *flexuosa* mentioned above; Sowerby's figure would do for var. *pauperrula*, but not this; while the figure in "British Mollusca" (pl. cix, fig. 4) is perfect, as most of them are in this well-illustrated work.

The Leckenby collection contained an adult specimen little more than half an inch in length, one of a pair said by Mr. Robert Damon to have been dredged in Weymouth Bay, and which changed hands for 10/- On the other hand, specimens from Thurso and Wick are very large, coarse, and solid, attaining 6-in. by 3½-in.; this is the var. *incrassata* of King; but coarse and solid examples occur of every size.

Monstrosities are numerous, and many of them have received special names. Two splendid figures of Turton's *B. carinatum* will be found in Brown's "Recent Conchology," and "Science Gossip" for April, 1894, contains figures of the curious malformation called monst. *bioperculatum*. As to the monst. *trioperculatum*, Jeffr., that was the outcome of a too eager inquiry, accompanied by a liberal offer, made many years ago to the whelk-dealers for a specimen, and with the inevitable result as nature could not produce one to order, a counterfeit was manufactured and successfully palmed off to a dealer, but it did not travel any further. No genuine specimen of this "sport" has been recorded.

In dealing with the phenomena of sinistral shells, Gwyn Jeffreys says that the animal "may be compared to the case of a man having his heart on the right and his lungs on the left side of his body. The structure of a mollusc is however not so complicated, and the con-

sequence of such a reversal in the position of its organs is probably not very important to its economy." (1) I do not know how Gwyn Jeffreys came to regard the lungs as being on one side only of the body, for as a matter of fact one lung is on the right and another on the left side, and in a sinistral specimen the right and left lungs would presumably be simply transposed.

B. HUMPHREYSIANUM, Penn.—S. W. Ireland, 80 f. (R. I. A. cruise); the Minch off Loch Boisdale, 72 f., a very young specimen (J. T. M.); between the Butt of Lewis and St Kilda. (Simpson)!

Var. *ventricosum*, Kien. (Journ. Conch., 1893, vol. vii, p. 261.)—South of Ireland (R. I. A. cruise). Gwyn Jeffreys records in "*British Conchology*" a var. *lacteum*, but without locality; that locality should be "Shetlands." A pretty variety, also from the Shetlands, has a white zone below the suture of each whorl, as well as on the outer lip. This species can scarcely be mistaken for *B. undatum* var. *zetlandica*; it has no palpable epidermis at any stage of growth, the aperture is reflected outwards, and the embryo is different. Sowerby's is the better figure, but the apical whorls are incorrect; they should be as Jeffreys'.

The *B. hydrophanum* of Hancock, was dredged by the "Triton" in the Shetland-Faroe Channel, and the same species, with *B. morchi*, Friele, by the "Knight Errant" in the same district.

BUCCINOPSIS DALEI, J. Sow.—Atlantic off Ireland 345 f. (R. I. A. cruise); west of St. Kilda 100 f. (Hoyle); Aberdeenshire, 40 miles off Rattray Head; (Kelly)! Buchan Deeps, 70 miles east of Aberdeen. (Simpson)!

There is considerable difference between the shells of the male and female of this species, the former being oblong and the latter oval. Sowerby's figure well illustrates the female form, and Jeffreys' *generic* figure the male, though the latter has the whorls too convex and the operculum is wrongly shaped. Jeffreys' *plate* figure is much too broad, and it should not be spirally striated nor have such a broad glaze on the pillar.

Gwyn Jeffreys recorded a *Buccinopsis striata* in the "Depths of the Sea," which he vaguely assigned as "another interesting addition to the Shetland fauna."

TRITON CUTACEUS L.—A very fine living specimen, dredged by me off St. Martin's Point, Guernsey, in 22 fathoms, in 1885, exceeds the dimensions given by Jeffreys. This is the only example that has been obtained alive in recent years. Nor has any addition been made

(1) Brit. Conch., vol. i, Introduction, p. xxi.

to the "three living specimens" of *T. nodiferus* found off Guernsey in 1832.

FUSUS ANTIQUUS L.—A "young and dead specimen" has been dredged by the Rev. J. Smart at Scilly; this is its furthest southern limit. The operculum is triangularly oval, dark horn-colour, very coarsely wrinkled, with a few faintly-impressed lines, and often a flexuous depression down the centre. Very rarely the shell is snow white; I have two from deep water off the Shetlands, but these do not belong to the next variety.

Var. *alba*, Jeffr.—Off Cork (Wotton)! off Aberdeen (Simpson)! the Irish Sea, and off Peterhead in 60 fathoms. All the specimens I have seen of this variety are very finely striated, and one from Peterhead is entirely devoid of sculpture except the lines of growth. It attains 6½-in by 3-in., but one form of it from the Irish Sea, with the aperture expanded and reflected, is 6½-in. by 4-in. Some aged specimens of the latter have the outer lip formed of half-a-dozen separate layers added one over the other, making the edge a third of an inch in thickness.

Var. *ventricosa*, Jeffr.—Great Fisher Bank, off Aberdeenshire (Simpson)! Doggerbank, 30 f. This varies in the length of the spire, but the last whorl is always tumid and greatly expanded, trumpet-shape, like *Limnaea auricularia*. Some of my specimens have hardly any spire, and the largest, from the Doggerbank, are 7-in. by 4½-in. It is yellowish-white externally, with the inside of a rich deep orange colour, and occasionally the upper whorls are carinated as in the var. *carinata*. One monstrous specimen from Aberdeenshire has all the whorls strongly carinated.

Var. *gracilis*, Jeffr.—I know this from S. W. Ireland only. It is a very handsome shell, characterised by a long slender spire, a thin texture, and tumid whorls. Its dimensions are 6-in. by 2½-in.

Var. *carinata*, Turt. = var. *striata*, Jeffr.—Bantry Bay, Irish Sea, and Bristol Channel. My finest are from S. W. Ireland, and measure 6½-in by 3-in. Some specimens approximate to *F. despectus*, L., in sculpture, but the two forms can always be readily separated. Gwyn Jeffreys admits that this is *F. carinatus*, Turt., but gives no reason for substituting a varietal name of his own, which was clearly not required. Var. *carinata* is also a more suitable name, as all the forms of *F. antiquus* are striated.

F. DESPECTUS, L., although a northern species, has been dredged by the "Porcupine" in the Atlantic off Ireland, and by the "Challenger" as far south as Portugal in 470 f. (a young specimen). I have examples from shallow water in the Faroe Isles, where it seems, however, to be

only partially established, and to be small and scarce. As a general rule, and comparing large series with *F. antiquus*, *F. despectus* will be found to be appreciably longer in the spire and shorter in the body-whorl, in some instances very much so. The carinated sculpture is always present and conspicuous in *F. despectus*, and is a prominent feature of the shell, it is only now and again that a specimen with *less* prominent carinations approximates to one of *F. antiquus var. carinata* that is *more* than usually carinated. Professor G. O. Sars and Mr. E. A. Smith consider the two forms distinct species, as to which I do not think there can be much doubt. Miss Elliott's examples of var. *carinata* in the National Collections are as characteristic as any that may be found, but these could never be mistaken for *F. despectus*; while Sars' figures are excellent representations of *F. despectus*, yet could not be mistaken for the most extreme examples of var. *carinata*. The Rev. Boog Watson writes with respect to *F. despectus*:—"The identity of this species with *F. antiquus* is very strongly supported, and is an opinion deserving the utmost respect. If it has not been followed here, the reason is that though my opportunities for comparison have been rather limited, I have an impression that the apex in the two species is different. On this point I had hoped for fuller information from Mr. Friele in his great work on the mollusca of the Norwegian Northern Expedition." (1) But that work was not forthcoming. It has subsequently been published, and Herr Friele has figured the apices of both *F. despectus* and *F. antiquus*, but his figures are not convincing. I have an uninterrupted series of all ages of both species, and I must confess to finding the evidence negative, notwithstanding that there is an unusual amount of individual variation in the apex of both species. The most that can be said is that the extremes of both forms nearly approximate; but they are not singular in that respect, nor would the mere presence or number of carinations in the var. *carinata*, however closely resembling those of *F. despectus*, of itself constitute that species. The extreme variability of these striations and carinations (hardly two specimens being alike) demonstrate their varietal character. *F. turtoni* has a correlative variety.

F. NORVEGICUS, Chemn.—Great Fisher Bank, and from Aberdeen trawlers. (Simpson)! None of the figures or descriptions of this species indicate the presence of a large swollen excrescence on the upper part of the pillar, just at the entrance of the aperture, which occurs in about 50 per cent. of adult specimens. This excrescence if examined is found to wind itself inwardly round the pillar. I cannot

(1) "Challenger" Gastropoda, p. 199.

imagine its utility, nor why it is present in only half the specimens. Jeffreys' dimensions are extreme; the usual size is 4½-in by 2-in. A dwarf form from the Doggerbank does not exceed 3-in. by 1½-in.

F. TURTONI, Bean.—Aberdeenshire coast, 70 miles from land, in 40 f., and from trawlers (Simpson)! Peterhead, 43 f. ("Triton" Exp.)! East Shetland fishing-banks, from trawlers. This species lives in muddy ground in deep water far from land, rare; more often procured by deep-sea fishermen than by the dredge. The colour is yellowish-white under the epidermis, and occasionally the inside is more or less tinged with purple; epidermis rather thin, deciduous, ranging from light-brown to olive-green, and frequently stained with ferruginous deposit. Round the periphery the spiral riblets are more prominent and irregular, and these sometimes develope into ridges or carinations (as in *F. antiquus var. carinata*), thus making the whorls more or less angular at that part. The operculum is large, elongated, and obliquely triangular (but varies greatly in length and width), dark horn-colour, highly glossy, closely wrinkled with semi-circular striations, and having impressed lines (variable in number) radiating from the nucleus.

This species is subject to more extreme variation than is generally supposed, and I regard it as by far the most variable of the genus, while the differences between the male and female forms are more than usually apparent. My smallest adult specimen, from the Shetlands, is only 3-in by 1¼-in., while the other extreme is represented by examples exceeding 5¼-in. by 2½-in., and there is every intermediate gradation of length and breadth. The whorls also are of every degree of convexity, and the aperture is especially variable according to age, as after it has reached maturity the outer lip is added to and reflected. The shell of the male, correctly figured by Sowerby and Jeffreys, has a comparatively small body-whorl and an elongated spire, and rarely exceeds 4½-in. by 1½-in. The young of this up to 2-in. in length present a very droll appearance, being all spire. An extreme example of this male form from the Shetlands, having the spire abnormally elongated, now in the collection of Mr. James Simpson of Aberdeen, has been named (in MS.) var. *attentuata*. The shell of the female, well figured by Forbes and Hanley (1) is larger and broader throughout, the spire is not nearly so attenuated, the last whorl is very much larger and swollen, and the shell attains 5¼-in. by 2½-in. The young of both forms are easily distinguished at all ages, and the adult have each the same number of whorls, 7½.

Bean founded this species on a specimen found in a Scarborough fishing-boat, but I have not been able to refer to his original description and figure to see which of these two forms is the type. (Jeffrey's

reference in "British Conchology" is wrong; instead of "Bean in Mag. N. Hist., viii," it should be "Bean in Loudon's Journal, vol. vii, p. 493, fig. 61.") Canon Norman says the slender or male shell is the "typical Doggerbank form," (2) but both forms occur on the Doggerbank, as well as in the Shetlands and off the Aberdeenshire coast. He also adds that it is "well figured by Forbes and Hanley," but a comparison of the latter's figures and measurements will demonstrate that their type is the large and broad female form.

Northern specimens are smaller than ours generally, rarely exceeding 4-in. in length, and these exhibit a still further range of variation. Sars figures several; Friele has described one as *F. ossiani*, and Middendorff another as *F. schantaricum*, while Canon Norman has also described two specimens from Norway, apparently immature, one as var. *brevispira* and the other as var. *tumida*. (3) Specimens, however, the exact counterparts of the two latter are also found in our seas, some of them much more tumid than his figure, while as regards the short-spired form, some of my British specimens have very little spire indeed, measuring only 4-in. in length by 2½-in. in width. That both slender and broad specimens also occur in Norway is evident from Sars' figures, as he gives the immature forms both of the male (t. 14, f. 3b) and female (t. 25, f. 10).

F. SCHANTARICUM, Midd. (1) possesses no generic attribute apart from *F. turtoni*, and though Canon Norman "lays chief stress on the spiral grooving of the inside of the lip" (p. 354), that is merely the impress of the ordinary outer sculpture, which is occasionally observable (also with the purple interior) in the immature stage of *F. turtoni*, and more frequently in *F. islandicus*, a species similarly sculptured. Sars' figure 3 (pl. xiv.) clearly shows the connection between the two forms. *F. turtoni* also rejoices in several generic names. Professor Dall has conferred on it that of *Beringius*, Herr Friele that of *Jumala*, and Canon Norman that of *Ukko*.

F. ISLANDICUS, Chemn.—Off Milford Haven, the Bristol Channel as far as Lundy Island, and the Wexford and Waterford coasts, procured by trawling (Wotton)! S. W. Ireland 345 f. (R. I. A. cruise); Porcupine Bank off the West of Ireland 85 f., and North of the Hebrides 185 f. ("Porcupine"); S. and S. E. Shetlands, procured from trawlers (Simpson)! S. Ireland, a trawled specimen, and E. Orkneys.

(1) Brit. Moll., vol. iii, p. 432; vol. iv, pl. cv., fig. 4; and pl. cvi, fig. 3 (the same figure reversed)
(2) "A Month on the Trondhjem Fjord," Ann. Mag. Nat. Hist., vol. xii, p. 352.
(3) Loc. cit., p. 352, pl. xvi, figs. 1, 2.
Loc. cit., p. 353, pl. xvi, fig. 3.

another trawled specimen (J. T. M.); Shetland-Faroe Channel 640 f. ("Triton"). The records given in the Linnean Society's Journal (1) as to *F. islandicus* being dredged by the "Triton" off Peterhead were *lapsus pennæ* of mine for *F. gracilis*. The operculum of *F. islandicus* is obtusely triangular, dark horn-colour, large, solid, and closely and coarsely wrinkled in the line of growth. *F. islandicus* has a broad as well as a narrow variety. Some from the Shetlands are unsually slender measuring 5-in. in length by 1¼-in. only in the widest part; but rougher ground in the same seas yields a much more robust form, some of my specimens thence being fully 6-in. by 2-in. These forms will no doubt in time receive distinct varietal names. The normal dimensions of the type are 5in. by 1¾in., though a specimen in Mr. F. W. Wotton's fine series of this handsome shell, from the Irish Channel, is 5¾in. in length, and is unique in having the epidermis perfect throughout. Another specimen from the same seas, in the collection of Mr. Bartlet Span of Tenby, is just short of 6-in. in length, but has lost the bulbous apex. In these large specimens the epidermis is usually more or less abraded. Mr. Bartlet Span found a specimen in Tenby harbour some years ago, which had most probably been cleaned out of a trawl-boat.

The peculiar bulbous apex, which is supposed to be a specific character of this species, is locally variable. Specimens from Greenland, Finmark, and the Shetlands have the spire gradually tapering to a blunt point, while those from S. W. Ireland, the Irish Channel, and adjacent coasts have the prominent bulbous apex depicted in Jeffreys' figure, which is much broader than the following whorls. The shell is more attenuated than either Jeffreys' or Sowerby's figures, especially the lower half, and has a much longer canal; Sowerby's figure should also have the suture oblique and the whorls less tumid. An actual specimen placed over these figures will show how very much they are drawn out of scale. Sars gives an excellent figure of the northern form (*minus* the bulbous apex) where, as in our seas, it is less rare than it used to be. Dr. Morch many years ago brought about 20 specimens from Greenland when on a visit to England, and these sold at from 20/- to 60/- each.

F. GRACILIS, Da Costa.—South Devon is the limit of this species, where it becomes rare.

Var. *convoluta*, Jeffr.—Scilly Islands (Smart and others); the Smalls Light (Span); and various other places, but sparingly. Variable in length and slenderness. My largest are 3½-in. in length by 1 in. only in the widest part, and have a deeply-channelled suture. A dwarf

(1) Zoology, vol. 17, 1883, pp. 95, 96, 97.

form from the Shetlands is half this size with a finer apex, the young of which have the same proportions and might easily be mistaken for *F. propinquus var. turrita*, but they are more coarsely sculptured. Some Scillonian specimens have a light yellow epidermis, with the sculpture less marked. This variety is well illustrated by Forbes and Hanley (pl. ciii, fig. 3) and by Captain Brown (pl. vi, figs. 7, 9).

Var. *celliana*, Jord. (Journ. Conch., 1890, vol. vi, p. 232).—Larger and broader. Off the Wexford and Waterford coasts 20-30 f. (Jordan and others); off Galley Head, S. Ireland (Worton)! Doggerbank 30 f.; Moray Frith 24 f. This is the form figured by Forbes and Hanley (though not the type) as "dredged from the Doggerbank at the depth of 50 f." (1)

Var. *coulsoni*, Jord. (Journ. Conch., vol. vi, p. 232, 1890).—Smaller and narrower; the usual deep-water form. Shetlands, from trawlers (Jordan and others); the Smalls Lighthouse (Span); off Peterhead 60 f.; West Orkneys 45 f.

Var. *glaber*, Verk. (2).—New to Britain. This was first recorded from Finmark by Mr. T. A. Verkrüzen. My specimens are small and thin, the epidermis very delicate, silky, and highly polished, resembling gold-beater's skin, and the spiral striae slight or totally absent. I have three specimens trawled from deep water in the Shetlands, and their appearance suggests a habitat in deep and still water on fine sand or mud. Canon Norman dredged a small form of it at Drontheim, which is figured in the "Annals" for November, 1893, and Mr. James Simpson, of Aberdeen, has a specimen from the north side of the Shetland-Faroe Channel 60-70 f. (!) The original Finmark specimens, of which Sars' figure is a good representation, have an unusually short base and canal somewhat similar to *F. curtus*, Jeffr., from North America and the Crag, but that character is not uniform in this varity.

I do not know of any good typical figure of this common shell. Shetland specimens of *F. gracilis* (as in the last species and the next) are more slender than usual, and Gwyn Jeffreys figures this slender form as his type; Sowerby figures an immature shell, the base being angulated in consequence of the last whorl not being fully developed; while Forbes and Hanley describe as their type "the beautiful slender form that is most commonly preserved in cabinets," but their figures illustrate the vars. *belliana* and *conoluta*. Mr. H. K. Jordan's collection contains a reversed example. Specimens of this and the next species are occasionally dredged which are denuded of the epidermis and

(1) Brit. Moll., vol. iii, p. 418, pl. ciii, fig. 1.

(2) Sars Moll. Reg. Arct. Norv., pp. 271 a, tab. 4, fig. 7 (as *Siphonalia glabra*, from Vadsø and the Lofotens).

apparently dead and water-worn, yet still containing the animal and operculum. As I have explained with regard to examples of *Trochus* in a similar condition, these have been swallowed by fish and voided again, the action of the gastric fluid having meanwhile destroyed the epidermis.

F. PROPINQUUS, Ald.—Not Dublin Bay nor Cork, which localities belong to the next species (Jeffreys); Birkdale (Heathcote); Llandulas (Archer); St. Andrew's (M'Intosh); off Peterhead 60 f. ("Triton")! West Orkneys 45 f.; and North Rona. In the Report of the "Valorous" Expedition, Gwyn Jeffreys has mistakenly recorded this species from the Bay of Biscay 109-1380 f., by the "Porcupine" Expedition of 1870, instead of from the West of Ireland, Stations 24 and 30, by the expedition of 1869; and Canon Norman has also mistakenly recorded it from "N. of Hebrides, 189-530 f., "Porcupine" 1869," instead of "Lightning" Expedition 1868.

Var. *turrita*, Sars.—East Shetlands, several specimens from Aberdeen trawl-boats (Simpson)! Its dimensions are $1\frac{1}{4}$-in. by $\frac{3}{8}$-in., the apex is much more pointed than in the type, and it is very rare on our Shetland coasts. One of my specimens is almost smooth. Searles Wood figures a specimen from the Red Crag (pl. ii, fig. 15) as what he considers "an abnormal form of *F. propinquus*." It is not very well executed, but fairly represents this variety. Various misconceptions have centred round the identity of this shell. The specimens ascribed to it by Mr. H. K. Jordan (1) are not this variety, but small typical specimens. Some writers prefer to consider it a variety of *F. tortuosus*, G. O. Sars, and it is so described and figured by him, though from a poor specimen minus the apex. (2) The difference between Sars' var. *turritus* and var. *attenuatus* (3) is not apparent, certainly not in the figures, and I consider them the same thing; while Gwyn Jeffreys held that *F. tortuosus*, G. O. Sars (non Reeve, which is *F. sabini*, Gray) is another variety of *F. propinquus* (4). However that may be, from my own specimens I can easily graduate vars. *turritus* and *attenuatus* into typical *F. propinquus*, from which they do not differ in any particular except that of proportion. Sars was mistaken in quoting *F. attenuatus*, Jeffr. as a synonym of his var. *attenuatus*; they have nothing in common except the name. The latter, as well as *tortuosus* and *turritus*, are attenuated at each end, which gives them a cylindrical outline, whereas *F. attenuatus*, Jeffr., and *F. consimilis*, Marsh., are attenuated in the spire only, but have a

(1) Journ. Conch., 1890, vol. vi, p. 233.
(2) Moll. Reg. Arct. Norv., p. 272, t. 25, fig. 11 (printed 1c in error).
(3) Loc. cit., p. 273, t. 15, fig. 5.
(4) Moll. "Triton" Exp., Proc. Zool. Soc., 1883, p. 365.

short and broad base, which imparts a conical outline in comparison with the others. The two latter are also much larger shells, with a glossy surface and compressed whorls. Canon Norman is also "inclined to add as a wider variety" *F. delicatus*, Jeffr. (°), but that again is quite distinct from *F. propinquus* or any of its varieties, all its affinities (except size) being with *F. sabini*, Gray.

Var. *laevis*, Marsh. n. var.—This is a small, delicate form, with a light, silky, polished epidermis, and the whorls partially or entirely without the usual spiral sculpture. It corresponds with *F. gracilis var. glaber*, but is still smoother than that variety, and comes from the same British locality.

As in the last three species, there is a broad as well as a slender variety, the result of depth and habitat. It flourishes best on the Doggerbank, where I have dredged it in comparative abundance and of large size, the largest attaining 2¼-in. by 1-in.; but on the edge of the Doggerbank and in the Silver Pits, where the water is deeper, they become smaller and narrower, like the Shetland form, although the latter district produces large specimens also in places. Mr. Richard Howse (⁸) first noticed and figured the small deep-water form, but mistakenly under the name of *F. gracilis var.*, which he described as "hispid, 1¼-in. by ½-in., with seven whorls"; and if it merits a varietal name that of *var. howsei* would be appropriate. Some of my Shetland specimens do not exceed an inch in length by half that width. Searles Wood records and figures a reversed specimen found by Mr. A. Bell in the Red Crag (pl. 27, fig. 21).

This is another instance in which Forbes and Hanley, Jeffreys, and Sowerby are at variance as to the type form, and unfortunately the author did not accompany his description with a figure. Gwyn Jeffreys' figure, description, and dimensions belong to the Shetland and deep-water form, while the other authors figure more southern examples as the type; and although Forbes and Hanley give the dimensions as 1½-in. by ½-in. their figured specimen is 2⅛-in. by 1-in. Captain Brown's figures are not this, but the next species.

F. JEFFREYSIANUS, Fisch.—Bristol Channel (Wotton)! the Smalls Lighthouse (Span)! Milford Haven (Jordan); Tenby and Laugharne (Williams Vaughan)! Brixham in S. Devon, from trawlers: and occasionally cast ashore in Torbay by storms. It has been dredged on the north coast of Spain (Locard, "Travailleur" Exp.), and I have a young specimen dredged by the "Porcupine" off Cadiz in 386 f.

(6) Ann. Mag. Nat. Hist., 1879, p. 142.
(8) "Notes on a Dredging Excursion off Dunbar," Ann. Mag. Nat. Hist., vol. xix, p. 162, pl. 10, fig. 5.

I incline to the opinion of Canon Norman, that this is "a large variety of *F. propinquus*." It is not only larger generally, but is much more solid and robust, and commences where the latter leaves off, viz. in the Bristol Channel, *F. propinquus* tending north, and *F. jeffreysianus* to the south. Its British range is from Exmouth in South Devon (Clark) to both sides of St. George's Channel as far as the Smalls Lighthouse off the Pembrokeshire coast, which is its northernmost limit, meeting here and mingling with *F. propinquus*, and so partaking somewhat of each other's characteristics. From a series of specimens from this district it is not difficult to graduate one form into the other, or to meet with examples that may be ascribed to either. Moreover, none of the characters ascribed to it by Jeffreys mark it off as a distinct species. The comparative length of the spire is too variable to make it a specific test, and as to that of the smooth epidermis, Gwyn Jeffreys would probably now qualify his description after admitting that *F. sabini*, *F. pygmaeus*, *F. propinquus*, and *Buccinum grœnlandicum* are occasionally "finely and closely ciliated, though the epidermis is usually smooth," for some *F. jeffreysianus* are certainly hispid even to the unaided eye. It it quite true that the young and fry "are as distinct from those of *F. propinquus* as the adult of each from the other," but neither is that a specific test. (It is curious, by the way, that the shape of the young are the reverse to the adult shell, those of *F. jeffreysianus* being long and narrow, while those of *F. propinquus* are short and stumpy.) The shell becomes larger and more solid as it proceeds south, and attains its greatest development in Torbay and at Exmouth, my largest thence being 2⅝-in. by 1¼-in., while the smallest, from the south of Ireland and the Pembrokeshire coast, are 1⅝-in. by ¾-in. All the published figures correctly represent the shell, the best perhaps being those of Captain Thomas Brown, (1) who was the first to figure it, though mistakenly as the last species. His description, however, is unreliable, and he says a specimen was "found at Seaton, Northumberland, by Walter Trevelyan, Esq., and in the cabinet of Sir John Trevelyan at Wallington;" but the figures are undoubtedly those of *F. jeffreysianus*, and of the South Devon form. Sir Walter may without doubt have picked up a specimen of *F. propinquus* at Seaton, but that cannot be the shell figured by Brown, and it is surprising to find Gwyn Jeffreys and others failing to recognise the figures. Sowerby figures the Irish form well.

F. BERNICIENSIS, King.—Aberdeenshire (Simpson and others); Channel slope 539 f. ("Porcupine"); Atlantic off Ireland 345 f. (R.I.A. cruise); Shetland Faroe Channel 570 f. ("Triton"). The finest came

(1) Illust. Rec. Shells, 2nd ed., 1845, p. 8, pl. vi, figs. 11, 12.

from the Doggerbank, and measure $4\frac{1}{4}$-in. by $1\frac{7}{8}$-in. Four prominent ridges (sometimes only three) encircle the periphery of each whorl. A specimen from the Doggerbank is peculiar in having the very different smooth and spiral embryo of *F. norvegicus*.

Var. *elegans*, Jeffr.—East Shetlands 70 f. (Simpson and others)! North of Unst (Jordan); Doggerbank 30 f., North Rona 45 f., and East Shetlands 100 f. Also N. of Hebrides 530 f. ("Knight Errant"): Shetland Faroe Channel 608 f. and 640 f. ("Triton"); between the Hebrides and Faroes 155-632 f. ("Porcupine.") L. 4-in., b. $1\frac{5}{8}$-in. This lives with the type on the Shetland deep-sea fishing-grounds, whence Barlee and Jeffreys first procured it, and I have several specimens from the same locality. From the same region I have a fully adult specimen which is only half the usual size—$2\frac{1}{2}$-in. by $1\frac{1}{8}$-inch. Another variety (2) with more tumid whorls and shorter spire, has been dredged by the "Porcupine" 50 miles west of the Shetlands in 203 f., and north of Scotland in 290 f. (Jeffreys), but which does not differ, except in texture, from var. *solida*, G. O. Sars (3). I have two specimens that may pass for either of these varieties, one from the Shetlands and the other from the Doggerbank. All three varieties gradually merge from the type, and are only the extreme forms common to all the *Fusus* family, and indeed to all univalves.

F. FENESTRATUS, Turt.—The Minch 72 f. a young specimen (J. T. M.); S. of Ireland 110 f. (E. A. Smith); S. W. Ireland 50 f. (R. I. A. cruise); Channel slope 539 f., off Cape Clear 180 f., S. of Ireland 725 f. and W. of Ireland 90 f., ("Porcupine"); off the Butt of Lewis 530 f. ("Knight Errant"); Shetland-Faroe Channel 530 f. ("Triton"). Two or three specimens have also been trawled in recent years between the Pembrokeshire and Waterford coasts; one of these is $2\frac{1}{4}$-in. in length, and has seven whorls besides the apical ones; but for many years previously the only specimens known had their source from old Mr. Humphrey's, the dealer, of Dublin, who obtained altogether during his career eight specimens, one of which is in my collection. My young specimen from the Minch has only $3\frac{1}{2}$ whorls, but is interesting as showing the embryonic sculpture, which is usually worn down in the adult. The first whorl is quite smooth, the second has spirals only, and the third initiates the longitudinals and spirals which characterise the adult. Gwyn Jeffreys gives an excellent figure, but Sowerby's is not like. *F. fenestratus* was also dredged by the "Porcupine" off the coast of Portugal in 220 f.

(2) Var. *infata*, Jeffr., "Valorous" Moll., Ann. Mag. N. Hist., 1877, p. 327.
(3) Moll. Reg. Arct. Norv., p. 278, tab. 14, fig. 2.

A good many outlying members of this genus have been dredged between the Hebrides and Shetlands and the Feroes, as well as in the Atlantic, by the "Lightning," "Knight Errant," "Triton," and "Porcupine," expeditions, including *F. delicatus*, Jeffr., *F. hirsutus* Jeffr. *F. lachesis*, Mörch, *F. sarsii*, Jeffr., *F. sabini*, Gray, *F. concinnus*, Jeffr., *F. turgidulus*, Jeffr., *F. togatus*, Mörch, and *F. moebii*, Dunk. and Metz. But it should be noted as a significant fact that the discoverer and author of most of these species did not attempt to claim for them a British origin.

To the foregoing may be added another species, closely allied to *F. attenuatus*, Jeffr., (1) which was trawled in 1897 by an Aberdeen steam-trawler "on the north side of the Shetland-Faroe Channel, on a small bank 60 to 70 fathoms deep, with very deep water on either side," and which I propose to name **F. consimilis**, n. sp. With two exceptions, it agrees in every respect with Gwyn Jeffreys' description of *F. attenuatus*, so closely indeed as to suggest at first that those two exceptions may possibly be reconciled if more specimens come to hand; but one of them is fundamentally distinct. Gwyn Jeffreys writes that the spire of *F. attenuatus* tapers "to a very blunt and regularly spiral point, which is not mammillar nor twisted," while my specimen has a twisted and bulbous apex wider than the following whorl, and similar to that of *F. islandicus*, but not stilliform. He also describes the canal as "straight," while in my shell it is much curved. All the other characters given to *F. attenuatus* may be applied to this species—shape, size, measurements, sculpture, epidermis, colour, etc. This specimen came into the hands of Mr. James Simpson of Aberdeen, who generously gave it to me. *F. attenuatus*, Jeffr., is a very rare species, only one living and two dead adult specimens having been dredged by the "Valorous" in mid-Atlantic, and by the "Porcupine" in the Atlantic off Ireland, while no figure of it has yet been published. The correct "Porcupine" localities for *F. attenuatus* are S. W. Ireland off Cape Clear 1207 f., and N. W. Ireland off Rockall 1215-1380 f., and not those recorded in error by Gwyn Jeffreys.(2)

A specimen of *F. concinnus*, Jeffr., (3) was found some few years ago on an Aberdeen trawl-boat by Mr. J. Simpson. It was an adult example, perfect but dead. The species was described by the author from a single specimen dredged by the "Triton," in the Shetland-Faroe Channel, in 608 f., but this specimen more probably came from the deep-sea fishing-grounds 70 miles east of the Shetlands, as trawlers

(1) Proc. Roy. Soc., vol. 18, p. 454, 1870, rare only; and Ann. Mag. N. Hist., 1877, (mis-printed 1876 in private copy), p. 326.
(2) Moll. "Valorous" Exp., Ann. Mag. N. Hist., 1877, p. 326.
(3) Moll. "Triton" Exp., Proc. Zool. Soc., 1883, p. 397, pl. xlix. figs. 8, 8a.

cannot work their trawl deeper than about 100 f., and rarely at that. On another occasion, from the same source, Mr. Simpson found a living but immature specimen of another *Fusus* different from any species that I know. It is nearest to *F. latericeus*, Möll., but differs from that shell in being still more slender, with more compressed whorls, no longitudinal ribs, and a bulbous apex. I am informed that of late years several species of the Echinodermata have been brought into Aberdeen, from the same fishing-grounds, which had only been previously dredged in the Shetland-Faroe Channel, and I have myself described an *Adula* (4) from these fishing-grounds which, if not well authenticated, might have been relegated to the Shetland-Faroe Channel. In this connection I may add that a more recent discovery of *A. simpsoni* in a Teredo-pierced piece of wood brings its habitat into complete harmony with that of *A. argenteus*, Jeffr., from frigid water in the Shetland-Faroe Channel.

The results of the exploration of the Shetland-Faroe Channel by various expeditions has of course brought the question of the limits of the British area for Zoological purposes into urgent prominence, and it is to be hoped that the British Association will soon take it in hand and issue some authoritative Rules on the subject, as they have done in the matter of the Rules of Priority and Nomenclature. This boundary or zone must in any case be an arbitrary one, and for that very reason individual opinion cannot be expected to carry any weight. It is also the more necessary not only because some rather wild ideas appear to be entertained as to what constitutes a British species or what are the limits of the British seas, but more especially because steam-trawlers are rapidly taking the place of the old sailing craft, and are now working nearly all the year round up to Iceland and the Faroes, bringing back with them various genera of marine animals; while the change from sailing to steam trawlers is still more accelerated owing to the growing reluctance of fishermen to remain at sea more than from Monday to Saturday; they are all learning to appreciate their week-end on shore, and, once enjoyed, cannot be induced to sacrifice that privilege; so that while steam-trawlers are easily manned, and can run home when they like, there is a difficulty in shipping hands for the sailing craft, who have to come home when they can.

(4) *Adula* (*Myrina*) *simpsoni*, Marsh., Journ. Malac., 1900, vol. vii, p. 167, figs. 1–3.

A CLASSSIFIED LIST OF THE HELICOID LAND SHELLS OF ASIA.

(PART II.*)

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

I. THE CHINESE EMPIRE *(continued.)*

B. TIBET.

This mysterious country is, conchologically, as in other respects, still practically a *terra incognita*, chiefly owing to the difficulties which attend travel, and more especially to the absolute prohibition by the Government to Europeans of entering the central parts. Since, in 1845, the two French missionaries, Huc and Gabet, made their famous journey, no European has succeeded in reaching Lhasa. The most recent attempt, in 1901, by the intrepid Swedish explorer, Dr. Sven Hedin, to enter the capital, has again ended in failure, for when within five days' journey from his goal he was turned back by the authorities to the frontier.

Considerable exploration has, however, been done in the eastern, northern, and western parts by English, French, and Russian travellers, and it is principally to those of the latter nationality that we are indebted for a glimpse of the molluscan fauna of this region. Foremost among these, ranks the Russian General Prejevalski, who made four expeditions between 1870 and 1885, to the eastern and north western districts. The Russian travellers Potanin, Beresowski, and Obrutschew, the Austrian explorer Loczy, the Hungarian Count Bela Szechenyi, and more recently the German savants Professor Futterer and Dr. Holderer, have all contributed to a partial knowledge of the mollusca of these parts.

It may be remarked that the physical conditions of a great portion of north-west Tibet do not favour molluscan life, barren, uninhabitable country, interspersed by salt lakes, stretching for hundreds of miles.

Many of the mollusca originally attributed to Tibet, i.e. those collected near Moupin by the Abbé Armand David, and described by Deshayes, have had to be eliminated from the Tibetan fauna, for the locality named, though ascribed by Deshayes to eastern Tibet, has been shown by Dr. von Möllendorff to be in China (Province of Sze-chuen).

Some shells collected about Yerkalo and Tse-kou by the Abbé Desgodins and Monseigneur Biet, have been described by Mr. Ancey, who states these localities are in Tibetan territory, and although the

* See Ante, p. 1.

maps to which I have access show these places on the Chinese side of the frontier, I have accepted Mr. Ancey's view and have included these shells in the Tibetan list.

The species described by Dr. von Möllendorff from the Koko-nor district are also included here, for, although Dr. von Mollendorff is inclined to consider this district outside Tibet. Prejevalski, Bonvalot, Wellby, and Hedin all show it on their maps within the boundaries of north Tibet.

On glancing at the known Tibetan Helicoids, one feature is striking, viz., the absence of *Zonitidae*; and we have also a preponderance of the typical genus *Cathaica*. That the *Zonitidae* will be found on further exploration, however, may be inferred from the fact that they have been recorded from all the surrounding countries.

As a case of apparent erratic distribution may be cited *Cathaica stoliczkana*, Nevill, recorded originally from eastern Turkistan, and which has been found in the extreme east of Tibet, near Yerkalo.

Family **Helicidae**
Group **Belogona**, v. Iher.
BELOGONA EUADENIA, Pils.
Genus EULOTA, Hartm.
Section EULOTELLA, s.s.
physeta, Anc.
pandynama, Mab.
= poirieri, Bourg.
desgodinsi, Anc. Yerkalo.
Genus CATHAICA, Mdff.
Sub-genus EUCATHAICA, Andreae.
giraudeliana, Hde. Yerkalo.
Sub-genus XEROCATHAICA, Andr.
holdereri, Andr. N.E. Tibet.
stoliczkana, Nev. Yerkalo.
cucunorica, Mdff. Koko nor.
siningfuensis, Hilb. Nan-shan Range.
v. brunnescens, Mdff.
nanschanensis, Mdff. Nan-shan Range.
kreitneri, Hilb. N.E. Tibet.
pulveratricula, Mts. Nan-shan Range.
ohlmeri, Andr. Koko-nor.
fedtschenkopsis, Anc. Yerkalo.
reneana, Anc. Yerkalo.
Sub-genus CAMPYLOCATHAICA, Andreae.
cunlunensis, Mdff. Di-chu, N. Tibet.
przewalskii var. minor, Andr. Nan-shan Range.
Genus PLECTOTROPIS, Mts.
hilberi, Anc. Ta-tsien-lou.
BELOGONA SIPHONADENIA, Pils.
Genus VALLONIA, Risso.
asiatica, Nev. South Koko-nor Range.
ladacensis, Nev. Narka, W. Tibet.
v. tibetana, Mdff. Burhan Bota, south of Tsaidam

C. EASTERN TURKISTAN.

The earliest records from this region are by von Martens, based on the collection of Fedtschenko, and by G. Nevill, from specimens obtained

by Stoliczka during the second Yarkand Mission. One species we owe to Prejevalski; while the remaining species have been contributed by the travellers Kasnakow and Stenroos, and were described by Dr. Westerlund. Here the *Zonitidae* are represented by one species, and the Chinese genus *Cathaica* again preponderates; but *Fruticicola* has one and *Vallonia* two representatives, showing relationship with the European Antarctic fauna.

Family **Zonitidae**.
Sub-family **Zonitinae**.
Genus POLITA, Held.
kasnakowi, West. Aksu.
Family **Helicidae**.
Group **Belogona**, v. Iher.
BELOGONA EUADENIA, Pils.
Section EULOTA, s.s.
stenroosi, West. (Pomatia). Terskii-Alatau.
v. tetrica, West.
Genus CATHAICA, Mdff.
Sub-genus EUCATHAICA, Andr.
funki, Anc. Karghalik.
Sub-genus PLIOCATHAICA, Andr.
rossimontana, Mdff. Karija Darja Valley, Russian Range.
phaeozona, Mts. Pasrobat; Karghalik; Sasak Taka.
Sub-genus XEROCATHAICA, Andr.
stoliczkana, Nev. Sasak Taka; Pasrobat.
Sub-genus PSEUDIBERUS, Anc.
plectotropis, Mts. Yarkand; Karghalik.
uniformis, Anc. Arassan Culak.
anisopleuros, Anc. (?) Central Asia.
Sub-Genus CAMPYLOCATHAICA, Andr.
capusi, Villeserre.
palmeni, West. Kashgar.
v. accinta, West. Djuka-Djok Valley.
scythica, West. Dgehularik.
opposita, West. Djuka-Djok Valley.
Genus EULOTA, Hartm.
BELOGONA SIPHONADENIA, Pils.
Genus HYGROMIA, Risso.
Section FRUTICICOLA, Held.
mesoleuca, Mts. Kizyl, Yarkand district.
Genus VALLONIA, Risso.
costata, Müll. Pasrobat.
asiatica, Nev. Pasrobat; Sasak Taka.

D. MONGOLIA.

This country as might be expected from its position shows affinity with northern Tibet. Our knowledge of the Helicoids is at present confined to the genus *Cathaica*, the shells having been collected by Prejevalksi, Regel and Obrutschew.

Genus CATHAICA, Mdff.
Sub-genus PLIOCATHAICA, Andr.
rubens, Mts. v. concolor, Mts. Mount Tarbagatai.
v. regeliana, Mts. Kuldja.
semenowi, Mts. Kuldja, Ili and Kunges Valley.
v. depressa, Mouss. Kuldja.
paricincta, Mts. Kuldja; Kasch; Ili and Kunges Valley.

v. bisbicincta, Mts.
v. ambicincta, Mts.
v. incincta, Mts.
v. bilaticincta, Mts.
duplocincta, Mts. Kuldja; Pilutschi; Kasch; Ibi and Kunges Valley.
Sub-genus XEROCATHAICA, Andr.
cavimargo, Mts Kuldja; Kunges Valley.
Sub-genus CAMPYLOCATHAICA, Andr.
rufispira, Mts. Kuldja.
v. albidorsalis, Mouss. Kuldja.
prezewalskii v. alaschanica, Mdff. Alashan district.
obrutschewi, Stur. Alashan.

E. COREA.

Our knowledge of the Helicoids of this region is very scanty. A few species were described by Pfeiffer and Reinhardt; one was collected by the naturalists of the Samarang, and described by Adams and Reeve; while Dr. von Möllendorff more recently has described a few shells collected by Dr. Gottsche. The paucity of the Molluscan fauna has already been remarked upon by Dr. von Martens (1886). Its affinities are with north China and Japan.

Family **Zonitidae**.
Sub-family **Zonitinae**.
Genus EUCONULUS, Reinh.
coreanus, Mdff. Seoul.
Family **Endodontidae**
Group **Haplogona**, Pils.
Genus PYRAMIDULA, Fitz.
Section PYRAMIDULA.
amblygona, Reinh.
v. conoidea, Mdff.
Section GONYODISCUS, Fitz.
elatior, A. Ad. Corea, Dagelet Island.
costulata, Mdff.
Family **Helicidae**.
Group **Epiphallogona**, Pils.
Genus GANESELLA, Blf.
gradata, Mdff. Hatong; Thosan.
Group **Belogona**, v. Iher.
BELOGONA EUADENIA, Pils.
Genus EULOTA, Harrm.
Section EULOTA, s.s.
coreanica, Ad. and Rve.
sieboldiana, Pfr.
Section EUHADRA, Pils.
purpurascens, Pfr.
luhuana, Sow. Corea; Dagelet Island.
hermannseni, Pfr. Imgin.
= koreana, Pfr.
= connivens, Reeve var.
Genus PLECTOTROPIS, Mts.
mackensii, Ad. and Rve. Cone Island.
ciliosa, Pfr. Port Hamilton.
Genus AGISTA, Alb.
gottschei, Mdff. Seoul.
BELOGONA SIPHONADENIA, Pils.
Genus VALLONIA, Risso.
tenera, Reinh.
= pulchellula, Hde.

F. CHUSAN.

Our knowledge of the Helicoids of this group of islands is extremely meagre. A few shells were collected by Dr. Cantor 1840-42, and

enumerated by Benson. The only other contribution is by A. A. Fauvel, who recorded four species. Of Benson's records two are doubtful: (1) *Hemiplecta striata*, Gray, a Singapore shell, and in Dr. von Martens' opinion included in the present fauna owing to an accidental change of label; and (2) *Plectotropis tapeina*, Bens., believed by the same authority to be a mistake in identification for *P. osbeckei*, Phil.

Family **Helicidae**.
Genus TRAUMATOPHORA, Anc.
triscalpta, Mts.
Group **Belogona**, v. Iher.
BELOGONA EUADENIA, Pils.
Genus EULOTA, Hartm.
Section EULOTA, s.s.
ravida, Bens.
Genus CATHAICA, Mdff.
Sub-genus PSEUDIBERUS, Anc.
tectum-sinense, Mts.
Genus PLECTOTROPIS, Mts.
ciliosa, Pfr.
? osbeckei, Phil. (? tapeina, Bens.)

G. FORMOSA.

Extensive collections were made in this island in the sixties of last century, by the then British Consul, Robert Swinhoe, and were described by Henry Adams, and by Pfeiffer. Quite recently Schmacker collected a number of shells, and described them in conjunction with Professor Boettger: his lamented death has deprived us of an ardent field naturalist, from whom considerable additions to our knowledge were expected.

Several genera, both of *Zonitidae* and *Helicidae* are represented, many showing close affinity with Chinese forms.

Family **Zonitidae**.
Sub-family **Ariophantinae**.
Genus ARIOPHANTA, Desm.
taivanica, Mdff.
Sub-family **Macrochlaminae**.
Genus MACROCHLAMYS, Bens.
formosana, Schm. and Bttgr.
vesta, Pfr.
Genus MICROCYSTINA, Morch.
? par, Schm. and Bttgr.
? spadix, Schm. and Bttgr.
v. cinctus, Pils.
Genus SITALA, H. Ad.
trochulus, Mdff.
v. formosana, Schm. and Bttgr.
Genus KALIELLA, Blanf.
depressa, Mdff.
Sub-family **Zonitinae**.
Genus TROCHOMORPHA, Alb.
haenseli, Schm. and Bttgr.
Family **Helicidae**.
Group **Epiphallogona**, *Pils.*
Genus CHLORITIS, Beck.
Sub-genus TRICHOCHLORITIS, Pils.
hungerfordiana, Nev.
Genus GANESELLA Blanf.
fulvicans, H. Ad.
albida, H. Ad.
sphaeroconus, Pfr.
v. campochilus, Pils.
Group **Belogona**, v. Iher.
BELOGONA EUADENIA, Pils.
Genus BULIMINOPSIS, Hde.
Section BULIMINOPSIS, s.s.
incerta, Pfr.

= taivanica, Mdff. (Tryon).
Genus EULOTA, Hartm.
Section EULOTA, s.s.
redfieldi, Pfr.
sieboldiana, Pfr.
[=?Nanina sieboldiana, Kobelt]
touaannensis, Soul.
Section EULOTELLA, Mts.
similaris, Fér.
assimilis, H. Ad.
Section EUHADRA, Pils.
luhuana, Sow.
swinhoei, Pfr.
bairdi, H. Ad.
formosensis, Pfr.
bacca, Pfr.
v. pancala, Schm. and Bttgr.
succincta, H. Ad.
v. amblytropis, Pils.
sargentiana, Pils.
mellea, Pfr.
friesiana, Mdff.
nux, Mdff.
Section DOLICHEULOTA, Pils.
swinhoeana, Pils.
= Bulimus swinhoei, Pfr.
elongata, Pfr.
= Bulimus (Amphidromus) formosensis, H. Ad.
Genus PLECTOTROPIS, Mts.
mackensii, Ad. and Rve.
shermani, Pfr.
v. lautsi, Schm. and Bttgr.
granti, Pfr.
Genus AEGISTA, Alb.
subchinensis, Pfr.

H. HONG-KONG.

As its close proximity to the Chinese mainland would lead one to expect, the mollusca of this island are essentially Chinese. No less than nine genera of Helicoids are represented, including such typically Chinese as *Plectopylis* and *Moellendorffia*; but *Cathaica* is absent. The majority of the species were described by Dr. von Möllendorff, who collected there extensively himself, as did Dr. Hungerford and Mr. T. W. Eastlake. Some remarks by the latter are worth quoting here: "It is remarkable that the Island of Hong-kong should have produced so many indigenous species. A British possession for more than thirty years, hardly one scientific expedition has touched the shores of this 'barren rock in the ocean' without discovering a new species.

"There are only a few places where shells are to be found, as the larger part of the island consists of naked rocks, or is sparsely covered by *Gleichenia dichotoma*— a fern, which is a sure indication of the absence of terrestrial mollusca. In the valleys, however, vegetation is luxuriant, and it is in these places that most of the shells are to be found. The dense woods of Little Hong-kong (a Chinese village about six miles from the colony) and the little valley near Sheko (ten miles from the colony), are favorite resorts for collectors. Curiously enough, one of the highest peaks on the island, known as High West (1608′) is the only place where some of the rarest species are to be found; as especial *Helix pulcinaris*, Gould." [*Plectopylis*.] . . . .

"The whole eastern side is covered with a dense growth of small ficus, acanthaceae, and orchidaceous plants, and these, protected from the violence of the north-east monsoon, form a favorite shelter for the mollusca. Unluckily, the peak is only accessible from the south, and thus almost the entire eastern side is beyond reach. Still one can descend safely thirty or forty yards below the peak, although great precaution is necessary, for granite boulders abound, and the slippery, as well as insecure footing these afford, renders a greater descent impossible."

Family **Zonitidae**.
Sub-family **Macrochlaminae**.
Genus MACROCHLAMYS, Bens.
discus, Mdff.
superlita, Morel.
nitidissima, Mdff.
Genus MICROCYSTINA, Mörch.
schmackeriana, Mdff.
eastlakeana (Mdff.), Eastlake (nom. nud.)
stenomphala, Mdff.
Sub-family **Helicarionlnae**.
Genus CRYPTOSOMA, Theob.
v. imperator, Gld.
imperatrix, West.
Genus KALIELLA, Blf.
depressa, Mdff.
hongkongensis, Mdff.
Family **Helicidae**.
Genus PLECTOPYLIS, Bens.
Section SINICOLO, Gude.
pulvinaris, Gould.
Group **Epiphallogona**, Pils.
Genus CAMAENA, Alb.
Sub-genus CAMAENA, s.s.
cicatricosa, Müll.
xanthoderma, Mdff.
v. minor, Eastlake.
Group **Belogona**, v. Ihe.
BELOGONA EUADENIA, Pils.
Genus EULOTA, Hartm.
Section EULOTELLA, Mts.
similaris, Fèr.
v. hongkongensis, Desh.
Genus PLECTOTROPIS, Mts.
gerlachi, Mdff.
BELOGONA SIPHONADENIA, Fèr.
Genus HELICODONTA, Fér.
Sub-genus MOELLENDORFFIA, Anc.
eastlakeana, Mdff.
trisinuata, Mts.

I. HAINAN.

Most of the Helicoids of this island were described by Dr. von Möllendorff from O. Herz's collections. Of *Zonitidae* seven species are known, and of *Helicidae* six species, all exhibiting decided affinity with the forms from southern China and Indo-China.

Family **Zonitidae**.
Sub-family **Macrochlaminae**.
Genus MACROCHLAMYS, Bens.
cincta, Mdff.
Genus MICROCYSTINA, Morch.
sinica var. hainanensis, Mdff.
Genus HEMIPLECTA, Alb.
filicostata, Mdff.
Sub-family **Helicarioninae**.
Genus SITALA, H. Ad.

1. Proc. Acad. Nat. Sci. Philad., 1882, p. 230.

hainanensis, Mdff.
Genus KALIELLA, Blanf.
depressa, Mdff.
trochospira, Mdff.
? costigera, Mdff.
Family **Helicidae**.
Group **Epiphallogona**, Pils.
Genus CAMAENA, Alb.
Sub-genus CAMAENA, s.s.
hainanensis, Mdff.
Sub-genus CAMAENELLA, Pils.
platyodon, Pfr.
= tournoueri, Crosse.
Genus CHLORITIS, Beck.
Sub-genus TRICHOCHLORITIS, Pils.
herziana, Mdff.
Genus GANESELLA, Blanf.
schomburgiana, Mdff.
= trochulus, Mdff.
Group **Belogona**, v. Iher.
BELOGONA EUADENIA, Pils.
Genus EULOTA, Hartm.
Section EULOTA, s.s.
tourannensis, Soul.
Section EULOTELLA, Mts.
assimilis, H. Ad.

DOUBTFUL AND SPURIOUS RECORDS.

Hemiplecta striata, Gray, = *naninoides*, Bens.—Recorded by Benson from Chusan (Dr. Cantor). Not since found. Dr. von. Martens attributes this record to an accidental change of labels, since Dr. Cantor collected also in Singapore, where this shell is very common. (Ost-Asien, Zool. ii, 1867, p. 58.)

? Eurypus pfeifferi, Phil.—Reached Europe with other shells from the Pacific Islands. Dr. von Martens thinks that in this case also the labels must have been misplaced. (Loc. cit., p. 58.)

Ganesella myomphala, Mts.—Recorded by Nevill from China (Hand List, 1, 1878, p. 72.) If correctly identified, this record will probably be due to a mistake in labelling, since this common Japanese shell has not been found in China by any traveller.

Ganesella largillierti, Phil.—Doubtfully recorded as Chinese, has since been found in the Loo Choo Islands.

Eulota mercatoria, Gray.—Also recorded from China, and since found in the Loo Choo Islands.

Mandarina mandarina, Gray.—Like the two preceding species originally attributed to China, but has since been found in the Bonin Group.

Mandarina pallasiana, Pfr.—Recorded by Bland with some doubt from Corea, has since been found in the Bonin group.

Plectotropis tapeina, Bens.—Dr. von Martens is of opinion that this shell was wrongly identified and probably pertains to *P. osbeckei*, Phil.

Helix melanostoma, Sow.—Recorded by Fraser and Cuming as collected with other shells by Mr. Robert Swinhoe in Formosa (Proc. Zool. Soc., 1865, p. 197). It is impossible to conjecture what species was intended by this record, no such species was ever described by Sowerby.

Helix rufierissa, Mdff.—A nude name published by T. W. Eastlake, (Proc. Acad. Nat. Sci. Philad., 1882, p. 235). I am unable to trace any species published by Dr. von Möllendorff under this name.

ADDITIONS AND CORRECTIONS.

On page 3 of my first paper *Sitala bilirata*, Gredl., becomes a synonym. The specific name is preoccupied in the genus *Sitala* by Blanford (1861). Tryon proposed the name *kuangsiensis* (Man. Conch., ser. 2, 1886, ii. p. 55), and this name should be substituted.

On page 3, after *Helicarion sichuanensis*, Hde., add *H. sinensis*, Hde. Yang-tse district.

On page 3, after *Macrochlamys davidii*, Desh. add *M sinensis*, Hd.

DESCRIPTION OF A NEW SPECIES OF CHLORITIS FROM NEW GUINEA.

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

(Figures 1-4.)

Chloritis (Sulcobasis) prestoni, n. sp.

1

2

3

4

Shell globose, moderately umbilicated, blackish chestnut, of a deeper shade towards the mouth. Spire conical, apex sunk, suture impressed. Whorls 4½, globose, the first 2½ increasing slowly, the last 2 widening rather suddenly, the last dilated above and a little constricted below, behind the peristome, and flattened laterally for some distance further back; finely striated, the earlier 3½ whorls with oblique rows of hair-scars; a shallow furrow encircles the body-whorl at the periphery. Last whorl decending shortly but rather deeply in front, angular round the funnel-shaped, deep umbilicus. Aperture semi-ovate; peristome thickened and shortly reflected, dark brown, the margins slightly convergent, columellar margin triangularly dilated and reflected over the umbilicus.

Diam. maj. 34, minor 28·5; alt. 30; apert. 14·5 millim.

Hab. —Collingwood Bay, British New Guinea. *Type* in my collection.

Compaired with *Chloritis rubsei*, Marc., its nearest ally, the new species is darker in colour, smaller, the spire is more compressed and elevated, the last whorl decends more and is less globose, the peristome is much less reflected, dark brown instead of bluish, and the outer margin is not sinuous, while the umbilicus is narrower. The sudden deflection of the last whorl is not well shown in figure 4.

ON A COLLECTION OF LAND AND FRESH WATER SHELLS FROM KELANTAN, MALAY PENINSULA.

By E. R. SYKES, B.A.

(Plate iii.)

Recently[1] I published a few brief diagnoses of some new shells from this district, collected by Mr. J. Waterstradt, and I am now enabled to give a fuller account of the collection, with illustrations. For the present, the Helicoids have been omitted, in the hope that some person, more conversant with the group than I am, may deal with them.

Streptaxis collingei, Sykes. Pl. iii. figs. 8—10.

Streptaxis collingei, Sykes: Ante, p. 22.

Amphidromus aureus, Martyn.

Both a dextral and sinistral form, bright yellow in colour, with a white zone below the suture, and no brown striping. One specimen, dextral, measures 62 millim. I have followed Pilsbry[2] as I gather

1. Ante, p. 22.
2. Man. Conch., vol. xiii, p. 160.

that the name *perversus*, which I should otherwise have used for this shell, is to be restricted to forms found in Celebes, Java and Borneo.

Hypselostoma hungerfordianum, Mlldff.

A good series of this interesting shell.

Boysidia kelantanense, n.sp. Pl. iii, fig. 7.

Shell umbilicate, obliquely striated, chestnut brown. Whorls 4½-5, very convex and suture deep, apex blunt, the last whorl somewhat distorted, obscurely angulated at the periphery. Aperture rounded, with a sinus at the upper corner of the outer lip; lip well reflected, not solute from the last whorl. *Parietal lamella strong*, 3 other well marked teeth inside the outer lip, and one each side of the lamella.

Alt. 3; diam. max. 2 millim.

Belongs to the group of *B. boettgeri*, Mlldff., from Java, and *B. palmira*, Stol., from Penang; compared with the latter the last whorl is more distorted and gibbous and the relative proportions of height and breadth differ, the present species being also much larger.

Rhodina (?) mirabilis. Sykes. Pl. iii, fig. 2.

Rhodina (?) mirabilis, Sykes: Ante, p. 22.

Subulina octona, Chemn.

Clausilia filicostata, Stol.

Clausilia kelantanense, Sykes. Pl. iii, fig. 1.

Clausilia (Pseudonenia) kelantanese (err. typ.), Sykes: Ante, p. 22.

Cyclophorus saturnus, Pfeiffer.

Cyclophorus borneensis, Melcalfe.

Lagochilus townsendi, Crosse.

Opisthoporus dautzenbergi Sykes. Pl. iii, figs. 5, 6.

Opisthoporus dautzenbergi, Sykes: Ante, p. 23.

Opisthoporus tener, Menke.

Compared with specimens of this species from Annam (coll. Fruhstorfer), I can trace but little distinction except size, one of the adult Kelantan shells, for example, only measuring diam. max. 13½ millim. The tube is also slightly more parallel to the suture.

Platyraphe chrysalis, Sykes. Pl. iii, fig. 4.

Platyraphe chrysalis, Sykes: Ante, p. 23.

Alycaeus gibbosulus, Stoliczka.

With this occurs another form, much less gibbous, and which may belong to a different species, but the specimens before me show considerable variation.

Alycaeus kelantanense, n. sp. Pl. iii, figs. 13, 14

Shell conic, minutely umbilicate, white in colour, the upper whorls often being yellowish, apparently due to the animal within. Sculpture close well marked rib-striae, with microscopic spiral striation intersecting the ribs. Whorls 5, moderately convex, the last whorl gibbous, and constricted about 2 millim behind the lip, the sculpture being thence much finer and more remote. Aperture subcircular, lip double, the upper outer margin forming a slight wing where it approaches the last whorl.

Alt. 3·8; diam. max. 4 millim.

Opisthostoma laidlawi, Sykes. Pl. iii, figs. 13, 14.

Opisthostoma laidlawi, Sykes: Ante, p. 22.

Georissa monterosatiana, G.-Ausl. and Nevill.

Ampullaria perakensis, De Morgan.

Ampullaria ampullacea, L.

Vivipara cingulata, Martens.

Canidea boucourti, Brot.

Faunus ater, L.

In my view, *F. cantori*, Bens., is only a small form.

Melania variabilis, Brus.

There are also two other species of *Melania*, which I am unable to identify.

Septaria, sp.

Neritina crepidularia, Lam.

Neritina zigzag, Lam.

Unio (Nodularia) ingallsianus, Lea.

Unio aseia, Bens.

Identified from the tablet in the British Museum, no doubt that from which Hanley described the species in 1856 (Cat. Rec. Biv. Shells p. 385.)

Monocondylaea chaperi, De Morgan (?)

Corbicula, sp.

EXPLANATION OF PLATE III.

Fig. 1. *Clausilia kelantanense.*
Fig. 2. *Rhodina (?) mirabilis.*
Figs. 3, 4. *Platyraphe chrysalis.*
Figs. 5, 6. *Opisthoporus dautzenbergi.*
Fig. 7. *Bowsidia kelantanense.*
Figs. 8, 9, 10. *Streptaxis collingei.*
Figs. 11, 12. *Alycaeus kelantanense.*
Figs. 13, 14. *Opisthostoma laidlawi.*

IS AMALIA CARINATA, RISSO, A BRITISH SLUG?

BY WALTER E. COLLINGE.

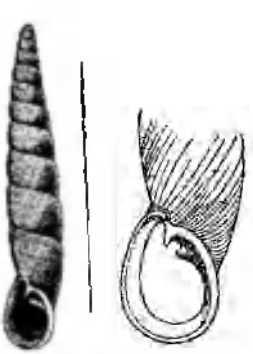
For some time I have been receiving (in connection with my proposed Monograph on the British Slugs) from various correspondents in different parts of the British Isles, numerous examples of *Amalia sowerbyi*, Fér. Amongst these, a specimen collected by Mr. Bromley Peebles, near Birmingham, and two collected by Mr. F. J. Partridge in Devonshire, seemed to differ slightly from the ordinary form. These I have subjected to a rather more careful scrutiny, and have also compared them with Simroth's excellent figure of *A. carinata*, Risso,[1] also with the drawings and description of the internal structure of this species, as given by Simroth,[2] and Lesson and Pollonera.[3] I have now little doubt that these three specimens are not referable to *A. sowerbyi*, Fér., but are very closely allied, if not identical with, the *A. carinata* of Risso. On comparing them with specimens of this latter species from Algiers, they are scarcely distinguishable from them, excepting in size, the English examples being the smaller.

Amalia carinata was described by Risso[4] in 1826, and has by most malacologists been regarded as a valid species. Bourguignat in 1862 described a *Milax carinatus*, and Paulucci in 1888 described a variety *fulva* of *A. marginata*, both of which have been regarded as synonyms of *A. carinata*, by Pollonera.

Externally there are few characters to distinguish *A. carinata* from *A. sowerbyi*, usually, however, it is darker than the typical form of *sowerbyi*, the mantle is longer, and the groove on the mantle extends further forward, this latter character being well shown in Lesson and Pollonera's figure.

Whether or not these three specimens are true *carinata*, and if so, does this species occur generally in this country, remains yet to be proved. With a view to working out this matter, I venture to appeal to malacologists for specimens of dark coloured forms of *A. sowerbyi*, from any part of the British Isles.

1. Abhandl. k. Senckenb. naturf. Gesell., 1891, Bd. xvi, p. 20, T. i, f. 7.
2. Zeit. f. wiss. Zool., 1885, Bd. xlii, p. 222, T. vii, f. xv, T. x, f. xvc, xvd.
3. Monog. d. Limacidi Italiani, 1882, T. i, f. 10–12, 20, 31, T. ii, f. 15.
4. Prod. Europe Mérid., 1826, p. 56.



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1 [illegible]

ON A MALFORMED VARIETY OF LIMNAEA PEREGER, MÜLL.

By H. OVERTON,

Sutton Coldfield.

In May 1897, I collected from a pool in Sutton Coldfield, a very interesting malformed variety of the well-known *Limnaea peregra*, and as illustrations of such seem to be scarce, I have thought it of sufficient interest to figure. The specimen is of a dull brown colour with eight whitish bands, six above and two below the periphery. The first and third bands are faint, only showing half way round the penultimate whorl; the second, fourth, fifth and sixth are well pronounced, the fifth and sixth, which are the broadest, almost fusing with one another. The seventh and eighth are faint, and between these and the sixth and seventh are still fainter traces of several

Limnaea peregra, Müll.

broken bands. Towards the ventral margin of the lip there is a curious gap, as if a piece of the shell had been broken out, but that this is not so, is evidenced by the perfect growth of the lip.

The shell was found in company with normal individuals and also with *Limnaea stagnalis*, both species, however, being much smaller than when I visited the spot three years previously, the former then were much larger and the outer lip remarkably expanded and reflected, whilst the latter were exceedingly large specimens. This feature appears strange, as the two visits were made as near as possible at the same time in each year.

DESCRIPTION OF A NEW SPECIES OF SEPARATISTA FROM NEW ZEALAND.

By HENRY SUTER.

Separatista benhami. n. sp.

SHELL small, fragile, subdiscoidal, with a very short spire and broadly-expanded aperture, cancellated, and with deep umbilicus. Colour yellowish-white, semi-transparent, flinty. Pullus consisting of 1½ whorls, which are smooth and glossy. Spire very low, conoidal. Whorls 3, rapidly increasing, body-whorl with a flat shoulder and distinct angle, the larger lower portion strongly convex. Suture first impressed, then, on reaching the aperture, channelled. Spiral ornamentation, consisting of numerous distinct threads, about 12 on the body-whorl, but bifurcating and thus increasing in number on reaching the lip; in the shallow grooves between the riblets there is a fine median thread, recognisable only under the lens. Axial ornamentation represented by numerous, broad, rounded sinuated costae, which become more pronounced and more distant towards the aperture; points of intersection granulate. Fine equidistant and numerous incremental lines cross the spiral threads. Aperture widely expanded, oval, straight above, subangulated at the base. Outer lip patulous throughout, sharp, sinuated below the angle. Inner lip subvertical, slightly concave in the whole length, broadly reflected, continuous with the outer lip and very slightly detatched from the penultimate whorl. Umbilicus not broad, but deep and carinated by the lowest spiral riblet. Operculum ?

Height 6. 5 ; breadth 7 millim. Aperture : height 6 ; breadth 6 millim.

Hab.—Cape Maria van Diemen, New Zealand

Type in the Otago University Museum, Dunedin, New Zealand.

This interesting little shell was found by Mr. Rayner, formerly lighthouse keeper at Cape Maria, and sent to Prof. Benham, the curator of the Dunedin Museum, who kindly handed the specimen over to me for description. I have very great pleasure in associating the name of our distinguished scientist with the species.

The unique specimen is most likely not quite adult, and therefore has the last whorl but very little disunited. The genus *Separatista* is new to the fauna of New Zealand. The species is nearly allied to *S. separatista*, Dillw., and perhaps *S. grayi*, Ad., but may at once be distinguished by the beautiful and complicated sculpture.

Hedley[11] suggests that "*Trichotropis gabrieli*, P. and G., *T. gracilenta*, Braz., and *T. torcularis*, T. Woods, may conveniently be distinguished from the typical northern *Trichotropis*, and assembled under *Separatista*." I fully share Mr. Hedley's opinion with regard to the forms mentioned by him, but there is one stumbling block in the way as far as New Zealand is concerned, and this is *Trichotropis inornata*, Hutton (= *elathrata*, Sow.). If *Trichotropis* is an exclusively northern genus, the question arises: What is *inornata*? It is quite true that the membranaceous fringes of *Trichotropis* are wanting, but otherwise the shell has all the characters of that genus, and I cannot make up my mind to class it under *Separatista*. The species of the latter genus seem to be exceedingly variable, but to include our *T. inornata* would necessitate reforming Gray's diagnosis of *Separatista* to such an extent, that it would almost become a synonym of *Trichotropis*. So far as I can ascertain, the operculum and the animal of *Separatista* are unknown, and the same is the case with *T. inornata*, so that with the little knowledge that we possess at the present time we have to admit the occurrence of *Trichotropis* not only in the northern, but also in the southern hemisphere. It is represented by about seven species in Japan, and there seems to be no reason why it should not also be found in New Zealand.

PROCEEDINGS OF THE MIDLAND MALACOLOGICAL SOCIETY.

35TH MEETING, APRIL 11TH, 1902.

The President in the chair.

EXHIBITS.

The evening was devoted to the examination of a collection of Algerian *Helicidae*, exhibited by Mr. H. H. Bloomer, who made some remarks upon the various species, and their range and character of variation.

Mr. Overton showed examples of *Physa hypnorum* from Tenby, *P. fontinalis* from Sutton Coldfield, *P. heterostropha* from South Staffordshire, and *P. acuta* from Kew.

36TH MEETING, MAY 9TH, 1902.

The President in the chair.

EXHIBITS.

By Mr. H. H. Bloomer: Sixty-nine species of *Achatinella*, from the Sandwich Islands.

By Mr. Breeden: Specimens of *Physa hypnorum*, *Helix pulchella*, *H. pygmaea*, *Vertigo minutissima*, and *V. pygmaea*, from Charmouth, Dorset.

By Mr. Overton: A curiously banded and malformed shell of *Limnaea pereger*, from Sutton Coldfield, also *L. glabra*, from Stafford.

CURRENT LITERATURE.

Pilsbry, Henry A.—Tryon's Manual of Conchology, ser. ii, vol. xiv (pt. 56), pp. 193—302, pls. 37—62. Philadelphia: Academy of Natural Sciences.

The author continues his enumeration of the *Cerionidae*, describing the following as new:—*C. caymanense*, from Grand Cayman Island; *C. crassicostatum* v. *smithii*, from Sagua de Tanamo; *C. longidens*, from Cuba; *C. exiguum* v. *fraternum*, from San Salvador; *C. bryanti* v. *pudicum*, and *C. rubicundum* v. *heterodon*, from Inagua.

The present part concludes volume fourteen, and includes an Index to *Cerion* and References to the sixty-two plates.

Dr. Pilsbry is to be congratulated on the completion of a further volume of this invaluable work, which is yet a desideratum in many of our museum and public libraries.

Gude, G. K.—Descriptions of new Helicoid land shells from Japan. Proc. Acad. Nat. Sci. Phila., 1901, p. 617.

The new species here described are:—*Chloritis (Trichochloritis) pumila*, making the third species of this genus recorded from Japan, and *Eulota (Aegista) mimuloides*.

1 Records Australian Museum, Vol. iv, No. 3, p. 146.

Stearns, R. E. C.—The Fossil Freshwater Shells of the Colorado Desert, their distribution, environment and variation. Proc. U.S. Nat. Mus., 1901, vol. xxiv, pp. 271—299, pls. xix—xxiv.

To all interested in the distribution and variation of the mollusca, Dr. Stearns' paper presents numerous points worthy of consideration, while the six beautifully clear plates, make the paper an exceedingly valuable one.

Stanton, T. W.—*Chondrodonta*, a new genus of ostreiform mollusks from the Cretaceous, with descriptions of the genotype and a new species. Ibid., pp. 301—307, pls. xxv, xxvi.

Dr. Stanton is of opinion that the *Ostrea munsoni*, Hill, is not a member of the genus *Ostrea* nor referable to any described genus, he therefore proposes the name *Chondrodonta* as a new genus for this and a new species, *C. glabra*. The affinities of the new genus seem to be with the *Pectinacea*, which includes the *Spondylidae*, *Limidae* and *Pectinidae*.

Williamson, M. Burton.—A Monograph on *Pecten aequisulcatus*, Cpr. Bull. S. Calif. Ac. Sci., 1902, vol. i, no. 5, pp. 51—61, pl. iv—vi.

Mrs. M. Burton Williamson gives an interesting account of this mollusc, and some notes on the various parts of its anatomy. The paper scarcely deserves the title of monograph, but we hope the authoress will later give us a more detailed account of the anatomy, including the nervous system, illustrated by clearer figures.

Möllendorff, O. von.—Binnen-Mollusken aus Westchina und Centralasien. II. L'Ann. du Mus. Zool. d l'Acad. Imp. Sci. St. Petersb., 1901 (1902), T. vi, pp. 299—412, Tafn. xii—xvii.

Continuing his work on the Mollusca of Western China and Central Asia, the author here devotes the greater portion to the genus *Buliminus*, of which he describes and figures upwards of 40 new species and a dozen sub-species. The following new subgenera are described :—*Pupinidius* (type *B. pupinidius n.sp.*), *Petraeomastus* (type *B. heudeanus*, Ancey,) *Clausiliopsis* (type *B. szechenyi*, Bttg.), *Lophauchen* (type *B. cristatellus*, n. sp.), *Coccoderma* (type *B. granulatus*, Mdff.). Two new sub-species of *Pupilla*, 2 species of *Phaedusa*, and 1 of *Limnaea* are also described.

Randles, W. B.—Merestic variation in *Trochus zizyphinus*. Nature, 1902, vol. 65, p. 535, figs. 1, 2.

The author records and figures the presence of two supernumerary eyes on the right ocular tentacle. So far as could be made out from the examination of an incomplete series of longitudinal sections, all the eyes seem to have been functional during life, each being provided with crystalline lens, retina and optic nerve. The innervation is derived from a single optic nerve arising from the right cerebral ganglion. This nerve bifurcates, one branch passing to the primary eye, and the other again dividing, supplies the two secondary eyes.

Kew, H. Wallis.—On the Mucus-threads of Land-Slugs. Journ. Conch., 1901, vol. 10, pp. 92—103, 4 figs ; 1902, vol. 11, pp. 153—165, 3 figs.

Mr. Kew gives a very useful resumé of the published observations upon this subject, together with some observations of his own, and others communicated by correspondents.

Baker, F. C.—The Mollusca of the Chicago Area. The Gastropoda. Bull Chicago Ac. Sci., 1902, pp. 131—418, pls. xxviii—xxxvi.

The treatment adopted in the present work is very similar to that employed by the author when dealing with the Pelecypoda in a previous part. Here, however, numerous extracts and figures from Pilsbry's work, add greatly to the general value.

Mr. Baker, in nearly all cases, has given very clear descriptions of the shell, the animal, jaw, radula, and notes on the generative organs, distribution, and habitat.

Referring to the speed of molluscs while in motion, the author gives the results of some of his own observations. A few species were timed whilst travelling a distance of two inches, with the following results :—

Limnaea palustris	...	45 seconds	*Polygyra profunda*	...	55 seconds
Limnaea caperata	...	50 ,,	*Polygyra albolabris*	...	60 ,,
Limnaea cubensis	...	50 ,,	*Polygyra monodon*	...	120 ,,
Limnaea reflexa	...	35 ,,	*Polygyra thyroides*	..	60 ,,
Physa heterostropha	...	30 ,,	*Circinnaria concava*	...	90 ,,
Viviparа contectoides	...	120 ,,			

In a work of this character, an author has often to rely upon the statements of other writers, and in consequence it behoves him to exercise every care and discrimination in selecting the same. The statements found on p. 197 *re Limax maximus*, L., are woefully inaccurate ; it reads :—"In Europe it is solitary in habit and is found chiefly in the woods, under fallen trees and stones and near the sea shore. . . Its food consists principally of fungi. It is said to rarely to eat green plants (vide Scharff)." Owners of vegetable gardens know to their cost how very plentiful this species is, and what damage it does to the produce.

In all 113 species are recorded comprised in 38 genera. The volume concludes with a useful Bibliography, Glossary, an Appendix, Index, and 9 plates.

Kennard, A. S. and Woodward, B. B.—Note on the occurrence of *Planorbis stroemii*, Westerlund in the Holocene deposits of the Thames Valley. Proc. Malac. Soc. Lond., 1901, Vol. iv, p. 236.

Collett, O.—Contributions to Ceylon Malacology. [3] The Terrestrial Mollusca of Ambagamuwa (Part II). Journ. R. Asiatic Soc., Ceylon Branch, 1901, vol. xvi, pp. 1—8.

Babor, J. F.—Mekkysi ceského Plistocaenu a Holocaenu. Archiv pro prirodov. prozk. Cech, 1901, Dil. xi, pp. 1—83, 30 figs.

Robert, A.—La segmentation dans le genre *Trochus*. Compt. Rendus, 1901, vol. cxxxii, pp. 995—997.

Pannell, Jr. C.—The Land and Freshwater Mollusca of Surrey. Journ. Conch., 1902, vol. 10, pp. 168—179.

Cockerell, T. D. A. and Cooper, Mary.—Notes on *Ashmunella*. Nautil., 1902, vol. xv, pp. 108, 110.

GENERAL REVIEWS.

The Foraminifera: An Introduction to the Study of the Protozoa. By Frederick Chapman. 8vo. pp. xv and 354, pls. 1—14, and 42 figs. in text. London: 1902. Longmans, Green and Co.

Mr. Chapman's work supplies students of the Foraminifera with a concise and authoratative guide, which has long been desired, and will, we feel sure, meet with a ready welcome.

After a general introduction on the nature and occurence of Foraminifera, their structure, classification and reproduction, the author devotes a chapter to the structure and plans of growth of the shell; a further chapter deals in an interesting manner with the various ideas of the early writers concerning the nature of Foraminifera. Chapter vi is devoted to a consideration of the various classifications which have been used by different investigators; chapters vii to xvi are confined to a systematic review of the different families, genera, etc.; chapter xvii to a survey of the various geologic foraminiferal faunas: chapter xviii to the geographical distribution; chapter xix to the collecting, examination and mounting, the work concluding with a useful series of bibliographical lists, comprising the more important works.

Mr. Chapman has given students of this interesting order of protozoa a valuable handbook, which few will omit to avail themselves of.

EDITOR'S NOTES.

We regret to have to record the decease of Alpheus Hyatt, one of the foremost authorities upon the fossil Cephalopoda, which occurred at Cambridge, Mass., U.S.A., on January 15th: also of Professor A. G. Wetherby, an American conchologist, on February 15th; and that of J. C. Mansel-Pleydell, on May 3rd.

We again appeal to those subscribers whose subscriptions to volumes vii, viii, and ix are in arrear, to kindly forward the same. A third request will surely not be necessary.

The publication of the Journal involves a considerable expenditure of time and labour, in addition to an annual financial loss; unless the subscriptions are forthcoming at the commencement of each year, it will be impossible to carry it on.

THE

JOURNAL OF MALACOLOGY.

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ON THE NON-OPERCULATE LAND AND FRESH-WATER MOLLUSCS

collected by the Members of the "Skeat Expedition" in the Malay Peninsula, 1899-1900.

BY WALTER E. COLLINGE, B.Sc.,

The University, Birmingham.

(Plates iv-vi.)

INTRODUCTION.

OF the collection of Land and Freshwater Molluscs obtained by the members of the "Skeat Expedition" in the Malay Peninsula, Dr. Harmer has invited me to furnish a report upon the non-operculate species.

The collection is not a large one, comprising representatives of only 29 species, which are contained in 22 genera; of these 11 species and 3 genera are new.

The most interesting species are those belonging to the genus *Atopos*, Simr., which has not hitherto been recorded from the Malay Peninsula; unfortunately the new species are nearly all represented by single examples. *Paraparmarion*, *Apoparmarion*, and *Cryptosemelus* are new and interesting genera, placed at present in the family *Girasiidae*.

A number of specimens of the animals of *Hemiplecta humphreysiana*, Lea, were collected, which has enabled me to give some details of the anatomy. I am also able to make a further contribution to our knowledge of the internal structure of the genus *Amphidromus*, Albers, by a description of various internal parts of *A. perversus*, L.

Of the shells, the most interesting are the two new species of *Streptaxis*, and the very small new species of *Hypselostoma*.

Previous collections from these regions have been described by

de Morgan (22, 23), Crosse (9, 10), Godwin-Austen and Nevill (14), Stoliczka (30), and Möllendorff (19, 20, 21).*

My best thanks are here tendered to the Council of the Royal Society for a Grant in aid of this work.

The identification of some of the specimens here recorded, has often proved very difficult, and I must express my indebtedness and thanks to Messrs. Edgar A. Smith and E. R. Sykes for the generous assistance they have at all times so willingly given me.

LIMNAEIDAE.

Limnophysa, Fitzinger.

Limnophysa singaporica, Küster.

Limnaeus singaporinus, Küst.: Conch. Cab., T. i, pt. xvii, p. 35, no. 50, Tab. 6, fig. 17.

Hab.—Biserat, State of Jalor.

STREPTAXIDAE.

Ennea, H. & A. Adams.

Ennea (Microstrophia) perakensis, Godw.-Aust., and G. Nev.

Ennea perakensis, Godw.-Aust., and G. Nev.: P.Z.S., 1879, p. 735, pl. lix, fig. 2 (juv.).

Ennea (Microstrophia) perakensis, Mlldff.: P.Z.S., 1891, p. 331, pl. xxx, figs. 1, 1a.

Hab.—Caves near Biserat, State of Jalor.

One specimen.

Streptaxis, Gray.

Streptaxis sykesi, n. sp.

Pl. iv, figs. 1, 2.

Shell dextral, subdiscoidal, depressed, flattened above, concave below, deeply and widely umbilicated, smooth except for faint lines of growth; whorls 5, regularly increasing, aperture somewhat L-shaped, deeply depressed above, armature consisting of one lamelliform projection, ascending inwards, situated on the columella whorl; peristome thickened and reflected.

Diam. maj. 11·5, min. 8·5; alt. 3 millim.

Hab.—Biserat, State of Jalor.

This interesting species seems to be very distinct from any previously described. It is perhaps most closely allied to the *S. plussensis*.

* Since this paper was completed, Mr. E. R. Sykes has published two papers in this Journal, and Dr. Möllendorff one in the *Nachrichtsblatt d. D. Malak. Gesell.*, the titles of which have been added to the Bibliography.

of de Morgan (23), which species, however, has a more heliciform shell, and according to the author's figures (*op. cit.*, pl. v, figs. 1*a-c*), there is a distinct notch or groove in the upper portion of the aperture. *S. sykesi* is much more distantly related to *S. planus*, Fulton (11), with which it partly agrees in the form of the aperture. I have much pleasure in naming the species after Mr. E. R. Sykes.

Streptaxis striatula, n. sp.

Pl. iv, figs. 3, 4.

Shell dextral, flattened above and below, umbilicus deep, striae fairly prominent; whorls 6, irregular, last whorl occupying the greater portion of the shell, deeply depressed above, armature consisting of one long, lamelliform projection, situated on the columella whorl; peristome reflected and slightly thickened.

Diam. maj. 13, *min.* 8·5; *alt*, 5 millim.

Hab. Belimbing, State of Ligeh.

This species is probably allied to *S. theaecola*, Heude (16, p. 151, pl. xxxv, fig. 25), and also to *S. borealis*, Heude (16, p. 79, pl. xviii, fig. 26), but distinct, I think, from either.

VITRINIDAE.

Helicarion, Fér.

Helicarion permolle, Stol.

Helicarion permolle, Stol.: J. As. Soc. Bengal, 1873, vol. xlii, p. 18, pl. i, fig. 11, pl. ii, figs. 21-23.

Hab.—Gunong Inas, 3,000 ft., State of Perak.

This is certainly the mollusc described by Stoliczka, for both externally and internally it agrees with his description and figures.

GIRASIIDAE.

Apoparmarion, n. gen.

Apoparmarion partridgii, n. sp.

Pl. iv, figs. 5-12, Pl. v, figs. 31-33.

Animal yellowish-brown, head bluish, tentacles yellow; mantle blue, coarsely granulated, rising upon the shell on all sides, on the right side posteriorly a large wing-like lobe covers the apex of the shell. Body laterally divided up into somewhat diamond-shaped figures by a series of oblique lines. Rugae small. Peripodial groove distinct. Foot fringe yellow, no lineoles. Foot-sole yellow, divided into median and lateral planes. Caudal mucous pore not extending to the foot sole.

Length (in alcohol) 25 millim.

Shell amber coloured, thin, membranaceous, apex distinct, whorls 2. Maj. diam. 9·5, min. 5 millim.

Body cavity not extending posterior to the visceral mass. Intestinal tract short. Generative organs *Parmarion*-like. Well developed penis with beak-like head, no penis papilla. Dart-gland and dart-sac, latter containing fleshy dart.

Hab.—Gunong Inas, 3,500 ft, State of Perak.

I have pleasure in associating with this interesting species the name of Mr. F. J. Partridge, who has spared no pains to faithfully represent by his skillful brush and pencil, most of the specimens in this collection.

The Alimentary Canal (Pl. iv, fig. 7).—The intestinal tract is both short and simple. Commencing at the fairly large buccal cavity, the oesophagus passes off from the dorsal side, and after a short course enters the wide pyriform crop, which has, at its posterior end, a sharp constriction marking the division between the crop and the ill-defined stomach. The intestine passes off from the posterior end of the stomach, and making a bend forward and to the right side forms the second loop of the intestinal tract, then gradually narrowing, a very short backwardly directed loop follows, which again bends forward to form the rectal portion, and terminates at the anus.

Lying at each side of the forepart of the crop is a conspicuous salivary gland, which gives off a duct opening at the side of the oesophagus, on the dorsal region of the buccal cavity.

The Generative Organs (Pl. iv, figs. 8-11).—The form and general character of these organs at once indicate the *Parmarion* relationship of this genus. The vagina, which opens into the vestibule by an opening common to this organ and the dart-sac, is short and wide; at its posterior end it becomes constricted, and on the right side the duct of the pyriform receptaculum seminis opens into it. Beyond the constriction is the free-oviduct, which at first is a wide, sac-like cavity, suddenly narrowing into a tube, which as it passes backward gradually widens until it joins the oviducal portion of the common duct. Externally the lower portion has its wall thrown into a series of folds which give it a fluted appearance. The penis is a long tube-like organ, with a sharply differentiated beak-like head. At the distal end of the tube-like portion, the retractor muscle is inserted. The two portions of the penis are connected together by a short neck. The head is marked by a series of crescent shaped constrictions, while just below the point where the vas deferens joins the penis, there is a peculiar little outgrowth (Pl. iv, fig. 9, x). Internally the cavity of the penis differs considerably from the external form. Commencing as a

narrow tube the lumen widens until about the middle of the penis, then narrowing somewhat abruptly it gradually becomes less, and passing through the neck as a very fine tube it expands in the first portion of the head into a globular sac, which is connected on its ventral side with the vas deferens (Pl. iv, fig. 10). The remaining portion of the head is solid. The dart-gland and the dart-sac are of about equal length, and similar in shape. The external wall of the sac is marked by a series of ring-like indentations. Internally there is a small fleshy dart, the surface of which is minutely studded with fleshy papillae, (Pl. iv, fig. 11). No trace of a muscle at the distal end of the dart gland was observed.

The Free Muscles (Pl. iv, fig. 12).—The buccal retractor divides anteriorly into two bands which are inserted into the posterior ventral portion of the buccal cavity. Both superior and inferior tentaculars join to form a common tentacular retractor, and are exactly the same on both sides. The columellar muscle is short and small.

Paraparmarion, n. gen.

Paraparmarion elongatus, n. sp.

Pl. v, figs. 34-36.

Animal dark reddish-brown, head and tentacles bluish, mantle degenerate, rising upon the shell on the right side only, as a dark brown, wing-like lobe, covering the apex of the shell. Rugae scarcely visible, small and flat. Peripodial groove faintly marked. Caudal mucous pore very small, not extending to the foot-sole. Foot-fringe reddish-brown. Foot-sole reddish-brown, divided into narrow median and broad lateral planes.

Length (in alcohol) 12 millim.

Shell yellow, thin, membranaceous; whorls 3, last whorl large and globose.

Hab.—Gunong Inas, 3,500 ft., State of Perak.

This is one of those small, puzzling, *Parmarion* like molluscs, common to the Indian and Malayan faunas. I have compared this interesting specimen with a large number of small *Parmarion*-like molluscs in my collection, from Java, Borneo and India, which at present are unnamed, and also with immature specimens of *Parmarion*, but can find nothing at all like it. The well-developed shell and the degenerate mantle at once characterise this form, and it seems desirable that it should be named, if for no other reason than that of directing attention to these diminutive species. Until the internal structure is made known it is difficult to say what its true position is, but judging by the external features, this genus may possibly supply a

link between the genus *Damayantia* of Issel and *Parmarion* of Fischer.

Cryptosemelus, n. gen.

Cryptosemelus gracilis, n. sp.

Pl. v, figs. 37-39.

Animal dark blue, body marked by prominent oblique lines running downward and backward, dorsum posteriorly keeled; mantle rises upon the shell anteriorly and laterally, on the right side it is produced into a wing-like extension covering the apex of the shell, while on the left side antero-laterally there is a smaller lappet. Rugae only visible on the head and anterior parts of the body. Caudal mucous pore very small. Peripodial groove distinct. Foot-fringe bright yellow, no lineoles. Foot-sole divided into median and lateral planes.

Length (in alcohol) 19·5 millim.

Shell yellow, thin, membranaceous, whorls, $3\frac{1}{2}$, last whorl very large.

Hab.—Bukit Besar, State of Nawng Chik.

Known to the natives as the "Dancing Slug."

Girasia. Gray (em Godw.-Aust.).

Girasia peguensis, Theob.

Pl. iv, figs. 13-14.

Girasia peguensis, Theob. : J. As. Soc. Bengal, 1864, p. 244.

Girasia? peguensis, Godw.-Aust. : P.Z.S., 1880, p. 294.

Girasia peguensis, Godw.-Aust. : Moll. of India, 1888, vol. i, p. 227, pl. lix, figs. 6-6d.

Hab.—Belimbing, State of Ligeh.

It has been pointed out by Godwin-Austen (12) that so far as the mantle is concerned, this species forms a connecting link between *Girasia* and *Austenia*, Nev (em. G.-A.); this author also draws attention to the fact that the right and left tentacular retractor muscles differ from one another, which I am able to confirm: the left one is joined to the buccal retractor and both of these have their origin posterior to the shell, while the right one remains distinct and originates from the posterior border of the visceral mass.

The Generative Organs (Pl. iv, figs. 13-14). The generative organs of this species have not previously been described. The vagina is a wide cavity, similar in detail to that in *G. hookeri*, Gray. The receptaculum seminis is much longer than in the last mentioned species, and has a distinct duct which gradually widens into the elongated head (Pl. iv, fig. 13, *r.d.* and *r.s.*). In life it lies at the

left hand side of the free-oviduct beneath the penis. In figure 14 (Pl. iv), the free-oviduct is purposely omitted so as not to complicate the figure. The extreme end of the receptaculum seminis is overlapped by the folds of the oviduct. The penis is long and twisted upon itself (Pl. iv, fig. 14, *p.*). At the point where the penial retractor muscle is attached, its walls are thrown into a series of constrictions and at the distal end of this constricted portion there is a short coiled kalk-sac (Pl. iv, fig. 13, *k.s.*). The vas deferens passes over the proximal portion of the penis and then beneath it before communicating with the oviduct. No flagellum or diverticulum was present in the specimen dissected. The penial retractor muscle is long, and originates just behind the right tentacular retractor muscle on the right posterior border of the visceral mass. The free-oviduct is much longer than in *G. hookeri*, Gray, but not so wide. The common duct is a sinuous tube, but not folded upon itself as in many species of this genus; lying over its posterio-dorsal portion is the albumen gland. I was unable to trace the hermaphrodite gland, but a portion of the hermaphrodite duct was dissected out: this is characterised by the absence of any convolutions or foldings so generally associated with this particular organ (Pl. iv, fig. 13, *h.d.*).

ZONITIDAE.

Macrochlamys, Bens.

Macrochlamys resplendens, Philippi.

Helix resplendens, Philippi: Zeitschr. f. Malak., 1846, p. 192.
Macrochlamys? resplendens, Godw.-Aust.: Moll. of India, 1883, p. 109, pl. xxvi, figs. 1-3.
Hab.—Penang.
One specimen.

The habitat of the type was Mergui. Mr. Edgar A. Smith, who has very kindly examined this specimen and compared it with examples in the British Museum, writes me "We have a specimen from King Island, Mergui Archipelago (named by Dr. von Martens as *resplendens*) which is exactly like your example only a trifle smaller, that is to say less fully grown."

Cryptosoma, Theob.

Cryptosoma, sp.

Pl. iv, figs. 14, 15.

Animal yellowish, with deep blue mottling: head and tentacles dark blue. Caudal mucous pore large. Peripodial groove distinct, terminating below caudal mucous pore. Foot-fringe yellow with blotches of

blue. Foot-sole yellow, not divided into medium and lateral planes. Extremity of foot rounded.

Length (in alcohol) 24 millim., breadth of foot-sole 7 millim.

Hab.—Summit of Bukit Besar, 3,500 ft., State of Nawng Chik. One specimen, damaged.

Although I think this is a new species of *Cryptosoma*, I hesitate to name it, as it was in a very damaged condition when received, in fact the only internal parts of its anatomy present were the terminal ducts of the generative organs, and of these I give a figure (Pl. iv, fig. 24). The penis is of considerable size, very long, and quite distinct in form from that of any described species. There is a small kalk-sac just before the commencement of the vas deferens. The dart-gland and dart-sac are proportionally small, at the distal end of the gland there is a short muscle; a dart, partially formed was present in in the dart-sac.

Rhysota, Albers.

Rhysota cymatium, Bens.

Helix cymatium, Benson, apud Pfr.: Novit. Conch., 1, p. 58, pl. xvii, figs. 1, 2.

Rhysota cymatium, Stol.: J. As. Soc. Bengal, 1873, vol. xlii, p. 11, pl. i, figs. 1-3, pl. ii, figs. 13-15.

Hab.—Penang.

Hemipleeta, Albers.

Hemipleeta humphreysiana, Lea.

Pl. iv, figs. 16-23.

Hemiplecta humphreysiana, Lea.: Trans. Amer. Phil. Soc, 1841, vol. vii, p. 463, pl. xii, fig. 16.

Hab.—Kwala Aring, State of Kelantan.

After a careful examination of the shells and animals of the specimens collected, I have come to the conclusion that there are here three distinct forms. Fortunately I have had two or three examples of each, and quite recently I have been able to confirm my observations made some months back.

Respecting the different forms, which it will be convenient to refer to as A, B, and C respectively, the different characters in the shell were in each case found to be associated with differences in the animal.

THE SHELL.—In the form A the apex is fairly high, and the keel on the whorls slightly produced with only a single band below the keel on the last whorl; generally the whorls are flattened.

In the form B the apex is much higher than in A, and the last whorl exhibits a somewhat prominent keel. In addition to the band below the keel, there is a broad incipient band above; the whorls are more convex than usual and the shell thicker.

In the form C both apex and whorls are flattened, there is very little keel on any of the whorls, and an incipient band above the keel only; the shell is much thinner than either A or B.

INTERNAL STRUCTURE OF THE ANIMAL.—*Alimentary Canal.* No differences of any importance were found in the intestinal tract. In an example of form C the long straight oesophagus is followed by a wide crop, over which a pair of large salivary glands lie, fused in their mid-dorsal line. Posterior to the crop is a short tube-like portion which passes into the large sac-like stomach, which is coiled upon itself, the posterior portion exhibiting a well marked constriction which separates the terminal portion from the main cavity. The remaining part of the intestine is a simple wide tube, which makes a bend backward over the region of the stomach, and then again forward, traversing the side of the pulmonary cavity.

The Generative Organs (Pl. iv, figs, 16-19).—In the form A there is a large vestibule into which the penis opens on the right side. This latter is a long muscular organ for half of its length, then coiling upon itself, it becomes a narrow tube-like body, and making a further sharp turn upon itself it joins the epiphallus, from here a short diverticulum is given off which terminates in a fine hook-like process (Pl. iv, fig. 16). The epiphallus is a short tube expanding at its distal end to form a bulbous, sac-like, terminal portion, the kalk-sac, to which the retractor muscle of the penis is attached. The vas deferens joins the epiphallus just below the insertion of the muscle, and is a long fine tube looped around the vagina. All around the proximal portion of the vagina, a series of short oblique muscles bind this organ to the ventral body wall. The vagina is wide and sac-like in this region, but bending to the right it soon becomes tube-like. The receptaculum seminis is small and its duct short. Inserted in the distal wall of the receptaculum seminis is a short stout muscle, differing in this particular point from the condition described by Godwin-Austen (13, p. 32). The free-oviduct exhibits a constriction about its middle, and then gradually becoming smaller joins the oviducal portion of the common duct. There is a large conspicuous dart-gland, the actual dart-sac being very small and containing no true dart, this latter being represented by a short, broad, muscular papilla, on the summit of which there is a small, pointed, horny-looking body (Pl. iv, fig. 17).

In the forms B and C the generative organs were very similar to

one another. Those in B are here figured and described (Pl. iv, fig. 18). The chief differences from those described in the form A are, the general position of the organs, the form of the male organs, free oviduct, and the densely convoluted common duct.

Proximally the penis is surrounded by a muscular collar, and is shorter than in the form A. At the inner side of the muscular collar there is inserted a small muscle (Pl. iv, fig. 18, m^1), which is continuous with one inserted in the end of the kalk-sac (Pl. iv, fig. 18, m^2). There is a small diverticulum, the retractor muscle of the penis being inserted at its distal end. The epiphallus is very short, practically a small connecting duct between the penis and vas deferens. The kalk-sac is smaller than in form A. The vagina is comparatively short, the receptaculum seminis sessile, and usually without any muscle. Externally the free oviduct appears as a large, globose mass for the greater portion of its length, internally, however, the actual cavity is considerably smaller than one would at first suppose (Pl. iv, fig. 28, *f.ov.*). Commencing at the external generative orifice the internal wall of the vagina has quite smooth walls, but passing distally they become plicated, and at the point where the sharp bend occurs at the junction of vagina and free-oviduct, the walls become very richly folded, and again quite smooth in the free-oviduct (Pl. iv, fig. 19).

The Free Muscles (Pl. iv, figs. 20-22).—In the form A the buccal retractor forms a thick broad band, tapering posteriorly at its origin and dividing anteriorly into two narrow bands, which are inserted into the walls of the buccal cavity posteriorly and ventro-laterally. The retractors and inferior tentaculars are on both sides fused together, while more posteriorly the combined pedal and inferior tentacular join the superior tentacular, passing backward as a single band (Pl. iv, fig. 20).

In the form B the buccal retractor is as in A. The pedal retractor arises from the superior tentacular, and then posteriorly the superior and inferior tentaculars unite (Pl. iv, fig. 21).

In the form C the buccal retractor commences as a broad band, which soon bifurcates, the two branches then being similar to those in A and B. The superior and inferior tentaculars fuse much more anteriorly than in either A or B, after the fusion the pedal retractor arises, and some distance behind a further pedal (Pl. iv, fig. 22).

The Pallial Organs (Pl. iv, fig. 23).—The kidney is a little more than half the length of the lung, the latter measuring 102 millim., and the former 62 millim. The ureter passes off from the anterior border, at its commencement it is slightly more than 5 millim. in breadth, but posterior to the region of the pericardium it narrows forming a tube of uniform dimensions. The posterior border of the pericardium is

exactly 37·5 millim. from the anterior border of the kidney. The pulmonary vein is large, as also the efferent and afferent vessels.

The specimen figured is one of form B.

HELICIDAE.

Trochomorpha, Albers.

Trochomorpha castra, Bens.

Helix castra, Benson : Ann. Mag. N.H., 1852, vol. x, p. 349.

Trochomorpha castra, Stoliczka : J. As. Soc. Bengal, 1873, vol. xlii, p. 21, pl. i, figs. 14-16, pl. ii, figs. 7-9.

Hab.—Kwala Aring, State of Kelantan.

One specimen.

Sitala, A. Ad.

Sitala carinifera, Stol.

Sitala carinifera, Stoliczka : J. As. Soc. Bengal, 1873, vol. xlii, p. 16, pl. i, figs. 8, 8*a-c*.

Hab.—Gunong Inas, 3,500 ft., State of Perak.

Four specimens.

Chloritis, Beck.

Chloritis malayana, Mlldff.

Helix (Trachia) malayana, Mlldff. : J. As. Soc. Bengal, 1886, vol. lv, p. 303.

Chloritis malayana, Mlldff. : P.Z.S., 1891, p. 335, pl. xxx, figs. 6, 6*a*.

Hab.—Foot of Gunong Inas, State of Perak.

Amphidromus, Albers.

Amphidromus perversus, L.

Pl. iv, figs. 24, 25, Pl. v, figs. 26-28.

Hab.—Biserat, State of Jalor.

Three examples of the animal of this species, enables me to give some account of the anatomy.

The shells of the two specimens here described were submitted to Mr. Hugh Fulton, who very kindly confirmed my identification.

The Generative Organs (Pl. iv, figs. 24, 25, Pl. v, fig. 26). In the first specimen the vagina is of great length, and proximally is held in position by a series of short, strong muscles arising from the floor of body cavity. Internally the condition is not unlike that I have described in *A. palaceus*, Mouss. (6). The free oviduct is very short. The receptacular duct is a long, wide, irregular shaped tube, distally it becomes very narrow and forms a short, fine tube, which terminates

in an ovoid-sac, the receptaculum seminis (Pl. iv, fig. 24, *r.s.*). The penis is short, with an epiphallus of great length, variously folded and twisted upon itself, it penetrates the distal wall of the penis and terminates in a short, bluntly ending, fleshy papilla (Pl. v, fig. 26, *p.p.*); beyond the epiphallus is a long flagellum whose distal portion is densely coiled. Internally the wall of the penis is thrown into a series of thick, longitudinal, muscular folds, with short cross connecting folds (Pl. v, fig. 26). The retractor muscle of the penis is short, and inserted on the right side, at the proximal end of the epiphallus. The vas deferens leaves the latter organ as a narrow tube, and passing forward along its walls, it bends back again over the region of the vagina and joins the common duct, which is long, and richly folded. The albumen gland is long and narrow. The hermaphrodite duct short and convoluted.

In the second specimen (Pl. iv, fig. 25) the chief differences are, that the vagina is shorter and S-shaped, the receptacular duct longer and narrower, the epiphallus and flagellum both shorter, and the retractor muscle of the penis longer.

The Free Muscles (Pl. v, fig. 27).—The buccal retractor consists of a series of short muscular bands inserted on the ventral side of the buccal cavity, and two rather longer bands, one being inserted on each lateral wall of the buccal cavity. All these fuse immediately behind the buccal cavity, and pass backward as a single band. The tentacular and pedal retractors are similar on both sides. The superior and inferior tentaculars first join, forming a stout band with which the pedal unites a little more posteriorly. The columellar muscle is short and narrow, and twisted twice.

The Pallial Region (Pl. v, fig. 28).—The kidney is unusually large, measuring 51·5 millim. in length and 5·5 millim. in breadth. The ureter passes off from the anterior border, and in the region just in front of the pericardium it passes across the dorsal side of the kidney, continuing its course backward on the opposite side, to the posterior end of the lung, where it bends forward again and runs along the side of the rectum. In a sinistral example of this species the ureter does not cross over the kidney. The measurements of the different organs in the two specimens were as follows:

	Lung.	Kidney.	Pericardium.
Dextral	65·5	51·5	10 millim. long.
Sinistral	80	58	8 „ „

Hapalus, Albers.

Hapalus jousseaumei, de Morgan.

Hapalus jousseaumei, de Morg.: Bull. Soc. Zool. Fr., 1885, vol. x, p. 24, pl. i, figs. 2*a*, 2*b*.

Hab.—Kwala Aring, State of Kelantan.

PUPIDAE.

Hypselostoma, *Benson.*

Hypselostoma laidlawi, n. sp.

Pl. v, figs. 29, 30.

Shell dextral, conical, with last whorl dorsally grooved, surface smooth, deeply umbilicated, whorls 5, regularly increasing, aperture CO shaped, armature consists of four teeth, a dorsal and ventral one situated on the upper and lower border of the peristome, and two smaller internal teeth, one on the right and one on the left of the peristomial teeth; peristome thin, slightly reflected.

Alt. and diam. 1 millim.

Hab.—Biserat Caves, State of Jalor.

STENOGYRIDAE.

Prosopeas, Mörch.

Prosopeas tchehelense, deMorg.

Stenogyra tchehelensis, de Morg.: Le Natural., 1885, p. 69, Bull. Soc. Zool. Fr., 1885, vol. x, p. 40, pl. ii, figs. 7*a*, 7*b*.

Stenogyra swettenhami, de Morg.: Bull. Soc. Zool. Fr., 1885, vol. x, p. 41, pl. ii, figs. 6*a*, 6*b*.

Stenogyra (Subulina) tchehelensis, Mlldff.: J. As. Soc. Bengal, 1887, vol. lv, p. 304.

Stenogyra (Opeas)? terebralis, Theob. (? n. sp.): G. Nevill, Hand-list Moll. Ind. Mus., 1878, p. 166.

Prosopeas tchehelense, Mlldff.: P.Z.S., 1891, p. 337.

Hab.—Gunong Inas, 3,000 ft., State of Perak; Belimbing (from jungle floor, at base of cliff), State of Ligeh; Biserat, State of Jalor.

Möllendorff (20, p. 337) has expressed the opinion that the *Stenogyra tchehelensis* and *S. swettenhami* of deMorgan are the same, the latter being only a slight variation. After examining a large series of specimens from the above localities, I can fully endorse this opinion.

The eggs of this mollusc are exceedingly large for the size of the animal, and are enclosed in a hard calcareous shell. All the eggs in the region of the free-oviduct had a well developed shell, whilst those in the lower portion of the oviducal canal had not.

Specimens having eight whorls in the shell were found to be sexually mature; the largest shell met with was one with twelve whorls,

CLAUSILIIDAE.

Clausilia, Drap.

Clausilia kapayanensis, de Morg.

Pseudonenia kapayanensis, de Morg.: Bull. Soc. Zool. Fr., 1885, vol. x, p. 43, pl. ii, fig. 8.

Hab.—Belimbing, State of Ligeh.

One specimen.

Clausilia penangensis, Stol.

Clausilia (Phaedusa) penangensis, Stol.: J. As. Soc. Bengal, 1873, vol. xlii, p. 27, pl. ii, figs. 4-6 and 15-17.

Hab.—Belimbing, State of Ligeh.

I have to thank Mr. E. R. Sykes for very kindly examining these. A large globose form, which at first sight seems very distinct, he thinks is only a variety, as there are intermediate forms gradually leading up to it.

Clausilia penangensis, var.

Hab.—Bukit Besar, 2,000 ft., State of Nawng Chik; Patalung, State of Raman.

VERONICELLIDAE.

Veronicella, Blainv.

Veronicella, sp.

Hab.—Hills near Biserat, State of Jalor.

There are two specimens belonging to this genus, but owing to injury the species are undeterminable.

RATHOUISIIDAE.

The genera of slugs which have been grouped under this family are *Rathouisia*, Heude (15), *Atopos*, Simr. (27), *Prisma*, Simr. (27), and the sub-genus *Padangia*, Babor (1).

In the present collection there are examples of *Atopos* only (and possibly Babor's sub-genus), but as the anatomy of this genus has an important bearing upon the family generally, and on other families of molluscs, it seems desirable to very briefly state the history of the various species and genera, and the views of other malacologists upon their position, affinities, etc.

Under the name of *Vaginula tourrannensis*,* Souleyet (29) in 1852 described a slug found by Gaudichand near Tourranne in

* It should be pointed out that Férussac's genus *Vaginulus* (1821), has really priority over any of the above mentioned genera, for he distinctly states that in *V. tasmanii*, the type of the genus, the pulmonary aperture is on the lower right side of the mantle about two-fifths of the length of the body from the anterior end, the female generative orifice on the same side is said to be about the middle. Blainville's account of the anatomy, however, is partly contradictory to Férussac's account, and his figures very unsatisfactory.

Cochin China. Later Semper (26) found a slug in Central Luzon which he named *Vaginulus trigonus*, and expressed the opinion that it was more like a *Limax* than a *Vaginula*. Stoliczka (30) in 1873 found in Penang a species closely allied to *V. tourrannensis*, Soul., which according to Heynemann (17), is probably identical with the *V. pulverulenta* of Benson from the same island. Heynemann in 1876 † described a further new species from Queensland, which he named *V. australis*. In 1882, Heude (16, p. 10, pl. xiii, figs. 2, 2*a*) gave a brief description of a slug found in Eastern China, under the name of *Vaginulus sinensis;* finding, however, that the name *sinensis* was preoccupied by Möllendorff's *Vaginula sinensis*, he re-named it *leonina*, an altogether unnecessary change, as he now (16) transferred it to a new genus *Rathouisia*. Tapparone-Canefri (31) in 1883 described a species from New Guinea which he named *V. prismatica*. Heude in 1885 (16, p. 100, pl. xxvi, figs. 1. 1*a*) gave a description and figures of a further new species of *Rathouisia* (*R. tigrina*), while at the same time Rathouis (24) gave a short, but exceedingly interesting account of the life-history of *R. leonina*, Heude, and figures of many parts of the internal structure. Unfortunately, as the Sarasins (25) have observed, the lithographic impressions of his figures are so faint that much of the detail is lost.

When studying the specimens of slugs in the British Museum collection in 1885, Heynemann examined two slugs, one from an island in the Torres Straits, the other from the Huon Gulf (17).

Heude in 1890 (16, p. 133, pl. xxxvi, figs. 23, 23*a*), described a further new species of *Rathouisia* (*R. pantherina*) from Eastern China, and gave figures of the animal.

In 1891, Simroth (27) in a paper betokening rare and critical insight, founded the genera *Atopos* and *Prisma*, the former including three new species: *A. semperi* from Mindanao, and *A. leuckarti* and *A. strubelli* from Amboina, and the *Vaginulus trigonus* of Semper and the *V. pulverulenta* of Benson. The new genus *Prisma* included the following species: *P. tourrannense*, Soul., from Cochin China, *P. prismaticum*, Tap.-Can., from New Guinea, *P. australe*, Heyn., from Queensland, and the Huon Gulf specimen in the British Museum collection, to which he gave the name of *P. heynemanni*. A detailed account of the anatomy of the three new species of *Atopos* was given, illustrated by figures.

In the same year Cockerell (2) published the names *Vaginulinae* or *Rathouisiinae*, as a sub-family for the genera *Rathouisia*, *Atopos* and *Prisma*. He further pointed out that a specimen in the British

† J. Mus. Godeffroy, 1876, xii, p. 159.

Museum collection from Penang marked "*V. sanguinea*, Stol.," was apparently referable to *A. pulverulentus*, Bens., and also gave a description of *Prisma heynemanni*, Simr.

In 1892 von Ihering (18) published a short, critical note on Simroth's paper, and proposed a separate family—*Atopidae*—for the genus. A reply by Simroth followed (28).

Nothing more was heard of these interesting molluscs until 1899, when the Sarasins (25) in their beautiful work on the Land Mollusca of the Celebes, described four new species of *Atopos*, viz., *A. scutulatus*, *simrothi*, *cristagalli* and *pristis*, and gave some interesting notes on their anatomy and figures of some of the internal organs.

Lastly Babor (1) in 1900 described a new sub-genus—*Padangia*—for a new species, *Atopos (Padangia) schildii*, from Padang, Sumatra.

The opinions held by the different writers quoted above, as to the affinities and systematic position of these various genera are widely diverse. On the one hand Simroth and Babor are both inclined to regard them as allied to the *Veronicellidae*, while on the other von Ihering and the Sarasins allie them with the *Testacellidae*.

Simroth (27) in his valuable paper first directed attention to certain resemblences between *Atopos* and the *Athoracophoridae (Janellidae)*, and he there states that the *Veronicellidae* may have been directly derived from the Opisthobranchia, the *Athoracophoridae* diverging from them at some period; the two families he classes together as Mesommatophora, in contradistinction to the true Stylommatophora. Babor (1) also hints at the resemblences between the *Athoracophoridae* and *Padangia*.

Von Ihering strongly supports the Testacellid relationship, entirely overlooking the fact mentioned by Simroth, that the Testacellid tooth structure, evolved as it is by necessity for adaptation to carnivorous habits, has no anatomical value, as is evidenced by the great variety of molluscs possessing such a tooth structure.

The Sarasins regard *Rathouisia* and *Atopos* only as valid genera, *Prisma* in their opinion not having been sufficiently defined. Whilst strongly favouring the Testacellid affinities of these two genera, they admit that such characters may have arisen independently, as in *Ianthina* and *Scalaria*. Further, these authors regard *Apera*, Heyn., as also being closely allied to the *Rathouisiidae*, they write (25, p. 112) "This slug, we can without hesitation look upon as an ancestral form of *Atopos*." Unfortunately the genus *Apera* is known to these authors from Binney's original description and figures only. The spider glands of Simroth are not present in *Apera*, and the general disposition and form of the digestive and generative organs, pedal gland, etc., is totally

different. As yet our knowledge of the internal structure of this genus is very imperfect. I have given a very brief account of the anatomy of *Apera burnupi*, E. A. Smith (3), and *A. natalensis*, Cllge. (5), from two alcoholic specimens, and in a later example of the former species, I have recently figured and described the male organ (7). This figure is repeated here for comparison (Pl. vi. fig. 6).

An examination of the specimens contained in the present collection, and comparison with the results obtained by the above authors, suggests not a few points of interest.

Firstly there seems every probability that the family *Rathouisiidae* comprises a large number of species, and possibly genera, distributed over the Malay-Australian region and Southern China.

From the primitive condition of the digestive organs, and similar indications in the generative organs, I am adverse to grouping any of the genera with the *Testacellidae*, and prefer to regard the Testacellid resemblences as a case of parallel evolution rather than one of direct affinity.

Respecting the generic or sub-generic distinctiveness of *Rathouisia*, *Atopos*, *Prisma*, and *Padangia*, our knowledge is yet too inexact and insufficient for any definite expression of opinion. I agree with the Sarasins that *Prisma*, Simr., is as yet insufficiently defined, still, I think there can be no doubt as to the wisdom of separating it from *Atopos* on the one hand and *Veronicella* on the other.

From the above brief résumé it will be seen that we have yet much to learn respecting the internal structure of these most interesting molluscs, before our attempts at classification or tracing affinities can be of any value. I am pleased to learn that my friend Dr. Josef F. Babor has in active preparation a monograph of the genus *Atopos*, to the completion of which, all malacologists will look forward with great interest.

RATHOUISIIDAE, Heude.

Atopidae, von Ihering; Nachr. Deutsch. Malak. Gesell., 1892, p. 143.

Atopos, Simr.

Atopos sarasini, n. sp.

Pl. v, figs. 40-42, 56-59, Pl. vi, figs. 60-65.

Colour of the notum a deep blue, granulated, extending over the head in a hood-like manner; head yellowish; underside (perinotum?) yellowish-brown; foot-sole yellowish-brown; keel only faintly produced. Length of notum (in alcohol) 59·5, breadth 13·5, height 14·5 millim. Breadth of foot-sole 9 millim. Female generative orifice 14 millim. from the male generative orifice.

Hab.—Hills near Biserat, State of Jalor.

Probably this species belongs to Babor's sub-genus *Padangia*. The granulated appearance of the notum is due to a large number of small wart-like bodies of two different sizes. The notum fits over the head as a hood, covering over the tentacles and mouth. The external male generative orifice is situated on the right side, as indicated in figure 57 (Pl. v); although very carefully examined, I failed to find any opening on the left side which would correspond to the opening of the left gland of Simroth.

The Alimentary Canal (Pl. v, fig. 59).—The digestive tract is exceedingly simple. I have nothing to add to the accounts already given by Simroth and the Sarasins, of the buccal cavity and sheath. The oesophagus passes from the buccal cavity towards the right side, then dipping ventrally it passes beneath the most posterior portion of the buccal mass, and backward to the stomach or mid-gut gland of Simroth, which internally has a sacculated appearance very similar to that figured by Rathouis (24, Pl. xxxii, fig 1), in *Rathouisia leonina*. Leaving this gland the intestine makes a slight sigmoid curve and runs dorsal to the oesophagus as the second loop of the intestinal tract, then making a bend to the right, it terminates at the anal aperture, the whole structure being of a very simple and primitive nature. The contents of the oesophagus and mid-gut gland were microscopically examined, and the results obtained tend to confirm Simroth's observations on the contents in *A. semperi* and *A. leuckarti*, viz. that the food consists of vegetable matter (fungi) and flesh.

The Generative Organs (Pl. v, figs. 58-59, Pl. vi, figs. 60-64).—Having only one specimen for dissection, I have been unable to work out the structure of the generative organs in the detail I should have liked. This specimen internally was not in the best condition either, which is the more to be regretted as both Simroth (27), and the Sarasins (25) give few particulars regarding these organs. The figures given by Simroth (27, T. xxxvii, figs. 27-28) I can scarcely think are correct.

In *A. sarasini* I was able to trace a well developed vagina, a simple tube-like organ, at the distal portion of which, the duct of the receptaculum seminis enters, beyond this point it becomes folded in an U-shaped pouch, continuing again as a tube; this portion lying posterior to the receptaculum seminis I regard as the free-oviduct. It passes into the oviduct, a large and closely coiled body which is sharply folded upon itself, the folding marking the organ off into three portions. At the end of this tube there is a small glandular body lying upon the albumen gland, this, I think may be the ovary (Pl. vi, fig. 60, *o*). I have failed to trace any connection between the male and female organs.

The penis is a large and muscular body enclosed within a muscular sheath. There is a prominent retractor muscle inserted in its distal end. The external orifice is common to the penis and the right Simroth gland. I was unable to find any trace of a gland on the left side. Internally the sheath of the penis has plicated walls, while arising from the distal end of the cavity is a large muscular organ the penis papilla. This is broad at its base, narrowing towards its free end which terminates as a comparatively sharp point. Its external wall appeared longitudinally indented or fluted, but this appearance is probably due to the pressure of the plications of the sheath. On the left side, at the base of the penis there is a small aperture which communicates with a folded duct (Pl. vi, fig. 61), this I succeeded in tracing as far as the inner side of external male generative orifice. As previously pointed out, only a single Simroth gland was found, the one on the right side; I am quite certain as to the absence of any such body on the left side. The structure of the folded distal portion of that on the right side is shown in transverse section in figure 62 (Pl. vi.). On comparing this transverse section with some recently made of the dart-gland of a Cingalese mollusc (8), I have been struck by the extraordinary resemblance they bear to one another, which has led me to inquire whether it is not possible that the Simroth gland is a vestigial dart-gland?

The Pedal Gland (Pl. vi, fig. 65).—This is a small tongue-shaped body measuring 22 millim in length. Serial transverse sections were made of the whole of the gland, and while agreeing in general with Simroth's description, there were some points very different, but better material is necessary before these can be discussed.

Atopos harmeri, n. sp.

Pl. v, fig. 43-45.

Colour of the notum, light blue with darker blue blotches and spots, a dark blue stripe extends along the mid-dorsal line, granulated; head yellow; tentacles dark blue; underside (perinotum?) yellow; foot sole yellowish-white with a faint median groove and transverse wrinkling; keel only very feebly developed. Length of notum (in alcohol) 65·5, breadth 12, height 14·5 millim. Breadth of foot-sole 7 millim. Female generative orifice 13 millim. from the male generative orifice.

Hab.—Kampong, near the borders of Kelantan and Ligeh.

A young example of this species measuring 37·5 millim. in length, exhibits a much more prominent keel than the larger specimen. Judging from the external features this species is probably allied to *A. strubelli*, Simr. I have much pleasure in associating with this species the name of Dr. S. F. Harmer.

Atopos rugosus, n. sp.

Pl. v, figs. 46-48.

Colour of notum, dark green with yellowish-brown spots, granulated, the extreme anterior portion of the notum is almost white, while posteriorly the body is sharply pointed; underside (perinotum ?) yellowish; foot-sole dirty yellow; keel fairly well developed, yellowish brown in colour. Length of notum (in alcohol) 43·5, breadth 7, height 8 millim. Breadth of foot-sole 4 millim. Female generative orifice 8·5 millim. from the male generative orifice.

Hab.—Hills near Biserat, State of Jalor.

Atopos punctata, n. sp.

Pl. v, figs. 49-52.

Colour of notum, yellow spotted with dark blue or black, granulated; head and tentacles yellowish; underside (perinotum ?) yellow; foot-sole yellow with closely set transverse wrinkles; keel fairly prominent. Length of notum (in alcohol) 35, breadth 4, height 4 millim. Breadth of foot-sole 2 millim. Female generative orifice 7 (?) millim.* from the male generative orifice.

Hab.—Hills near Biserat, State of Jalor.

A figure of a small piece of the notum much enlarged (Pl. vi, fig. 52), shows that the wart-like bodies vary greatly in size, as do also the blackish spots.

Atopos strubelli, Simr.

Atopos strubelli, Simr.: Zeit. f. wiss. Zool., 1893, Bd. lii, p. 600. The specimen collected agrees practically in all details with the description given by Simroth. The dimensions are as follows: Length of notum (in alcohol) 61·5, breadth 11, height 11·5 millim. Breadth of foot-sole 7 millim. Female generative orifice 13 millim. from the male generative orifice.

Hab.—Hills near Biserat, State of Jalor.

Atopos laidlawi, n. sp.

Pl. v, figs. 53-55.

Colour of the notum, dorsally yellowish-brown with small, dark brown dots, finely granulated, laterally an irregular, broad, dark brown band, below which the notum is drab colour, at the extreme anterior and posterior ends the notum is almost white; head dirty white; tentacles

* It is exceedingly difficult in small species like these, which have become hardened and somewhat brittle by immersion in alcohol, to be certain of the actual orifice.

bluish; underside (perinotum?) dirty white: foot-sole yellowish-white; keel well developed and fairly prominent, white with numerous minute brown dots. Length of notum (in alcohol) 30, breadth 7, height 7 millim. Breadth of foot-sole 4 millim. Female generative orifice about 6 millim. from the male generative orifice. *

Hab.—Ban Kong Rah, District of Gaboing.

This interesting species will probably prove to be at least sub-generically distinct from *Atopos* when the internal structure is known. It is named in honour of Mr F. F. Laidlaw, a member of the Skeat Expedition, and by whom it was collected.

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alb. gl. Albumen gland.
an. Anus.
b.c. Buccal cavity
b r. Buccal retractor.
c.m. Columellar muscle.
c m.f. Circular muscle fibres.
cr. Crop.
d. Dart.
d. gl. Dart-gland.
d.s. Dart-sac.
di. gl. Digestive gland.
div. Diverticulum.
ep. Epiphallus.
fl. Flagellum
f. ov. Free-oviduct.
f.s. Foot-sole.
gl. c. Gland cells
h.d. Hermaphrodite duct.
h. gl. Hermaphrodite gland.
int. 1-4 Loops of intestine.
k. Kidney.
k.s. Kalk-sac.
l.o.r. Left ocular retractor.
m.m.[a] Muscles.
m. gl. Mid-gut gland.
n. Notum.
o. Ovary.
ob. m. Oblique muscles.
oe. Oesophagus.
ov. Oviduct.
p. Penis.
pc. Pericardium.
pr. Prostate.
p p. Penis papilla.
p r. Pedal retractor.
p.v. Pulmonary vein.
r. Rectum.
r. ap. Renal aperture.
r.d. Receptacular duct.
r.m. Retractor muscle.
r. or. Respiratory orifice.
r.s. Receptaculum seminis.
s d. Salivary duct.
s. gl. Salivary gland.
S. gl. Simroth's gland
st. Stomach.
T. Superior tentacular retractor.
t. Inferior tentacular retractor.
Tn. Superior tentacle.
tn. Inferior tentacle.
ur. Ureter.
v. Vestibule.
vg. Vagina.
v.d. Vas deferens.
w.d.s. Wall of dart-sac
w.p.c. Wall of pulmonary cavity
♂ Male generative orifice.
♀ Female generative orifice.

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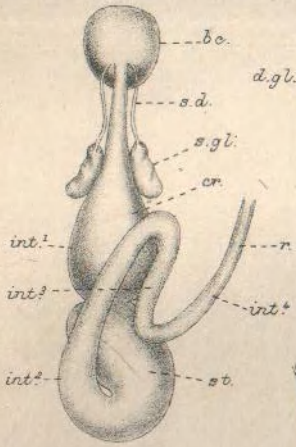

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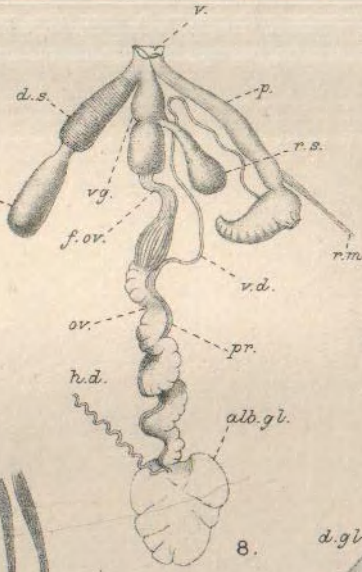

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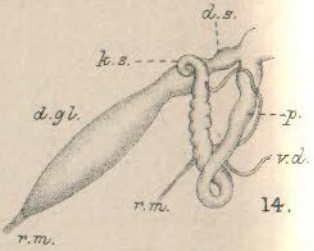

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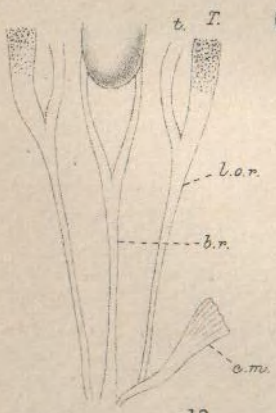

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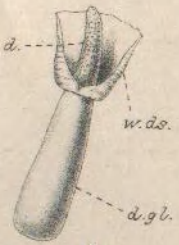

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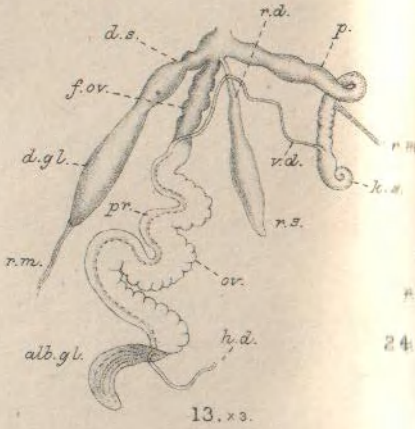

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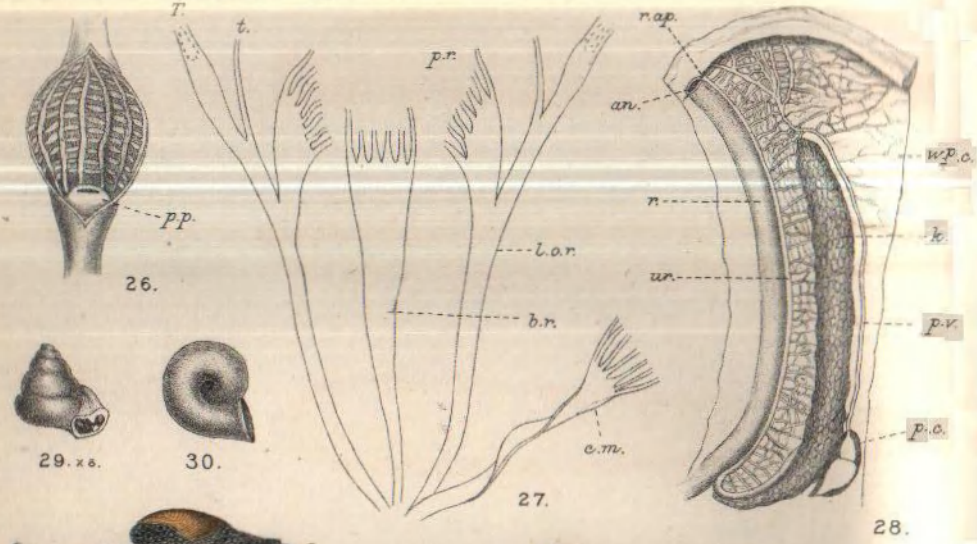

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F. J. P. del. et pinx. ad nat.

MOLLUSCA OF THE MALAYAN PENINSULA.

F.J.P. del. ad nat.

Huth Lith^{r} London

MOLLUSCA OF THE MALAYAN PENINSULA.

EXPLANATION OF PLATES IV-VI.

PLATE IV.

Fig. 1. *Streptaxis sykesi*, n. sp. Dorsal view of the shell. × 2.
Fig. 2. " " Ventral view of the shell. × 2.
Fig. 3. *Streptaxis striatula*, n. sp Dorsal view of the shell. × 1.
Fig. 4. " " Ventral view of the shell. × 1.
Fig. 5. *Apoparmarion partridgii*, n. sp. Dorsal view of the shell. × 2.
Fig. 6. " " Ventral view of the shell. × 2.
Fig. 7. " " Alimentary canal, enlarged.
Fig. 8. " " Generative organs, enlarged.
Fig. 9. " " Penis, much enlarged.
Fig. 10. " " Diagrammatic longitudinal horizontal section of the penis, showing the form and extent of the cavity.
Fig. 11. " " Dart-gland and dart-sac, the latter opened to show the dart, enlarged.
Fig. 12. " " Free muscles, enlarged.
Fig. 13. *Girasia peguensis*, Theob. Generative organs. × 3.
Fig. 14. " " The same showing the penis, etc., in natural position. The dart-gland *(d. gl.)* has been moved slightly to the left. The receptaculum seminis and free-oviduct are not shown.
Fig. 15. *Cryptosoma*, sp. Terminal ducts of the generative organs, enlarged.
Fig. 16. *Hemiplecta humphreysiana*, Lea, Generative organs of the Form A.
Fig. 17. " " Dart-sac opened to show the dart.
Fig. 18. " " Generative organs of the Form B.
Fig. 19. " " Vagina and free-oviduct dissected to show the internal walls.
Fig. 20. *Hemiplecta humphreysiana*, Lea. Free muscles of the Form A.
Fig. 21. " " Free muscles of the Form B.
Fig. 22. " " Free muscles of the Form C.
Fig. 23. " " The pallial complex. × ½.
Fig. 24. *Amphidromus perversus*, L. Generative organs.
Fig. 25. " " " "

PLATE V.

Fig. 26. *Amphidromus perversus*, L. Penis dissected to show the internal walls and penis papilla.
Fig. 27. " " Free muscles, enlarged.
Fig. 28. " " The pallial complex. × 1.
Fig. 29. *Hypselostoma laidlawi*, n. sp. Shell. × 8.
Fig. 30. " " Ventral view. × 8.
Fig. 31. *Apoparmarion partridgii*, n. sp. Right lateral view. × 1½.
Fig. 32. " " Dorsal view. × 1½.
Fig. 33. " " Left lateral view. × 1½.

Fig. 34.	*Parapalmarion elongatus*, n. sp.	Right lateral view. × 1½.
Fig. 35.	" "	Dorsal view. × 1½.
Fig. 36.	" "	Left lateral view. × 1½.
Fig. 37.	*Cryptosemelus gracilis*, n. sp.	Right lateral view. × 1½.
Fig. 38.	" "	Dorsal view. × 1½.
Fig. 39.	" "	Left lateral view. × 1½.
Fig. 40.	*Atopos sarasini*, n. sp.	Right lateral view. × 1.
Fig. 41.	" "	Dorsal view. × 1.
Fig. 42.	" "	Ventral view. × 1.
Fig. 43.	*Atopos harmeri*, n. sp.	Right lateral view. × 1.
Fig. 44.	" "	Dorsal view. × 1.
Fig. 45.	" "	Ventral view. × 1.
Fig. 46.	*Atopos rugosus*, n. sp.	Right lateral view. × 1.
Fig. 47.	" "	Dorsal view. × 1.
Fig. 48.	" "	Ventral view. × 1.
Fig. 49.	*Atopos punctata*, n. sp.	Right lateral view. × 1.
Fig. 50.	" "	Dorsal view. × 1.
Fig. 51.	" "	Ventral view. × 1.
Fig. 52.	" "	Portion of the notum, enlarged, to show the varying sizes of the papillæ, which give to the body a granulated appearance.
Fig. 53.	*Atopos laidlawi*, n. sp.	Right lateral view. × 2.
Fig. 54.	" "	Dorsal view. × 2.
Fig. 55.	" "	Ventral view. × 2.
Fig. 56.	*Atopos sarasini*, n. sp.	View of the ventral side of the body with the notum pulled forward to show the tentacles. × 1.
Fig. 57.	" "	Lateral view showing the position of the male and female generative orifices, pulmonary orifice, and anus.
Fig. 58.	" "	Position of the external orifices.
Fig. 59.	" "	Alimentary canal, enlarged.

PLATE VI.

Fig. 60.	*Atopos sarasini*, n. sp.	Female generative organs, enlarged.
Fig. 61.	" "	Male generative organs and right Simroth gland. × 2.
Fig. 62.	" "	Portion of a transverse section through the distal portion of the Simroth gland.
Fig. 63.	" "	Diagrammatic section of the gland.
Fig. 64.	" "	The penis dissected to show the internal walls, penis papilla, and orifice from duct. × 6.
Fig. 65.	" "	The pedal gland. × 1½.
Fig. 66.	*Apera burnupi*, E. A. Smith.	Generative organs. × 4.

NOTES ON SOME FURTHER MALFORMED SPECIMENS OF ANODONTA CYGNEA, L.

By H. H. BLOOMER.

(Plate vii).

Since my last notes on this subject appeared in the Journal,[1] I have received from Mr. S. P. Bolton several more injured specimens, among which were two showing other interesting points of malformation. One bore indications of an injury to the left valve—the fracture extending in an antero-ventral direction from the umbo to the edge of the shell, which had been repaired, the inner layer now being continuous with that of the other portion of the valve. There is also an indentation on the right valve opposite to the injury on the left one. The free edge of the left mantle lobe appears irregular in its growth, and the portion of the lobe covering the injured part of the valve is much thicker than the other portion. The left labial palps are somewhat aborted, and have a more ventral position than the right ones. The outer one for a little distance is fused with the mantle lobe.

In the other specimen the right valve was apparently stove in a little anterior to the centre of it, and just below the umbo. The injury at the time of occurence must have been considerable, and penetrated into the body of the animal itself. The injured valve was repaired and the subsequent growth of the shell was nearly normal. The left valve is intact. The gills suffered the greatest injury, while strange to say the mantle lobes appear to be normal. The left gills are severed from their distal edges to close to the outer supra branchial chamber (Pl. vii, fig. 1).

The right inner gill is not injured so much and the laceration does not extend so far dorsally, while, however, the free portion of the right outer gill is for some distance anterior to the injury, entirely missing (Pl. vii, fig. 2, *r.o.g.*), and the portions near the base on both sides of the gap have fused with the mantle lobe.

A transverse section across the injured portion of the animal, shows both the left supra branchial vessels to be somewhat distorted and bent inwards, and the right inner gill exhibits the subsequent fusion of its injured portions.

(1) Journ. of Malac., 1900, vol. vii, p. 133.

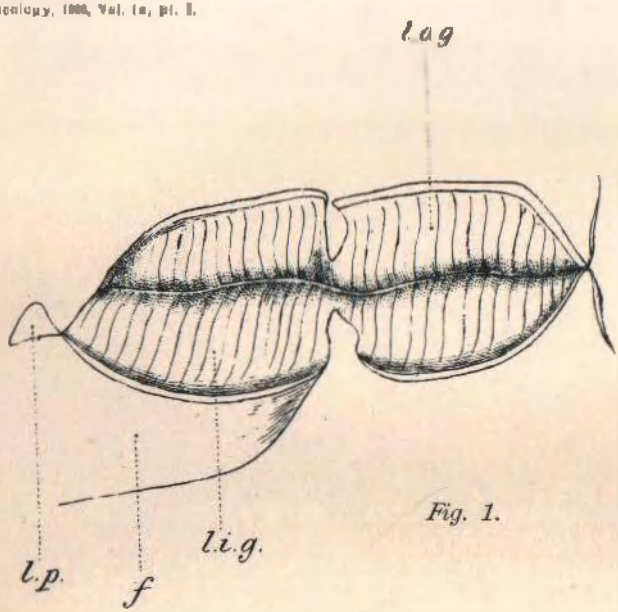

Fig. 1.

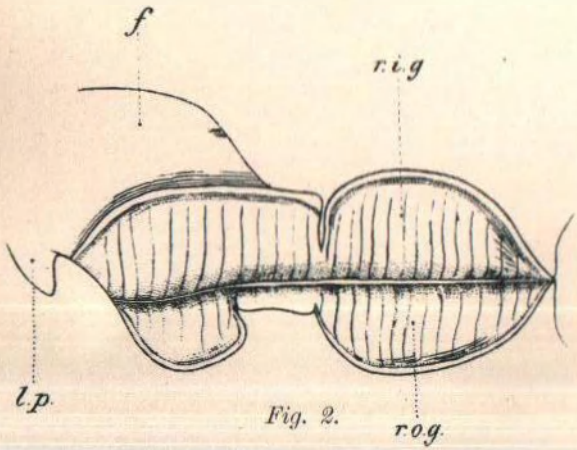

Fig. 2.

H.H.B. del. ad nat.

ANODONTA CYGNEA, L.

Fig. 1. Left side. Fig. 2. Right side.

References: f. Foot; l.p. Labial palp; l.i.g. Left inner gill; l.o.g. Left outer gill; r.i.g. Right inner gill; r.o.g. Right outer gill.

A CLASSIFIED LIST OF THE HELICOID LAND SHELLS OF ASIA.

(PART III.*)

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

ii. ASIATIC RUSSIA.

A. WESTERN TURKISTAN.

The Helicoids of Russian Turkistan exhibit strong affinity with those of Eastern Turkistan, notably in the presence of the genera *Cathaica* and *Macrochlamys*. The occurrence, on the other hand, of two species of *Zonites*, one of *Retinella*, and seven species of the Belogona Siphonadenia proves relationship with the Palaearctic Fauna.

The earliest record of Helicoids is by Prof von Martens, who worked out the collections of Fedtschenko and Semenow. Others were described by Dr. Westerlund from material collected by Dr. S. Korschinsky, Adrianow, Dr. A. Nikolsky, A. Kuschakewitsch, L. Bartschtschewsky, Dr. A. Regel, A. Kasnakow, and K. E. Stenroos. The shells collected by the latter went to the Museum of Helsingfors, while all the others described by Dr. Westerlund are in the Imperial Museum of St. Petersburg.

Macrochlamys coeligena, n.sp.

(Figs. 1-3.)

Shell narrowly perforate, lenticular, depressed, fragile, greenish corneous, translucent, polished, finely striated, shortly and slightly

1 2 3

Figs. 1-3.—*Macrochlamys coeligena*, n. sp.

costulate near the sutural margin. Spire obtuse, suture somewhat shallow, margined. Whorls 4½, compressed and a little flattened above and below, slightly sloping towards the suture, increasing slowly at first; last whorl more than twice the size of the penultimate, widened towards the mouth, not descending in front, rounded at the periphery, impressed round the umbilicus. Aperture oblique, much

* See Ante p. 51.

wider than high: peristome thin, acute, the margins convergent; upper and lower margins gently curved, united by a thin callus; outer round; columellar ascending, slightly dilated over the narrow perforation of the umbilicus.

Diam. maj. 12, min. 10·5; alt. 5·5 millim.

Hab.—Tian-Shan Mountains, Russian Turkistan.

From Mr. Preston I received two specimens with the MS. name "*Macrochlamys coeligena*, Mart." Professor von Martens, to whom I submitted a specimen, informs me that the new species is allied to *M. sogdiana*, and that he saw a specimen in Mr. Rolle's collection for which he suggested the name *M. coelicola*, in allusion to the native name Tian-Shan meaning Celestial Mountains. To prevent confusion I have retained the name *coeligena*, as the shells have been distributed under that name.

Macrochlamys coeligena differs from *M. sogdiana*, Mts., by its smaller size, its more depressed shape, and its more flattened whorls; the umbilical region is more excavated and the last whorl is less widened towards the mouth. The shell is also thinner in texture than that of *M. sogdiana* which, moreover, is opaque not translucent.

Family **Zonitidae**.

Subfamily **Macrochlaminae**.

Genus MACROCHLAMYS, Bens.

sogdiana, Mart. Sarafschan; Ferghana; Taschkent; Samarkand.

coeligena, n.sp. Tian-Shan.

turanica, Mart. Sarafschan; Kokand; Ferghana; Khiva.

clessini, West. Issik-Kul, Alatau.
= schmidti, Cless.

schmidti, Brancs. Turcomania.

korschinskyi, West. Kugart and Taldyk-ssu Rivers.

Sub-family **Zonitinae**.

Genus VITRINA, Drap.

alexandri, West. Iskander-Kul.

rugulosa, Mart. Iskander-Kul.

conoidea, Mart. Sarafschan; Ferghana.

taddei, Boettg. Kopet Dagh.

Genus ZONITES, Montf.

cornu, Ptr. Samarkand.

latissimus, Dohrn. Samarkand.

Genus EUCONULUS, Reinh.

fulvus, Drap. Iskander-Kul.

Sub-family **Ariophantinae**.

Genus ZONITOIDES, Lehmann.

nitidus, Müll. Turcomania.

Family **Endodontidae**.

Genus PUNCTUM, Morse.

pygmaeum, Drap. Kultuk, Transcaspia.

Family **Helicidae**.

Group **Belogona**, v. Iher.

BELOGONA EUADENIA, Pils.

Genus CATHAICA, Mdff.

Sub-genus PLIOCATHAICA, Andr.

phaeozona, Mart. Ferghana; Tian-Shan.

rubens, Mart. Sarafschan

v. finschiana, Mart. Alatau

v. zeiliana, Mart. Alatau.

v. caryodes. West. Kugart and Baskan Rivers; Lepsinsk.

v. limitata, West. Artschaty.
v. angulata, West. Artschaty; Samarkand.
semenowi, Mart. Tian-Shan; Alatau.
duplocincta, Mart. Tian-Shan.
Sub-genus XEROCATHAICA, Andr.
fedtschenkoi, Mart. Sarafschan.
Sub-genus PSEUDIBERUS, Anc.
aspasta, West. Taschkent.
plectotropis, Mart. Tian-Shan.
Sub-genus CAMPYLOCATHAICA, Andr.
rufispira, Mart. Sarafschan.
retteri, Rosen. Samarkand.
v. serotina, West. Samarkand; Saamin.
dichrozona, Mart. Ferghana.
indigena, West. Wandsch Valley.
BELOGONA SIPHONADENIA, Pils.
Genus HELICELLA, Fér.
Section HELIOMANES, Moq.
derbentina, Andrz. Taschkent; Saamin; Khiva.
diaphora, West. Targahak.
Section TACHEA, Risso.
seductilis, West. Kashkara, Ferghana.
transcaspia, Boettg. Kopet Dagh.
Genus HYGROMIA, Risso.
Section FRUTICICOLA, Held.
rhysota, West. Alatau.
Genus VALLONIA, Risso.
ladacensis, Nev. Tian-Shan.
mionecton, Boettg. Kopet Dagh.
Genus HELICODONTA, Fér.
lentina, Mart. Ferghana.
Genus HELIX, L.
Section LEVANTINA, Kob.
kurdistana, Parr. Samarkand.

B. SIBERIA.

The vast territories comprised within the limits of Eastern and Western Siberia, are comparatively poor in molluscan life, and although many large tracts of country have never been searched, it is not very probable that any considerable number of new forms will come to light. Among the earlier naturalists who have brought Siberian molluscs to Europe must be mentioned Gebler, Ehrenberg and Middendorff: the first two in 1829, the latter in 1851. Maack, during a residence of many years, collected in the neighbourhood of Irkutsch, and the same naturalist, in conjunction with Gerstfeldt, travelled and collected in the Amur District in 1855. Other contributions were made by Kindermann and Schrenck (1854-1856), Nordenskjold and Stuxberg (1875), during the Nova-zembla and Jenissei Expedition. These were described by Dr. Westerlund in Kon. Svenska vet. Akad. Handl., Bd. xiv, No. 12 (1877). The latter work was accompanied by a plate, but unfortunately without any explanation of the figures, and as no references to these were given in the text, I have thought it useful to publish here the explanation with which Dr. Westerlund has kindly favoured the writer.

Fig. 1. *Helix fruticum*, Müll
Fig. 2. „ *nordenskioldi*, West.
Fig. 3. „ *stuxbergi*, West.
Fig. 4. *Pupa theeli*, West.
Fig. 5. *Succinea turgida*, West.
Fig. 6. „ *putris* v. *acuta*, Pfr.?
Fig. 7. „ *altaica*, Mart.
Fig. 8. *Limnaea attenuata*, Say.
Fig. 9. „ *lagotis*, Schr. v. *patula*, West.
Fig. 10. „ *peregre* v. *producta*, West.
Fig. 11. „ „ v. *torquilla*, West.
Fig. 12. *Physa hypnorum* v. *polaris*, West.
Fig. 13 „ *sibirica*, West.
Fig. 14. *Planorbis infraliratus*, West.
Fig. 15. *Valvata aliena*, West
Fig. 16. „ *sibirica*, Midd.
Fig. 17. *Sphaerium levinodis*, West.
Fig. 18. „ *nitidum*, Cless.
Fig. 19. *Calyculina lacustris*, var.
Fig. 20. *Pisidium nordenskioldi*, Cless.
Fig. 21. „ *sibiricum*, Cless.
Fig. 22. „ *mucronatum*, Cless.
Fig. 23. „ *boreale*, Cless.

Most of the known Helicoids, as might be expected, belong to the Palaearctic Fauna, the *Zonitidae* being represented by nine species, the genus *Eulota*, more characteristic of the Eastern Fauna, producing eight species.

Family **Zonitidae**.
Sub-family **Zonitinae**.
Genus VITRINA, Drap.
pellucida, Müll. Baikal; Tomsk; Jenissei; Amur; Kamschatka.
sibirica, West. Tomsk; Jenissei.
= rugulosa, West.
exilis, Morel. Kamschatka.
Genus VITREA, Fitz.
hammonis, Strom. Tomsk; Jenissei; Amur.
petronella, Charp. E. Siberia.
pura, Ald. Jenissei; Baikal.
Genus EUCONULUS, Reinh.
fulvus, Drap. Baikal; Jenissei; Irkutsch; Kurga; Amur; Kamschatka.
pupula, Gould. Kamschatka.
Sub-family **Ariophantinae**.
Genus ZONITOIDES, Lehmann.
nitidus, Müll. Tomsk; Jenissei.
Family **Endodontidae**.
Group **Polyplacognatha**.
Genus PUNCTUM, Morse.
pygmaeum, Drap. Baikal; Amur.
Group **Haplogona**, Pils.
Genus PYRAMIDULA, Fitz.
Section GONYODISCUS, Fitz.
ruderata, Stud. Jenissei; W. and E. Siberia.
v. angulosa, Mouss. Tomsk; Irkutsch; Amur; Kamschatka.
v. opulens, West. Kamschatka.
pauper, Gould. Kamschatka.
flocculus, Morel. Kamschatka.
Family **Helicidae**.
Group **Belogona**, v. Iher.
BELOGONA EUADENIA, Pils.
Genus EULOTA, Hartm.
Section EULOTA, s.s.
fruticum, Müll. Tomsk; Jenissei; Altai.
v. asiatica, Dyb. Amur.
v. europaea, Dyb. W. Siberia
ravida, Benz. Amur.

serotina, A. Ad. Saghalien.
maacki, Gerstf. Amur.
selskii, Gerstf. Amur.
middendorffi, Gerstf.
Wladiwostock; Amur.
cincto-inflata, Mouss.
Wladiwostock.
similaris v. arcasiana, Cr. and Deb. Amur.
weyrichi, Schrenck. Amur. Saghalien.

Genus CATHAICA, *Mdff.*

Sub-genus EUCATHAICA, Andr.
graeseri, Mouss. Wladiwostock.

BELOGONA SIPHONADENIA, Pils.

Genus HELICELLA, Fér.

Section HELICELLA, s.s.
apollinis, Mart. Altai.

Section THEBA, Risso.
strigella, Drap. Amur.
duiensis, West. Saghalien.
schrencki, Midd. Altai; Jenissei; Irkutsch; Trans-Baikal; Amur.
= sibirica, Friv.
helvola, Friv. ? W. Siberia.
carthusiana, Müll. Irkutsch; Amur.

Genus HYGROMIA, Risso.

Section MONACHA, Fitz.
frequens, Mouss. ? W. Siberia.
incarnata, Müll. ? W. Siberia.

Section FRUTICICOLA, Held.
hispida, L. ? Amur.
sericea, Drap. Irkutsch; Amur.
rufescens, Penn. Irkutsch; Amur.
= strigella, Gerstf.
rhysota v. altaica, West. Altai.
nordenskioldi, West. Altai; Jenissei; Amur.
= rufescens, Schr.
v. depressa, West.
v. planata, West.
verna, West. Irkutsch.
= hispida, Schr.
dieckmanni, Mouss. Amur.
stuxbergi, West. Altai; Amur.
annexa, West. Irkutsch.
= rufescens, Schr.
czekanowskii, West. Irkutsch
eutheta, West. Amur.

Section DIBOTHRION, Pfr.
bicallosa, Friv. Altai.
sibirica, West. Amur.
= gerstfeldti, Dyb.

Genus ACANTHINULA, Beck.

Section ZOOGENITES, Morse.
harpa, Say. Amur.
= amurensis, Gerstf.

Genus VALLONIA, Risso.
pulchella, Müll. Jenissei; Amur.
costata, Müll. Irkutsch; Jenissei; Amur.
v. amurensis, Sterki. Amur.
tenuilabris, Braun.
adela, West. Irkutsch; Jenissei; Amur.

Genus HELICIGONA, Fér.

Section CHILOSTOMA, Fitz.
ussuriensis, West. So. Ussuri Distr.

Section ISOGNOMOSTOMA, Fitz.
supersonata, Midd. E. Siberia.

Genus HELIX, L.

Section TACHEA, Leach.
atrolabiata v. laeta, West. Awtrasia.

iii. AFGHANISTAN.

One of the least known regions as regards Mollusca is undoubtedly

Afghanistan. The earliest record is by Capt. Thomas Hutton (Journ. Asiat. Soc. Beng., vol. xviii, part 2, 1849 (1850), p. 649), who procured a few species during the advance of the Army of the Indus into Afghanistan in 1839. Only three Helicoids were recorded. The only subsequent contribution appears to be that by Mr. C. F. Ancey in 1893, (Bull. Soc. Zool. Fr., xviii, p. 40), who *inter alia* refers to the paucity of the Molluscan Fauna of Baluchistan, which he attributes to the geological constitution of the soil, and the vast deserts which cover part of its surface. No Helicoids of Baluchistan are known.

Vitrina baccata, Hutt.
Eulota bactriana, Hutt.
Helicella (Heliomanes) krynickii v. candaharica, Pfr.

iv. KURDISTAN.

The only known Helicoids of this district belong to the genus *Helix*. Bourguignat recorded a few, the remainder were described by Galland. The unsettled state of the country no doubt accounts for our meagre knowledge of its molluscan fauna.

Genus HELIX, L.
Section LEVANTINA, Kob.
guttata, Oliv.
kurdistana, Parr.
v. ergilensis, Gall.
v. sesteri, Gall.
v. michoniana, Bourg.
= v. baschkira, Pfr.
escheriana, Bourg.
v. diarbekirana, Gall.
v. euthyomphala, Gall.
ninivita, Gall.
Section HELICOGENA, Fér.
lucorum, L.

v. MESOPOTAMIA.

We owe our knowledge of the Mollusca of this region almost entirely to the researches of Dr. Schlaefli, the results of which were tabulated by Mousson in 1874.

Family **Zonitidae**.
Sub-family **Zonitinae**.
Genus VITREA, Fitz.
aequata, Mouss.
nitelina, Bourg.
Family **Helicidae**.
Genus LEUCOCHROA, Beck.
fimbriata, Bourg.
Genus HELICELLA, Fér.
Section XEROCRASSA, Monterosato.
seetzeni, Roth.
Section HELIOMANES, Moq.
commeata, Mouss.
derbentina, Andrz.
mesopotamica, Mouss.
vestalis, Parr.
Section THEBA, Risso.
obstructa, Fér.
Genus HELIX, L.
Section LEVANTINA, Kob.
caesariana, Parr.
guttata, Oliv.
escheriana, Mouss.
Section HELICOGENA, Fér.
figulina, Parr.
lucorum v. onixiomicra, Bourg.

vi. ARABIA.

Like many of the preceeding regions, Arabia has but a scanty molluscan Fauna. The bulk of the Helicoids show an intimate affinity with the Fauna of Asia minor. One species of *Lejeania* found in the south, however, connects this region with Abyssinia.

Family **Zonitidae**.
Sub-family **Zonitinae**.
Genus VITRINA, Drap.
gruneri, Pfr.
Genus ZONITES, Montf.
sabaea, Mart. Menaha.
Genus EUCONULUS, Reinh.
eremias, Melv. and Pons. Hadramaut.
Family **Helicidae**.
Group **Belogona**, v. Iher.
BELOGONA EUADENIA, Pils.
Genus LEUCOCHROA, Beck.
boissieri, Charp. Arabia, Petraea.
BELOGONA SIPHONADENIA, Pils.
Genus HELICELLA, Fér.
Section XEROCRASSA, Monterosato.
beadlei, Pils. Desert.
Section HELIOMANES, Moq.
derbentina, Andrz. Oman.
Section LEJEANIA, Anc.
leucosticta, Mart. Menaha.
Genus HELIX, L.
Section EUPARYPHA, Hartm.
tohenica, Bourg. Aden. Makalla.
Section EREMINA, Pfr.
desertorum, Forsk. Arabia Petraea.
= arabica. Roth.
desertella, Jick. Djeddah.

vii. PERSIA.

The principal contribution to our knowledge of the Persian Helicoids is by Prof. von Martens, who published the malacological results of Prof. Hausknecht's travels in Persia as well as Kurdistan, Mesopotamia and Syria. The entire molluscan fauna is essentially palaearctic, no Eastern Asiatic forms having been found. Dr. Westerlund described the material collected in North Persia by Keyserling and Bienert, and Mousson those collected by Dr. Sievers; Dr. Poblig published the results of his own travels in North Persia; Prof. Boettger enumerated the shells procured by Dr. Radde's expedition to Transcaspia and Chorassan, and also those collected by Hans Leder and Otto Herz, while Issel catalogued the shells acquired during the Italian mission to Persia. The most recent additions are by Mr. E. A. Smith from the Urmi district, and Pfarrer Naegele who made considerable collections, the shells being described by himself and by Dr. Kobelt.

Family **Zonitidae**.
Sub-family **Zonitinae**.
Genus VITRINA, Drap.
Section OLIGOLIMAX, Fisch.
annularis v. persica, Boettg. Schah-rud.
Genus POLITA, Held.
herzi, Boettg. Tuesch.

patuliformis, Boettg. Schah-rud.
v. calculiformis, Boettg. Chorassan.
Section GASTRANODON, Boettg.
siaretana, Boettg.
Genus VITREA, Fitz
lucida, Drap
cellaria, Müll. v. concinna, West. Siaret, Chorassan.
caspia, Boettg. Astrabad.
Genus RETINELLA, Shutt.
semisculpta, Mart Caspian.
persica, Boettg. Siaret, Chorassan.
Genus EUCONULUS, Reinh.
fulvus, *Drap.* Mazenderan.
Family **Helicidae.**
Group **Belogona,** v. Iher.
BELOGONA SIPHONADENIA, Pils.
Genus HELICELLA, Fér.
Section HELIOMANES, Moq.
derbentina, *Andrz. Astrabad;* Ghilan; Salmas, Buschir.
krynickii, Andrz. Ispahan; Ashabad.
millepunctata, Boettg. Irak Adschmi; Schah-rud.
Section HELICELLA, s.s.
aberrans, Mouss.
Section CANDIDULA, Kob.
acutistria, Boettg. Koyun Daghi.
kotschyi, Pfr.
langloisiana, Bourg. Schiraz.
parableta, Boettg. Urmia?
profuga, Schm. Teheran.
Section JACOSTA, Gray.
crenimargo v. obtusior, Mouss. Salmas.
Section THEBA, Risso.
arpatschaiana, Mouss. Salmas.
pisiformis, Pfr. Astrabad; Siaret; Schah-rud.
v. atypa, Boettg. Astrabad.
syriaca, Ehrb. Ghilan.
talyschana, Mart. Rescht; Astara.
Genus HYGROMIA, Risso.
Section MONACHA, Fitz.
aristata, Kryn. Mazenderan.
Genus ACANTHINULA, Beck.
Section ZOOGENITES, Morse.
harpa, Say. Astrabad.
Genus VALLONIA, Risso
pulchella, Müll. Shamhala.
costata, Müll. Mazenderan.
mionecton v. shamhalensis, Rosen. Shamhala.
Genus HELICIGONA. Fér.
Section FRUTICOCAMPYLAEA, *Kob.*
narzanensis, Kryn. Astrabad.
ravergiensis, v. persica, Boettg. Astrabad; Ghilan.
transcaucasica, Bayer. Mt. Elburs.
Genus HELIX, L.
Section EUPARYPHA, Hartm.
subdentata, Fér.
Section LEVANTINA, Kob.
dschulfensis, Dub. Araxes Valley.
– djulfensis, Mouss.
mazenderanensis, Nev. Mazenderan.
ghilanica, Mouss. Ghilan.
urmiensis, Naeg. Salmas; Urmia.
Section TACHEA, Leach.
atrolabiata, Kryn. Ghilan.
v. stauropolitana, Schm. Ghilan, Rastemabad.
v. elegans, Issel. Ghilan.
v. lenkoreana, Mouss. Rescht; Astara.
Section HELICOGENA, Fér.
lucorum, v. taurica, Kryn. North Persia.
figulina, Parr. Seir, Urmi.
salomonica, Naeg. Urmia.

CURRENT LITERATURE.

Nierstrasz, H. F.—The Solenogastres of the Siboga-Expedition. Siboga-Expeditie. Monog. xlvii. Leyden : 1902. pp. 46, plts. i-vi.

One of the most important memoirs of recent years, upon the structure and classification of the Solenogastres, is that just published in connection with the "Siboga" Expedition.

Hitherto only two species were known from the East Indian Archipelago viz. those described by Thiele in 1898—*Notomenia clavigera and Proneomenia australis.* The 'Siboga' expedition has been extremely fortunate, bringing back no less than 65 specimens, which are contained in 8 genera, of which 4—*Dinomenia, Proparamenia, Hemimenia, and Cyclomenia*—are new. All the species, twelve in number, are also new.

The genus *Dinomenia* is characterised by the presence of a thick cuticle, in which are many layers above each other of hollow, pointed spicula. The papillae are numerous. There is a dorso-terminal sense organ present, three ventral folds ; two separate, unramified, tubular salivary glands ; and cloacal ducts with vesicular appendages. There are no gills and the radula is distichous. Two species are described, *D. hubrechti, and D. verrucosa.* The genus is regarded as related to *Proneomenia* because of the integument, and to *Paramenia* on account of the distichous radula.

The genus *Proparamenia* has also a thick cuticle with many layers of pointed spicula, and numerous papillae. There is no dorsal sense organ, and no copulation spicula. There are 3 ventral fold ; 2 separate, ramified salivary gland ; 2 vesicular receptacula seminis ; and a circlet of gills in the cloaca. The radula is monoserial.

Hemimenia while closely related to *Neomenia*, differs from it in the structure of the integument, which has a thin cuticle, with flat imbricated spicula, and no papillae. It is very rightly regarded as a transition form, and as such may be compared with *Paramenia*, Pruvot.

Cyclomenia is another similar genus, exhibiting relationship to *Proparamenia* on the one hand and *Paramenia* on the other.

The author divides the *Neomeniidae* into two groups, viz.: A. Those forms possessing a thick cuticle, with numerous pointed, hollow spicula in different layers, and a large number of hypodermal papillae, and B. Those forms with a thin cuticle, covered with a layer of flat, imbricated spicula, and no hypodermal papillae. He further points out, that taking the radula as a basis of classification, we have the family divided into three groups, viz. *a.* Forms with polystichous radula, *b.* Forms with distichous radula, and *c.* Forms without a radula. It further appears that there is a correspondence between groups A and *a*, and groups B and *b*, with certain exceptions such as *Dondersia and Macellomenia.*

If we might suggest a slight improvement upon this, it would be as follows:

Group i.—**Neomeniatina** for group A of Nierstrasz

ii.—**Parameniatina** for intermediate forms.

iii.—**Metameniatina** for group B of Nierstrasz.

The author then discusses in some detail the relationships of the known genera of *Neomeniidae*, which are summarised in diagrammatic form.

In additions to the conclusions stated above, Dr. Nierstrasz has set forth in great detail, with a wealth of illustration, a host of anatomical facts on the structure of the new genera and species, which in the present state of our

knowledge, cannot fail to be of the greatest importance. While it is very interesting to guess at the position and possible origin of the Aplacophora, it is much more important that more forms should be worked out, in order that there may be some foundation for what at present, can only be regarded as interesting speculation. The generalisations in this memoir, do not go beyond the point warranted by the result obtained. It is a solid contribution, and marks an important advance in our knowledge of these interesting molluscs.— W.E.C.

Hedley, C.—Studies on Australian Mollusca. Pt. v. Proc. Linn. Soc. N.S.W., 1902, pp. 700-708, pl. xxxiv.

The following new species are described and figured: *Columbella plexa*, *Puncturella galcrita*, *Philine trapezia*. Figures of various other species are given, and valuable notes on their nomenclature and classification.

Drummond, Isabella, M.—Notes on the development of *Paludina* [*Vivipara*] *vivipara*, with special reference to the Urinogenital organs and theories of Gasteropod torsion. Quart. Journ. Micro. Sci., 1902, vol. 46, pp. 97-143, pls. 7-9.

Miss Drummond has studied the development of the urinogenital organs of *Vivipara*, and arrives at the following conclusions: the functional kidney of the adult belongs, as von Erlanger has already shown, to the left side of the body and the right is not lost, as described by von Erlanger, but persists as the genital duct. An indication of the original coelomic connection between gonad and kidney, is present in the course of development. The gonad arises as a solid proliferation of the morphologically dorsal wall of the pericardium. It arises from the original left side, and shows no sign of a paired origin.

The authoress then briefly summarises the theories of Bütschli, Plate, Pelseneer, Amaudrut and Boutan on Gasteropod torsion, and divides such theories into two classes, viz. i. Those which view the present position of the pallial complex as due to a forward movement along the right side of the body, which resulted from greater growth of the left side than of the right. ii. Those which view the present position of the pallial complex as due to a ventral flexion, followed by a vertical rotation of the whole visceral hump upon the head. The evidence for the second of these views seems greater than that for the first.

Dautzenberg, Ph.—Description de deux Bulimulidés nouveaux provenant du Pérou. Journ. de Conchyl., 1901, vol. xlix, pp. 213, 214, pl. vii, fig. 1-4.

The two species described and figured are *Peronaeus iocosensis* and *P. baeri*.

Dautzenberg, Ph. et Bernier, J.—Description d'un Bulimidé nouveau, provenant de la Nouvelle Calédonie. Ibid., pp. 215, 216, pl. vii, fig. 5, 6. *Leucocharis porphyrochila*.

Dautzenberg, Ph.—Sur deux déformations observées chez des *Placostylus* de la Nouvelle Calédonie. Ibid., pp. 217, 218, pl. vii, fig. 7, 8.

The author describes and figures two interesting monstrosities of *Placostylus porphyrostomus*, Pfr., and *P. fibratus*, *Martyn*.

Dollfus, G. et Dautzenberg, Ph.—Nouvelle list des Pélécypodes et des Brachiopodes fossiles du Miocène moyen du Nord-Ouest de la France. Ibid. pp. 229-280.

The authors' catalogue 185 species of molluscs and various varieties, the following species are new: *Coritia boistelı* and *Prasina lecointreae*.

Dautzenberg, Ph.—Descriptions de coquilles nouvelles provenant de la Nouvelle-Calédonie. Ibid., pp. 299-302, pl. viii.

The author figures and describes *Rhytida bernieri*, *Leucocharis porphyrochila*, Dautz. and Bernier var. *rubicunda*, and *Placostylus hanaiiensis*, all of which are new.

Dautzenberg, Ph.—Descriptions de coquilles nouvelles rapportées du Pérou par M. Baer. Ibid., pp. 306—313, pl. ix.

The new species are *Helix (Labyrinthus) baeri*, *Drymaeus josseaumei*, *D. scoliodes*, *Bulimulus (Ataxus) huayaboensis*, and *Ampullaria baeri*.

Dautzenberg, Ph.—Sur une nouvelle variété de *Chlamys operculatus*. Ibid., p. 340.

Wagner, A.—Neue Formen und Fundorte des Genus *Pomatias* Studer. Ann. d. k. k. naturhist. Hofmus., 1901, Bd. xvi, pp. 63-65.

The new forms are *P. (Auritus) gracilis* v. *gracillima*, nov., and *P. (Pleuropoma) roseoli*, n. sp.

Sturany, R.—Diagnosen neuer Landschnecken aus der Hercegovina. Ibid., pp. 65-67.

The author gives descriptions of the following new species: *Campylaea apfelbecki*, *C. pentheri*, *Xerophila rhabdota*, and *Clausilia (Medora) matulici*.

Sturany, R.—Neue Inselformen dalmatinischer Landschnecken. Ibid., pp. 68, 69, figs. 1-4.

Dr. Sturany describes and figures the following interesting species, viz.: *Campylaea insoluta*, Zglr. v. *lagostana*, *Buliminus brusnicensis*, and *B. pelagosanus*.

Sturany, R.—Ueber eine neue Ennea aus Südafrika. Ibid., pp. 69-71, fig.

Ennea fremuodes, n. sp.

Sturany, R.—Ueber eine neue Höhlenschnecke. Verhandl. d. k. k. zool-bot. Gesell. Wien, 1901, pp. 761, 762, 3 figs.

Spelaeoconcha paganetti, n. sp.

Sturany, R.—Mittheilungen über Gehäuseschnecken aus dem Peloponnes. Ibid., 1902, pp. 402-409, figs 1-4.

Sturany, R.—Ueber die Verbreitung von *Cylindrus obtus*, Drap. Nachr. d. Deutsch. Malak. Gesell., 1902, pp. 9-13.

Sturany, R.—Beitrag zur Kenntniss der kleinasiatischen Mollusken fauna. Sitz. d. k. Akad. d. Wiss. Wien, 1902, Bd. cxi, pp. 123-140. T. i, ii.

In all 53 species and varieties are recorded, of which the following are new: *Helix (Xerophila) dichesthemena*, *H (Xer.) pyramidata*, *Drp. v. platiensis*, *Buliminus (Chondrula) werneri*, and *Unio desectus*, Drouët, f. *pursacensis*.

Hoyle, William E.—British Cephalopoda: Their Nomenclature and Identification. Journ. Conch., 1902, vol. 10, pp. 197-206.

An authoritative statement on the nomenclature of the British Cephalopoda has long been desired, and Mr. Hoyle's interesting and useful paper will be heartily welcomed by all malacologists. The most important change perhaps, is the adoption of the names *Polypus* and *Moschites* for the well-known genera *Octopus* and *Eledone*. A useful key for the determination of British forms, and a Bibliography complete the paper.

Hoyle, William E.—The Luminous Organs of *Pterygioteuthis margaritifera*, a Mediterranean Cephalopod. Mem. Manchester Lit. and Phil. Soc., 1902, vol. xlvi, pp. 1-14, figs. 1-6.

Mr. Hoyle finds that the luminous organs of *Pterygioteuthis margaritifer* may be divided into four sets; i. Ocular, ii. Siphonal, iii. Branchial, and iv Abdominal. Of the first set there are nine on each eyeball, their arrangement is irregular and there are marked differences in size; the second set are two in number, they are situated just below the hinder margin of the siphon; the third set are also paired, and lie at the root of each gill; while the fourth set are divided into a group of three lying transversely in the mantle cavity, close to the anterior margin of the nidimental gland, and two lying one in front of the other in the posterior end of the mantle cavity in the median line. As regards structure, the ocular and siphonal are the most complex, the branchial and abdominal being less so. Generally they recall the structure of the luminous organs in other cephalopoda, described by this and other writers.

Frandsen, P.—Studies on the Reactions of *Limax maximus* to Directive Stimuli. Amer. Ac. Arts and Sci., 1901, vol. xxxvii, pp. 185-227, 22 figs.

The behaviour of any organism toward artificial stimulation, the author remarks, is probably always largely dependent on its normal environmental conditions. The long action of these conditions, assisted, perhaps, by the animal's own efforts, conscious or unconscious, to adapt itself to them, finally results in certain habits and instincts. The process of adaptation being extremely slow, organisms are strongly averse to great or sudden changes in their environment and incapable of adjusting themselves to them. As a rule, then, we should expect animals to seek those conditions of light, heat, moisture, and other physical and chemical influences, which are most in accordance with those to which they are normally subjected.

In the present paper the author very carefully details his study of the locomotor responses of *Limax maximus* to three kinds of stimuli; those of touch, gravity and light; the chief results are as follows: Under ordinary circumstances, the slug is negatively thigmotactic. On an inclined *glass plate*, all slugs give a geotactic response, in some it is a decided positive, in others a markedly negative response; a few are somewhat indifferent. The quality and quantity of the slime secreted, and the relative proportions of the length of the anterior and posterior regions of the animal's body, are the two main factors in accounting for the different responses. The animals are markedly phototactic, and as in geotaxis, there are individual differences. To strong light, slugs, on the average give a strong negative response; the degree of response gradually diminishing with the reduction in the strength of the stimulus. They are responsive to light stimuli covering a wide range of intensities. In the dark, other directive stimuli being eliminated, the slug tends to travel in a spiral of gradually increasing radius, almost invariably producing one or more loops. These responses to touch, gravity, and light-stimuli emphasise the fact, that it is an animal's normal environmental conditions which chiefly determines its general response to artificial stimuli. The variations in precision and character of this general response are mainly dependent on certain internal factors, such as the food conditions of the animal, its fear of an enemy, and desire to escape captivity.

EDITOR'S NOTES.

Owing to the want of space, obituary notices of the late Alexander Kowalevsky, Oliver Collett, and J. G. Cooper are held over until the December issue.

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No. 4. DECEMBER 24th, 1902. VOL. IX.

DESCRIPTION OF A NEW SPECIES OF GOMPHINA FROM NEW ZEALAND.

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

Mr. William H. Webster of Auckland, New Zealand, has very kindly presented to the British Museum specimens of the Bivalve about to be described, also an oyster attached to part of a *Haliotis*, and a specimen of the rare *Unio (Diplodon) websteri* of Simpson, from Waiuku, New Zealand. The oyster is only about 16 millim. in diameter, and may very possibly be merely the young state of a fairly large species. As it possesses no striking features, and considering the variability of oysters generally, it seems to me unadvisable, at all events until more material is available, to attempt to name or describe it.

Gomphina maorum, n. sp.

Testa aequivalis, inaequilateralis, solidiuscula, ovato-trigonalis, mediocriter convexa, alba, fusco biradiata, lineisque zigzag-formibus fuscis irregulariter picta, ad umbones plus minus rufescens; latus anticum acute rotundatum, posticum brevius; margo dorsi posterior valde descendens, parum arcuatus, anterior longior, minus obliquus, vix

curvatus, ventralis late arcuatus; umbones mediocriter prominentes, fere contigui, postmediani; valvae concentrice fortiter striatae, haud lunulatae intus albae, in medio rufo plus minus saturatae, ad marginem laeves; cicatrix antica ovalis, posterior brevior, magis rotundata; sinus pallii parvus, minime profundus.

Longit. 16 millim., alt. 13, diam 8.

Both of the examples of this species which I have examined, exhibit two brown rays, one down the middle of the valves and the other posterior to it, the rest of the surface being marked with irregular wavy or zigzag lines, and they are slightly reddish towards the umbones.

The species is at once separable from *Gomphina undulosa*, Lamarck*, by the difference of form and the different position of the beaks and the relative difference in the extent of the anterior and posterior ends. In *G. undulosa* the beaks are slightly antemedian, whereas in the present species they are decidedly postmedian. The extent of the valves in front of and behind the umbones, is consequently reversed in the two forms. The style of colouration, the dentition of the hinge and the character of the scars and pallial line are alike in both. *G. moerchi* of Angas† is a more convex and triangular shell and subrostrate posteriorly. This subrostration, however, is only noticeable in the adult form, for young examples are quite obtuse behind. The locality of *G. moerchi* was unknown at the time it was described, but examples, received from the late M. Robillard, show that it occurs at the Mauritius. *G. undulosa* has been recorded from the same locality.††

* See Pfeiffer, Conch. Cab., ed. 2, *Veneracea*, p. 186, pl. xxiii. fig 3; Reeve, Conch. Icon., vol. xiv, *Venus*, pl. xxv, figs. 126a—b.

† Proc. Zool. Soc. London, 1872, p. 611, pl. lii, fig. 2.

†† Martens in Möbius's Beiträge zur Meeresfauna der Insel Mauritius und des Seychellen—Mollusken, p. 326.

ON THE SYSTEMATIC POSITION OF PATELLA KERMADECENSIS, PILSBRY.

By HENRY SUTER.

(Plate viii.)

Described and figured in 1894,[1] the soft parts of this mollusc have remained unknown. Some two years ago Mr. Shakespear, of Little Barrier Island, on a trip to the Kermadecs, kindly procured for me some specimens with the animal, and it was my intention of giving an account of the anatomy of this large and beautiful species; but having only a very limited time for scientific research at my disposal, I had to abandon the idea, and am now publishing only a few notes which may help to settle the systematic position of this mollusc.

The accompanying figure (Pl. viii, fig. 1.) of the underside of *P. kermadecensis*, drawn in natural size from a spirit specimen, shows that the branchial cordon is complete, and not interrupted in front.

The radula is rather short, and the formula is $3\ (_1{}^{2,1,2}{}_1.)3$. Figure 11 represents a row of teeth, and hardly needs an explanation. It may, however, be mentioned that the short rhachidian tooth bears two small sharp side-cusps on its reflected portion. The radula contains about 85 rows of teeth.

These few facts would, it seems to me, suggest that the species may be best classed under sect. *Ancistromesus*, Dall, of the sub-genus *Patella*, L. (s.str.)

New Zealand, Auckland, 10, Oct. 1902.

EXPLANATION OF PLATE VIII.

Fig. 1. Under side of *Patella kermadecensis*, Pilsbry, from spirit specimen. Natural size.
Fig. 2. Teeth of radula, magnified.

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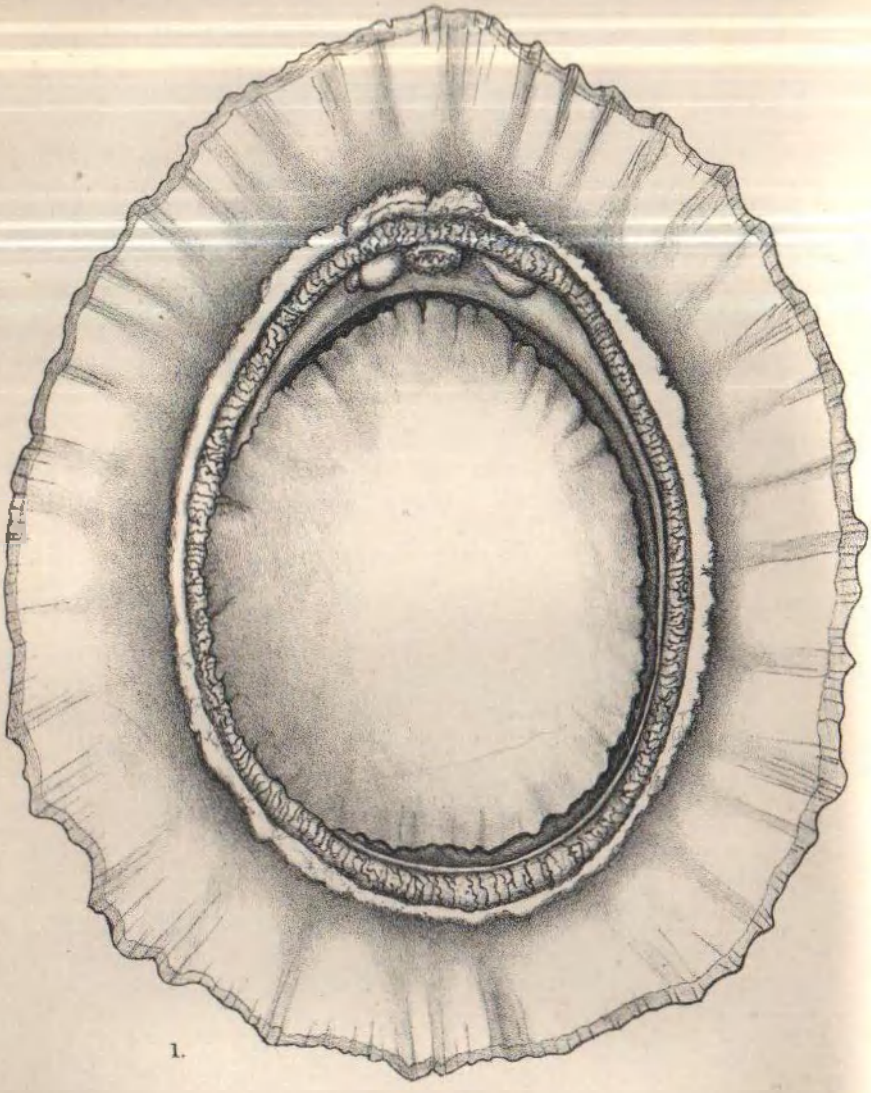
1. Proc. Acad. Nat. Sci. Philadelphia, 1894, pp. 308 etc, Pls. vii viii



1.

2.

H. Suter del. Huth, Lith. London.

PATELLA KERMADECENSIS, PILSBRY.

A CLASSIFIED LIST OF THE HELICOID LAND SHELLS OF ASIA.

(PART IV*)

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

viii. ARMENIA.

The Helicoids of Armenia all belong to the Palaearctic Fauna. The *Helicidae* are represented only by Belogona Siphonadenia, viz.: *Helicella*, *Helicigona*, and *Helix*. The *Zonitidae* produce *Vitrina*, *Retinella* and *Vitrea*.

The earliest record of Armenian shells is by Hohenacker (1837), collected by himself. Subsequent collections were made by: Sievers, described by Mousson; Filippi, enumerated by Issel; Schneider; Leder, catalogued by Boettger; Huet du Pavillon, published by Mortillet (1854); and Brandt, recorded by von Martens (1880).

Family **Zonitidae**.
Sub-family **Zonitinae**, Pils.
Genus VITRINA, Drap.
sieversi, Mouss.
= komarowi, Boettg. Glenowka, N.W. of Goktscha Lake.
Genus VITREA, Fitz.
translucida, Mort.
Genus RETINELLA, Shutt.
cyprea, Pfr. Baibout.
Family **Helicidae**.
BELOGONA SIPHONADENIA, Pils.
Genus HELICELLA, Fér.
Section HELIOMANES, Moq.
variabilis, Drap. Ispir.
derbentina, Andr. Borschom; Abas Tieman.
Section CANDIDULA, Kobelt.
striata, Müll. Baibout, between Erzeroum & Trebizond.
Section THEBA, Risso.
arpatschaiana, Mouss. var. sewanica, Mart. Is. Sewanga, Goktscha Lake.
carthusiana, Müll. Baibout.
globula, Kryn. v. nana, Boettg. Elenowka.
Genus HELICIGONA, Fér.
Section FRUTICOCAMPYLAEA, Kobelt.
joannis, Mort. Erzeroum.
= dumonti, Mort.
v. major, Mort.
pratensis, Pfr. v. depressa, Kobelt. Azchur, Upper Kur.
v. delabris, Mouss.
Genus VALLONIA, Risso.
costata, Müll. Michailowo.
pulchella, Müll. Michailowo.
Genus HELIX, Linné.
Section HELICOGENA, Fér.

* See ante p. 57.

aspersa, Müll. Trebizond.
pomatia, L. Trebizond.
ligata, Müll. v. gussoneana, Shutt. Tortoum.
melanostoma, Drap v. candida, Rossm.
vulgaris, Parr. Between Tiflis and Goktscha.
= obtusata, Zglr.
= obtusalis, Zglr.
nordmanni, Parr. Achalzych Tortoum.

Section TACHEA, Leach.

atrolabiata, Kryn. Borschom.

ix. TRANSCAUCASIA.

Repeated explorations of this district, principally by German travellers, have enabled us to form a fairly comprehensive survey of its molluscan fauna.

The earliest extensive collection is that made by Dr. Alexandre Schlafli, recorded by Mousson in two contributions (Coquilles terrestres et fluviatiles recueillies dans l'orient par le Dr. Alexandre Schläfli, 1859, and 1863). Professor Boettger, however, is the chief contributor, having published no less than twelve treatises in: Jahrbüchern der Deutschen Malakozoologischen Gesellschaft for 1879, 1880, 1881, 1883, and 1886; Bericht der Senckenbergischen Naturforschenden Gesellschaft for 1884 and 1889; and Radde's Fauna und Flora der Südwestlichen Kaspigebietes (1886), based on the results of Hans Leder's and O. Retowski's explorations. Oscar Schneider published the results of his travels in Naturwissenschaftliche Beiträge zur Kenntniss der Kaukasus Länder (1878), and Klika in Sitzungs Berichte der Kön Boehmischen Gesellschaft der Wissenschaften, 1893, no. xlv.

As might be expected the relations of the Transcaucasian molluscan fauna are with South Russia, Armenia, and Persia on the one hand, and on the other with Asia Minor.

Family **Zonitidae**.

Sub-family **Zonitinae**, Pils.

Genus DAUDEBARDIA, Hartm.

sieversi, Boettg.
lederi, Boettg. Kutais.
jetschini, Wagn. Psirsk.

Genus VITRINA, Drap.

Sub-genus PHENACOLIMAX, Stab.

pellucida, Müll. Manglis; Mamoutli; Kutais; Elisabetpol.
globosa, Boettg. Ibatani.

Sub-genus OLIGOLIMAX, Fisch.

annularis, Stud. Tiflis; Elisabetpol.
= subglobosa, Mich.
sieversi, Mouss. Kutais; Tiflis; Araxis Region.
= komarowi, Boettg.

Sub-genus TROCHOVITRINA, Schacko.

subconica, Boettg. Kasbeck.
lederi, Boettg.
subcarinata, Boettg. Lenkoran.

Genus Retinella, Shutt.
duboisi, Charp. Sukhum; Psirsk; Kutais; Gilat; Elisabetpol.
= approximans, Parr.
suanetica, Boettg. Suanetia.
sucinacea, Boettg. Abkhasia.
elegans, Boettg. Lenkoran.
mingrelica, Mouss. Kutais; Sukhum; Psirsk; Poti.
v. intermissa, Kob.
selecta, Mouss. Kutais; Sukhum; Lenkoran.
reticulata, Boettg,
= mingrelica, Boettg. non Mouss.
filicum, Kryn. Lenkoran.
koutaisiana, Mouss. Kutais; Borschom; Batoum.
= cypricus, var. Mouss.
v. transitans, Boettg.
difficilis, Boettg. Batoum.
v. discrepans, Retowski.
horsti, Boettg. Maikop; Dachowskaja; Chumischky.
Genus Aegopsina, Kob.
pontica, Boettg. Between Sukhum and Poti.
Genus Vitrea, Fitz.
cellaria, Müll. Akstafa; Kutais.
angystropha, Boettg. Kutais; Poti; Elisabetpol.
contortula, Kryn. Batoum; Borschom; Oschten Fischt; Lenkoran; Kutais; Poti.
subeffusa, Boettg. Borschom; Manglis; Mamoutli; Lenkoran; Oschten Fischt; Mount Guk.
= effusa, Boettg.
v. daghestana, Boettg. Kaba.
v. depressa, Boettg. Helenendorff.
pygmaea, Boettg. Manglis.
sorella, Mouss. Rion.
Genus Polita, Held.
pura, Alder. Manglis; Elisabetpol.
v. lenticularis, Held. Borschom; Lenkoran.
hammonis, Strom. Borschom.
petronella, Charp. Oschten Fischt.
v. subnitidosa, Mouss. Mamoutli.
= jaccetanica, Boettg.
suturalis, Boettg. Batum; Suram Mountains.
caspia, Boettg. Talysh District.
translucida, Mort.
decipiens, Boettg. Shagh Dagh
komarowi, Boettg. Between Sukhum and Poti.
derbentina, Boettg. Derbent; Helenendorff.
Genus Euconulus, Reinh.
fulvus, Drap. Borschom; Kutais; Manglis; Kasbek. Batum; Elisabetpol; Oschten Fischt.
Sub-genus Conulopolita, Boettg.
raddei, Boettg. Between Sukhum and Poti.
Sub-family **Arlophantinae**
Genus Zonitoides, Lehm.
nitida, Müll. Elisabetpol; Sukhum; Borschom; Michailowo.
Family **Endodontidae**.
Group **Polyplacognatha**.
Genus Punctum, Morse.
pygmaeum, Drap. Borschom; Manglis; Elisabetpol.

Group **Haplogona**.
Genus PYRAMIDULA, Fitz.
Sub-genus PYRAMIDULA, s.s.
rupestris, Drap. Germab; Borschom; Kutais; Elisabetpol.
v. saxatilis, Hartm. Borschom.
Section PATULASTRA, Pfr.
lederi, Boettg. Lenkoran.
Section GONYODISCUS, Fitz.
ruderata, Stud. Borschom; Elisabetpol.
v. gorktschaana, Mouss. Borschom: Gorktschak.
Family **Helicidae**.
BELOGONA EUADENIA, Pils.
Genus EULOTA, Hartm.
Section EULOTA, s.s.
fruticum, Müll. Elisabetpol.
BELOGONA SIPHONADENIA, Pils.
Genus HELICELLA, Fér.
Section HELIOMANES, Moq.
variabilis, Drap. Poti; Novo Rossizk.
vestalis, Parr. Borschom.
krynickii, Andr. Wladikawkas; Baku; Lenkoran.
= babondubi, Parr.
= theodosiae, Cless.
v. minor. Sukhum; Novo Rossigk.
derbentina, Andr. Derbent; Akstafa; Batoum; Manglis; Kers; Baku; Kutais; Tiflis; Borschom; Poti.
v. caucasica, Parr.
v. isomera, Boettg. Lenkoran.
v. suprazonata, Mouss. Delizan.
v. anprazonata. Mouss. Dagomys.
Section CANDIDULA, Kob.
acutistria, Boettg. Tiflis.
= crenimargo.
v obtusior, Mouss.
parableta, Boettg. Araxis.
profuga, Schm. Gudaur.
Section JACOSTA, Gray.
crenimargo, Kryn. Sardarabad.
= platigorskiensis, Bayer.
Section THEBA, Risso.
arpatschaiana, Mouss. Arpatschai; Daralaghez.
flaveola, Kryn. Between Sukhum and Poti; Psirsk.
flavolimbata, Boettg. Suanetia.
holotricha, Boettg. Psirsk.
pachnodes, Boettg. Uetsch Deré.
pisiformis, Pfr. Lenkoran; Batum; Elisabetpol.
pseudoglobula, Mouss. Kapudschiz.
selecta, Klika. Borschom; Kutais; Manglis; Gilat; Delizan; Elisabetpol; Araxis Region.
= globula, Kryn.
septemgyrata, Mouss. Kutais; Kers.
strigella, Drap. Wladikawkas.
transcaspia, Boettg. Kopet Dagh.
Section PLATYTHEBA, Pils.
prometheus, Boettg. Rion District.
jasonis, Dub. Nikolakevi.
Genus HYGROMIA, Risso.
Section MONACHA, Fitz.
aristata, Kryn. Kutais; Borschom; Poti.
carascalcides, Bourg. Dagomys; Psirsk; Mount Guk.

circassica, Charp. Borschom; Batum; Sukhum; Psirsk, Elisabetpol.
= colchica, Bayer.
euages, Boettg. Sukhum; Psirsk; Oschten Fischt.
frequens, Mouss. Kutais; Sukhum; Batoum.
fruticola, Kryn.
schuberti, Roth.

Section FRUTICICOLA, Held.
granulata v. epirotica, Mouss. Kasikoparan.
hispida v. hispidosa, Mouss. Akstafa.
revelata v. occidentalis, Recl. Somketh.
sericea v. caucasica, Mouss

Genus ACANTHINULA, Beck.
aculeata, Müll. Borschom; Elisabetpol; Lenkoran; Helenendorf.

Genus VALLONIA, Risso.
pulchella, Müll. Borschom; Batum; Sukhum, Elisabetpol; Poti.
costata, Müll. Borschom; Elisabetpol.
mionecton, Boettg. Agh Dagh.

Genus HELICIGONA, Fér.

Section FRUTICOCAMPYLAEA, Kob.
appeliana, Mouss. Kislovodsk.
v. mediata, West. Novorossik.
narzanensis, Kryn. Elisabetpol; Delizan; Mamoutli; Kasbeck.
v. suanetica, Boettg. Caucasus
v. macromphala, Boettg,
v. cyclothyra, Boettg.
v. solidior, Mouss.
pratensis, Pfr. Borschom; Kutais; Elisabetpol.
= bayeri, Parr.
v. depressa, Kob. Borschom.
v. solidior, Kob.
joannis, Mort. Batoum.
= dumonti, Mart.
pontica, Boettg. Sukhum.
nymphaea, Dub. Nikolakevi.
ravergiensis, Fér. Borschom; Manglis; Lenkoran; Elisabetpol; Murut
= limbata, Kryn.
= caucasica, Pfr.
= ravergii, Kryn.
= ravergieri, Kryn.
v. transcaucasica, Mouss. Helenendorf; Delizan.
phaeolaema, Boettg. Shagh Dagh.
eichwaldi, Pfr. Borschom; Kasbeck.
v. daghestana, Parr.
armeniaca, Pfr. Kasbeck; Elisabetpol.
= ziegleri v. airumia, Siemashko.

Genus HELIX, L.

Sub-genus LEVANTINA, Kob.
djulfensis, Dub. Djulfa; Ordubad.
= dschulfensis.
ceratomma, Pfr.

Sub-genus OTALA, Schm.
vermiculata, Müll.

Sub-genus TACHEA, Leach.
atrolabiata, Kryn. Borschom; Kutais; Poti; Sukhum; Elisabetpol.
= calligera, Dub.
v. stauropolitana, Schum. Sukhum; Mount Guk.
v. nemoraloides, Mart. Kutais.

v. lenkorana, Mouss. Lenkoran.
v. unicolor. Lenkoran.
v. pallasii. Dub Imeretia.
vindobonensis, Fér.
= austriaca, Mühl.
Sub-genus HELICOGENA. Fér.
buchi, Dub. Tiflis; Marienfeld; Chula; Imeretia.
v. martensi, Boettg.
lucorum, L.
v. euphratica, Mart. Sukhum; Elisabetpol.
v. taurica, Kryn. Elisabetpol; Lenkoran.
philibinensis, Friv. Georgia.
vulgaris, Parr. Kutais; Mount Guk; Kur District.
= obtusalis, Zglr.
nordmanni, Parr. Borschom; Kutais; Agkar; Kur District.
christophi, Boettg. Adschania.
raddei, Boettg. Lenkoran.

x. ASIA MINOR.

A. MAINLAND.

Our knowledge of the Mollusca of Asia Minor dates as far back as 1839, when a collection of these creatures was made by Dr. Erdl and Dr. Roth, which was described by the latter in "Molluscorum species, Dissertatio Inauguralis." Other contributions were made by Mousson (Coquilles terrestres et fluviatiles recuellies par le Prof. Bellardi, 1854); Pfeiffer, in Malak. Blätter, 1857; Issel, in Ann. Mus. Civ. Genova, 1877; Naegeli, in Nachrbl. Deutsch. Malak. Gesellsch., 1894; and quite recently by Sturany, in Sitz. Ber. K. Akad. Wiss., 1902, cxi.

One of the most striking features of the Molluscan fauna of this region is the number of species of *Zonites*, which further south are replaced by the genus *Leucochroa*.

The occurrence of *Vitrina conoidea*, Mart, on Mount Olympus in Asia Minor, as recorded by Bourguignat, [1] and confirmed by Sturany [2] is certainly remarkable. The shell was originally discovered in Turkestan, and if the Olympus specimens are correctly identified, the species may be assumed to exist in other places in the intervening countries; for the absence of intercourse would discountenance the theory of introduction to the one place or the other.

Family **Zonitidae**.
Sub-family **Zonitinae**. Pils.
Genus VITRINA, Drap.
sieversi, Mouss. Tokat.
= komarowi, Boettg.
? conoidea, Mart. Olympus.
Genus VITREA, Fitz.
cellaria, Müll. Trebizond.
diaphana, Stud. Trebizond; Reduktaleh.

1. Descr. nouv. Genre Gallardia, 1880, p. 8.
2. Sitz. Ber. Kais. Akad. Wiss., 1900, Bd. cix, p. 9.

crystallina, Müll. Reduktaleh.
lucida, Drap. Reduktaleh.
hydatina, Rossm. Smyrna; Samsun; Troas.
samsunensis, Retowski. Samsun.

Genus Polita, Held.
crenimargo, Retowski. Risa.
nitidissima, Mouss. Samsun; Sinope.
suturalis, Boettg. Risa; Trebizond.

Genus Retinella, Shutt.
natolica, Alb. Scutari.
duboisi, Charp. Reduktaleh, Elisabetpol; Kutais.
malinowskii, Pfr. Isnik.
cypria, Pfr. Tokat; Bujukdere; Samsun: Reduktaleh; Trebizond; Caria; Aidin;
v. borealis, Kob. N. Coast.
secernenda, Retowski. Trebizond; Samsun.
= filicum, Mouss. non Kryn.
frondosula, Mouss. Olympus.

Genus Euconulus, Reinh.
fulvus, Müll. Samsun; Reduktaleh.
boettgeri, Retowski. Trebizond.

Genus Zonites, Montf.
smyrnensis, Roth. Smyrna; Burnabat.
chloroticus, Pfr. Smyrna; Aidin.
corax, Pfr. Taurus.
caricus, Roth. Cacamo; Caria.
megistus, Rolle. Is. Meis (Megiste).
cilicicus, Kob. Giosna, Cilicia.
lycicus, Kob. and Rolle. Makri, Lycia.
rollei, Kob. Kastelloryzo, Is. Meis.

Family **Endodontidae.**

Sub-family **Endodontinae.**

Genus Pyramidula, Fitz.

Sub-genus Gonyodiscus, Fitz.
erdelli, Roth. Is. Prinkipo. Beikos.

Family **Helicidae.**

Belogona Euadenia, Pils.

Genus Leucochroa, Beck.
adanensis, Naeg. Adana, Cilicia.

Belogona Siphonadenia, Pils.

Genus Helicella, Fér.

Section Heliomanes, Moq.
variabilis, Drap. Hieronda; Caria; Troas; Smyrna; Brussa; Aidin; Magnesia.
variegata, Friv. v. infans, West. Smyrna.
ungeri, Zelebor, Samsun.
vestalis, Parr. Mersina; Alexandrette.
krynickii, Andr. Sinope; Samsun.
luteata, Parr. Is. Prinkipo.
derbentina, Andr. Trebizond; Samsun.
joppensis, Roth v. subkrynickiana, Mouss. Mersina.
cretica, Fér. Beikos.
dichesthemena, Stur. Eski-Chetur.

Section Helicella, s.s.
aberrans, Mouss. Mersina; Abullonia.
neglecta, Drap. Chysir Kaleh.
obvia, Mke. Zenibazar; Schumla.
= candicans, Auct.
v. dejecta, Zglr. Taurus.
? nivea, Zglr. Mersina.

Section Candidula, Kobelt.

conspurcata, Drap. Smyrna.
profuga, Schm. Smyrna.
v. drachorichi, Zel. Sinope; Samsun.
v. comnena, Rct. Trebizond.
protea, Zgrl. Besika.
striata, Müll. Sinope; Trebizond.

Secton JACOSTA, Gray.
rozeti, Mich. Lampsaki; Anatolia.

Section TROCHULA, Schlüter.
pyramidata, Drap. Is. Prinkipo; Smyrna. Abullonia; Brussa.
? vernicata, West. Smyrna.

Section COCHLICELLA, Risso.
barbara, L. Sinope
= acuta, Müll.

Section THEBA, Risso
berytensis, Fér. v. rachiodia, Bourg. Cacamo; Caria.
= granulata, Roth.
cantiana, Mont. Troas.
carthusiana, Müll. Caria; Brussa; Abullonia.
v. carthusianella, Drap. Caria.
flaveola, Kryn. Trebizond.
obstructa, Fér.
= obstrusa, Fér.
v. adpressula, Friv. Mersina.
v. depressula, Kob. Adana, Cilicia.
rothi, Pfr. Beikos.
v. obsita, Mouss. Beikos; Smyrna.
subobstructa, Bourg. Beikos.
syriaca, Ehrb. Hieronda; Mersina; Alexandrette; Caria.

Genus HYGROMIA, Risso.

Section MONACHA, Fitz.
bifaria, West. Brussa.
carascaloides, Bourg. Tokat.
consona, Zglr. Beikos.
dasilepida, Bourg. Lasistan.
frequens, Mouss, Alexandrette; Sinope; Samsun; Trebizond; Risa; Is. Prinkipo.
lepidolena, Bourg. Mersina.
malleolata, West. Nr. Smyrna.
muscicola, Bourg. Risa; Trebizond.
= crenophila, Pfr.
ovularis, Bourg. Isnik.
proclivis, Mart. Smyrna; Magnesia; Burnabat.
redtenbacheri, Zel. Smyrna.
rissoana, Pfr. Trebizond; Reduktaleh.
schuberti, Roth. Caria.

Section FRUTICICOLA, Held.
chrysotricha, Boettg. Samsun.
lanuginosa, Boiss. Beikos.

Genus VALLONIA, Risso.
pulchella, Müll. Samsun.

Genus HELICODONTA, Fér.

Section CARACOLLINA, Beck.
gyria, Roth. Caria; Lycia.
lens, Fér. Caria.

Genus HELICIGONA, Fér.

Section CHILOSTOMA, Fitz.
matrella, West. Smyrna.

Section FRUTICOCAMPYLAEA, Kobelt.
pratensis, Pfr. Chysir Kaleh.

Genus HELIX, L.

Sub-genus EUPARYPHA, Hartm.
pisana, Müll. Mersina; Alexandrette.
v. byzantina, Roth. Byzantium.

Section Levantina, Kobelt.
spiriplana, Oliv. Caria.
werneri, Rolle. Adana.
cilicia, Kob. Julet Kabas, Cilicia.
mardinensis, Kob. Mardin.
naegelei, Kob. Sis, Cilicia.
Section Otala, Schumacher.
vermiculata, Müll. Is. Prinkipo; Sinope; Burnabat; Smyrna; Troas.
callirhoe, Kob. Lycia.
lycica (Mart.), Kob. Lycia.
= codringtoni v. lycica, Mart. Kasteloryzo (Megiste).
Section Tachea, Leach.
atrolabiata, Kryn. Risa; Sephanos; Trebizond; Reduktaleh.
vindobonensis, Fér. Schumla.
aimophila, Bourg. v. tchichatcheffi, Kob. Biredschik.
Section Helicogena, Fér.
aspersa, Müll. Hieronda; Sinope; Caria; Byzantum; Aidin.
adanensis, Kob. Adana, Cilicia.
v. sarica, Kob.
buchii, Dub. Colchis.
lucorum, L. Orfa; Chalcedonia; Magnesia; Smyrna; Trebizond.
v. castanea, Oliv. Mersina; Alexandrette.
= mahometana, Bourg.
v. euphratica, Mart. Trebizond; Samsun.
v. taurica, Kryn. Taurus; Tokat; Sinope.
ligata, Müll. Magnesia.
anctostoma (Mart.), Kob. Cilicia.
= cincta v. anctostoma, Mart.
= beilanica, West. Beilan near Alexandrette.
cincta, Müll. var. Hieronda.
v. anatolica, Kob. Aidin.
asemnis, Bourg. v. venusta, Mart. Knidos Peninsula.
figulina, Parr. Smyrna; Troas.
melanostoma, Drap. v. micula, Parr. Smyrna.
v. mersinae, Kob. Mersina.
pathetica, Parr. Tokat; Amasia.
maltzani, Kob. Magnesi near Smyrna.
bituminis, Kob. and Rolle. Tchangankio; Alexandrette.
issica, Kob. and Rolle. Alexandrette.
pericalla, Bourg. Giosnia, Cilicia.
antiochiensis, Kob. and Rolle. Antioch.
epidaphne. Kob. Antioch.
infidelium, Kob. Alexandrette.
escherichi, Boettg. Ak-shehir.

B. ISLANDS OF ASIA MINOR.

The only comprehensive survey of the Mollusca of these Islands I have been able to trace is that by Professor von Martens, [1] based

1. Arch. für Naturgesch., 1885, p. 189.

on a collection made in 1887 in the Grecian Islands, extending to the southwest corner of Asia Minor, by von Ortzen. Previous records are by J. Roth, [2] and Mousson, [3] the latter from collections made by Professor Bellardi. In the case of Rhodes, Bourgnignat enumerated the collection made during Sauley's voyage.[4]

CHIOS.

Genus VITREA, Fitz.
nitidissima, Mouss. v. samia, Mart.
Genus RETINELLA, Shutt.
aequata, Mouss.
clessini, Hesse.
Genus ZONITES, Montf.
polycrates, Mart.
Genus HELICELLA, Fér.
Section HELIOMANES, Moq,
variabilis, Drap.
Section TROCHULA, Schl.
pyramidata.
Genus HYGROMIA, Risso.
Section MONACHA, Fitz.
schuberti, Roth.
– rissoana, Pfr.
Genus HELICODONTA, Fér.
Section CARACOLLINA, Beck.
lens, Fér.
Genus HELIX, L.
Section OTALA, Schum.
vermiculata, Müll. Kastro.
Section HELICOGENA, Fér.
aspersa, Müll, Kastro.
aperta, Born.
asemnos, Bourg. v. homerica, Mart.

SAMOS.

Genus VITRINA, Drap.
annularis, Stud. Kerki.
Genus VITREA, Fitz.
nitidissima, Mouss. v. samia, Mart. Kerki.
Genus RETINELLA, Shutt.
samia, Kob.
cypria, Pfr. v. major, Mart. Kerki.
Genus ZONITES, Montf.
polycrates, Mart. Marathokampos.
Genus PYRAMIDULA, Fitz
rupestris, Drap. Kerki.
Genus HELICELLA, Fér.
Section HELIOMANES, Moq.
cauta, West.
Genus HYGROMIA, Risso.
Section MONACHA, Fitz.
schuberti, Roth. Marathokampos.
– rissoana, Pfr.
proclivis, Mart.
Genus HELICODONTA, Fér.
Section CARACOLLINA, Beck.
lens, Fér.
Genus HELIX, L.
Section OTALA, Schum.
vermiculata, Müll.
Section HELICOGENA, Fér.
aspersa, Müll.
aperta, Born. Marathokampos.

2. Mollusc. Species, 1830
3. Mitth. Naturf. Ges. Zurich, 1854, Bd. iii, p. 59.
4. Cat. Rais. Moll. Sauley, 1853

NIKARIA.

Genus VITREA, Fitz.
nitidissima, Mouss. v. samia, Mart,
Genus RETINELLA, Shutt.
cypria, Pfr. v. major, Mart.
aequata, Mouss.
hydatina, Rossm. Agio-Kiriko.
sorella, Mouss. Petropulis.
eudaedalea, Bourg.
Genus ZONITES, Montf.
smyrnensis Petropulis.
polycrates, Mart Eodilos.
Genus PYRAMIDULA, Fitz.
rupestris. Drap. Agio-Kiriko.
Genus HELICELLA, Fér.
Section THEBA, Risso.
carthusiana, Müll.
Genus HELICIGONA, Fér.
Section CHILOSTOMA, Fitz.
cyclolabris, Desh. v. (subfossil).
Genus HELIX, L.
Section HELICOGENA, Fér.
aperta, Born.
cincta, Müll. v. minor, Mart,

KALYMNOS.

Genus RETINELLA, Shutt.
cyprea, Pfr. v. major, Mart.
aequata, Mous.
Genus PYRAMIDULA, Fitz.
Section GONYODISCUS, Fitz.
erdelii. Roth.
Genus HELICELLA, Fér.
Section HELIOMANES, Moq.
variabilis, Drap.
Section CANDIDULA, Kobelt.
calymnia, Mart.
Section TROCHULA, Schl.
pyramidata, Drap.
Genus HYGROMIA, Risso.
Section MONACHA, Fitz.
proclivis, Mart.
Genus HELICODONTA, Fér.
Section CARACOLLINA, Beck.
lens, Fér.
Genus HELIX, L.
Section LEVANTINA, Kobelt.
spiriplana, Oliv. var.
Section OTALA, Schum.
vermiculata, Müll.
Section HELICOGENA, Fér.
valentini, Kob.

KAPPARI.

Genus PYRAMIDULA, Fitz
Section GONYODISCUS, Fitz.
erdelii, Roth.
Genus HYGROMIA, Risso.
Section MONACHA, Fitz.
proclivis, Mart.
Genus HELIX, L.
Section OTALA, Schum.
vermiculata, Müll.
Section HELICOGENA, Fér.
figulina, Rossm.

KOS.

Genus HELICELLA, Fér.
Section, TROCHULA, Schl.
pyramidata, Drap.
Genus HYGROMIA, Risso.
Section MONACHA, Fitz.
proclivis, Mart.
Genus HELIX, L.
Section EUPARYPHA, Hartm.
pisana, Müll.
Section OTALA, Schum.
vermiculata, Müll.

NISYROS.

Genus RETINELLA, Shutt.
aequata, Mouss.
Genus PYRAMIDULA, Fitz.
Section GONYOMISCUS, Fitz.
erdelii, Roth.
Genus HYGROMIA. Risso.
Section MONACHA, Fitz.
proclivis, Mart.
Genus HELIX, L.
Section OTALA, Schum.
vermiculata, Müll.

SYMI.

Genus ZONITES, Montf.
symmensis, Roth.
rhodius, Mart.
Genus HELIX, L.
Section LEVANTINA, Kob.
spiriplana, Oliv. var.
Section OTALA, Schum.
vermiculata, Müll.
Section HELICOGENA, Fér.
aperta, Born.
asemnis, Bourg. v. homerica, Mart.
figulina, Rossm.

RHODES.

Genus VITREA, Fitz.
nitelina, Bourg
protensa, Fér.
Genus RETINELLA, Shutt.
aequata, Mouss.
Genus ZONITES, Montf.
verticillus, Fér.
rhodius, Mart.
Genus PYRAMIDULA, Fitz.
Section GONYOMISCUS, Fitz.
erdelii, Roth.
Genus HELICELLA, Fér.
Section HELIOMANES, Fér.
variabilis, Drap. Kastelo; Trianda.
cretica, Pfr. Kastelo; Trianda.
simulata, Fér.
submaritima, Desm.
= lauta, Lowe.
maritima, Drap.
Section HELICELLA, s.s.
itala, Linné
= ericetorum, Müll.
Section CANDIDULA, Kob.
mesostena, West. Trianda.
Section TROCHULA, Schl.
verticillata, Parr.
pyramidata, Drap. Kastelo.
trochoides, Poir.
Section THEBA, Risso.
syriaca, Ehrb. Kastelo; Trianda; Rhodos.
rothi, Pfr.
Genus HYGROMIA, Risso.
Section METAFRUTICICOLA, Iher.
pellita, Fér. Rhodos.
Genus HELICODONTA, Fér.
Section CARACOLLINA, Beck.
lens, Fér.
lenticula, Fér.
Genus HELIX, L.
Section EUPARYPHA, Hartm.
pisana, Müll.
Section LEVANTINA, Kob.
spiriplana, Oliv. Kastelo.
= gallandi, Bourg.
v. maltziana (Parr), Rossm.
= maltziana (Parr), Pfr.

Section OTALA, Schum.
vermiculata, Müll.
lactea, Müll.
Section HELICOGENA, Fér
aspersa, Müll.
aperta, Born.
cincta, Mull.
figulina, Rossm. Kastelo.
pomacella, Parr v. concolor, Bourg.
equitum (Bourg.), Kob.

KHARKI. (CHALKI).

Genus RETINELLA, Shutt.
aequata, Mouss,
Genus HELICELLA, Fér.
Section HELIOMANES, Moq.
cretica, Pfr.
Genus HYGROMIA, Risso.
Section METAFRUTICICOLA, Iher.
pellita, Fér.
Genus HELIX, L.
Section LEVANTINA, Kob.
spiriplana, Oliv.
Section HELICOGENA, Fér.
aperta, Born.

KARPATHOS.

Genus RETINELLA, Shutt.
aequata. Mouss.
Genus ZONITES, Montf.
caricus, Roth.
Genus HELICELLA, Fér.
Section HELIOMANES, *Moq.*
cretica, Pfr.
candiota, Pfr.
Genus HYGROMIA, Risso.
Section METAFRUTICICOLA, Iher.
pellita, Fér.
Genus HELIX, L.
Section LEVANTINA, Kob.
spiriplana, Oliv. var.

SOKASTRO. (WEST OF KARPATHOS).

Genus HELICELLA, Fér.
Section HELIOMANES, Moq.
cretica, Pfr.

KAXO. (KASOS).

Genus RETINELLA, Shutt.
aequata, Mouss.
Genus ZONITES, Montf.
pergranulatus, Kob.
casius, Mart.
Genus HELICELLA, Fér.
Section HELIOMANES. Moq.
cretica, Pf.
candiota, Pfr.
Section TROCHULA, Schl.
pyramidata, Drap.
Genus HYGROMIA, Risso.
Section METAFRUTICICOLA, Iher.
pellita, Fér.
testacea, Mart.

ARMATHIA.

Genus HELICELLA, Fér.
Section HELIOMANES, Moq.
candiota, Pfr.
Section CANDIDULA, Kob.
mesostena, West.
Genus HYGROMIA, Risso.

Section METAFRUTICICOLA, Iher.
pellita, Fér.
Genus HELIX, L.
Section OTALA, Schum.
vermiculata, Müll.

C. CYPRUS.

We owe our knowledge of Cyprus Helicoids chiefly to Bourguignat,[1] Mousson,[2] and Zelebor.[3] More recently Rolle,[4] Kobelt,[5] and Westerlund [6] have added some new species.

Genus VITREA, Fitz.
cyprina, West. Atrankan.
Genus ZONITES, Montf.
cypricus, Pfr.
Genus PYRAMIDULA, Fitz.
Section GONYDISCUS, Fitz.
sudensis, Pfr. v. cypria, Kob.
Genus HELICELLA, Fér.
Section HELIOMANES, Moq.
cretica, Pfr. v. littoralis, Mouss.
ungeri, Zel.
Section CANDIDULA, Kob.
profuga, Schm.
contempta, Parr.
cyparissias, Parr.
Section JACOSTA, Gray.
syrensis, Pfr.
= tarulosa, Parr.
ledereri, Pfr.
andrewi, Rolle. Usticensis, Calc.
Section TROCHULA, Schl.
idaliae, Bourg.
liebetruti, Alb.
Section COCHLICELLA, Risso.
barbara, L.
= acuta, Müll.
Section THEBA, Risso.
syriaca, Ehrb.
rothi, Pfr.
larnacensis, Kob. Larnaka.
Genus HYGROMIA, Risso.
Section MONACHA, Fitz.
redtenbacheri, Zel.
nicosiana, Mouss.
v. pallida, Mouss.
lusignani, Kob.
Section METAFRUTICICOLA, Iher.
pellita, Fér.
Genus HELICODONTA, Fér.
Section CARACOLLINA, Beck.
lens, Fér.
lenticula, Fér.
Genus HELIX, L.
Section EUPARYPHA, Hartm.
pisana, Müll.
Section LEVANTINA, Kob.
bellardii, Mouss.
v. occlusa, Mouss.
guttata, Oliv.
lapithoensis, Rolle.
gertrudis, Rolle.
chrysostomi, Rolle.
Section OTALA, Schum.
vermiculata, Müll.
Section HELICOGENA, Fér.
aspersa, Müll.
aperta, Born. var. Kob.

1. Cat. Rais. Moll. Saulcy, 1853.
2. Coq. terr. fluv. Bellardi, 1854, p. 28.
3. In Unger and Kotschy, Die Insel Cypern, 1865, p. 591.
4. Nachr. Deutsch. Malak. Gesell., 1878, p. 165.
5. Rossm. Icon. Suppl., Bd. I, 1895, Lief. 5 and 6.
6. Nachr. Deutsch. Malak. Gesell., 1902, p. 22.

= kalimatia, Bourg. Mus. Geneva.
ligata, Müll.
cincta, Müll.
v. cypria, Kob.
stenarochila (Bourg.), Kob.
trixenostoma (Bourg.), Kob.
cornarae (Bourg.), Kob.
pediaea (Bourg.), Kob.
chassyana (Mab.), Kob.
xeraethia (Bourg.), Kob.

DOUBTFUL SPECIES RECORDED BY BOURGUIGNAT AND ZELEBOR.

Helix cirtae, Rossm.—Perhaps a form of *Otala vermiculata*.
Helix soluta, Mich.—It is extremely improbable that this Algerian shell occurs in Cyprus.
Helix supplementaria, Parr.—A nude name recorded by Zelebor.

XI. SYRIA (INCLUDING PALESTINE).

Like those of Asia Minor the Mollusca of Syria have first been brought to our knowledge by Roth and Mousson. Bourguignat recorded the the collection made by Saulcy (1853), while the latest comprehensive list is by Dautzenberg.[1] Most of the mollusca of this region, are of the desert type of snails, chief among which are the Leucochroas.

Family **Zonitidae**.
Sub-family **Zonitinae**, Pils.
Genus DAUDEBARDIA, Hartm.
gaillardoti, Bourg. Sidon.
saulcyi, Bourg. Beyrouth; Sidon.
= syriaca, Roth.
Genus VITREA, Fitz.
cellaria v. sancta, Roth. Hieros; Antioch; Jerusalem.
nitelina, Bourg. Jerusalem; Naplouse; Nazareth.
camelina, Bourg. Jerusalem; Nazareth; Jericho; Naplouse; Baalbec.
draparnaudi v. syriaca, Rossm. Syria.
carmeliensis, Pfr. Mount Carmel.
berytensis, Naeg. Beyrouth.
Genus RETINELLA, Shutt.
simoni, Boettg. Baalbec.
libanica, Boettg. Beyrouth.
aequata, Mouss. North Palestine.
jebusitica, Roth. Jerusalem; Sarepta; Hakeldama.
protensa, Fér. Naplouse.
Family **Endodontidae**.
Sub-family **Endodontinae**, Pils.
Genus PYRAMIDULA, Fitz.
hierosolymitana, Bourg. Hieros; Jerusalem.
Section GONYDISCUS, Fitz.
erdelli, Roth. Jerusalem; Beyrouth.
? = flavida, Rossm.
Family **Helicidae**.
BELOGONA EUADENIA, Pils.
Genus LEUCOCHROA, Beck.
candidissima, Drap. Common.
v. hierochuntina, Boiss.

1. Revue Biol. Nord de France, 1894, p. 329.

Jaffa.
prophetarum, Bourg. Jerusalem; Sebbeh. North and West of Dead Sea.
fimbriata, Bourg. Alexandrette.
v. myops, West.
v. illicita, Mouss.
v. varicosula, West. Tarina.
cariosa, Oliv. Nazareth; West Palestine; Syria.
v. amphicyrta, Bourg.
v. nazarensis, Mouss.
v. crassocarina, Mouss.
rollei, Kob. Alexandrette.

Section SPHINCTEROCHILA, Anc.
boissieri, Charp. Judaean Desert.
filia, Mouss. Near Dead Sea.

BELEGONA SIPHONADENIA, Pils.

Genus HELICELLA, Fér.

Section XEROCRASSA, Monterosato.
seetzeni, Koch. Southern Deserts; Jericho.
= sabaea, Boiss.
eremophila, Boiss. Desert of Sinai.
= cremnophila, Boiss.

Section HELIOMANES, Moq.
turbinata, Jan. Coast.
variabilis, Drap. Mount Carmel.
vestalis, Parr. Antioch; Dead Sea.
? = mesopotamica, Mouss.
v. alepina, West. Aleppo.
v. radiolata, Mart. Aleppo.
hamyi, Bourg. v. foveolata, West. Jericho.
= vestalis, v. foveolata, West.
maritima, Drap.
simulata, Fér. Jerusalem.
derbentina, Andr.
joppensis, Roth. Damascus.
= bargesiana, Bourg.
v. multinotata, Mouss. Jordan.
patriarcharum, West. Hebron.
cespitum, Drap. North Palestine
davidiana, Bourg. Jerusalem.

Section HELICELLA, s.s.
aberrans, Mouss. Damascus.
itala, L. Baalbec.
= ericetorum, Müll.
neglecta, Drap. Tiberias.
obvia, Mke. v. arenosa, Zglr.

Section CANDIDULA. Kob.
apicina, Lam. North Coast.
arrouxi, Bourg. Beyrouth.
caperata, Mont. Jerusalem; Nazareth.
hierocontina, West. Jericho.
conspurcata, Drap. Sidon.
improbata, Mouss. Jerusalem.
langloisiana, Bourg. Jerusalem; Mar Saba; Beni Hammad.
= caperata v. hierochuntina, Roth.
protea, Zglr. Judaea; Galilea; Moab.; E. Gilead; Syria.
= campestris, Zglr.

Section JACOSTA, Gray.
amanda, Rossm. Jerusalem.
ledereri, Pfr. Beyrouth.
= syrensis, Bourg. non Pfr.

Section OBELUS, Hartm.
tuberculosa, Conr. Jerusalem; Mar Saba.
= despreauxi, Bourg. S. Syria.
philammia, Bourg.
= serrulata, Pfr.

Section COCHICELLA, Risso.
barbara, L. Between Beyrouth and Sidon.
= acuta, Müll.

Section Theba, Risso.
berytensis, Fér. Jerusalem; Beyrouth; Mount Carmel; Sidon.
v. fourousi, Bourg. Beyrouth.
v. granulata, Roth. Liban.
obstructa, Fér. Jerusalem; Kemleh. Damascus; Tyre; Sidon.
v. adpressula, Friv. Beyrouth.
olivieri, Fér. Beyrouth; Jerusalem; Kemleh.
schotti, Pfr.
syriaca, Ehrb. Jerusalem; Syria; Tyre; Antioch.
= onchynina, Rossm.
= gregaria, Zglr.
carmelita, Tristr. Mount Carmel.
= tristrami, Mart.
Section Platytheba, Pils.
nummus, Ehrb. Beyrouth.
= hedenborgi, Pfr.
= oxygyra, Boiss.
spiroxia, Bourg. Alexandrette.
v. harmosa, West.
genezarethana, Mouss. Lake Genezareth; Jordan Valley; Tiberias.
= tiberiana, Mouss.
Genus Hygromia, Risso.
Section Monacha, Fitz.
crenophila, Pfr. Beyrouth.
= muscicola, Bourg.
solitudinis, Bourg. Baalbec.
Section Fruticicola, Held.
crispulata, Mouss. Jerusalem.
Genus Vallonia, Risso.
pulchella, Müll. Plain of Acre.
Genus Helicodonta, Fér.
Section Caracollina, Beck,
lenticula, Fér. Naplouse.

Genus Helix, L.
Sub-genus Euparypha, Hartm.
pisana, Müll. Sea of Judaea; Beyrouth.
Sub-genus Eremina, Pfr.
desertorum, Forsk.
= arabica, Roth.,
= maculosa, Born.
= irregularis, Fér.
= forskalii, Ehrb.
= psamitus, Bourg.
= gemellarii, Ben.
= rhodia, Chemn.
= depressa, Mart.
= pachytoichea, West.
= kobelti, West.
= dillwyniana, Pfr.
Section Levantina, Kob.
spiriplana, Oliv. South Palestine
= guttata, Bourg., non Oliv.
v. transjordanica, Kob.
hierosolyma, Boiss. Jerusalem.
v. masadae, Trlstr. Sebbeh.
v. lithophaga, Conr. Mar Saba; Deir.
caesareana, Parr. Jerusalem; Plain of Sharon; Mar Saba; Jericho; Jordan; Salima Valley; Sidon.
= caesarea, Boiss.
arnoldi, Kob. Between Jaffa and Jerusalem.
gerstenbrandti, Kob. Between Jaffa and Jerusalem.
ramlensis, Kob. Between Jaffa and Jerusalem.
guttata, Oliv.
eliae, Kob. South of Mount Carmel.
praecellens, Kob. Payas.
Section Otala, Schum.
vermiculata. Müll. Beyrouth;

Pieria.

Section HELICOGENA, Fér.

aspersa, Müll. Tyre; Sidon; Beyrouth; Jaffa, Jerusalem.
= grisea, Gm.
lucorum, L. v. taurica, Kryn. Lebanon.
schlaefli, Mouss.
fathallae, Naeg. La Trappe near Abkes.
ligata, Müll. Jerusalem; Lebanon.
anctostoma, Mart. Pompejopolis.
beilanica, West. Beilan near Alexandrette.
asemnis, Bourg. Naplouse; Lebanon.
= solida, Zglr.
= ciliciana, Bourg.
moabitica, Goldf. Moab.
figulina, Parr. Dead Sea.
v. albidula, Borug.
pachya, Bourg. Lake Genezareth; Beyrouth; Tiberias.
prasinata, Roth. Tiberias.
= jordanica, Bourg.
cavata, Mouss. Jerusalem.
= figulina v. B, Bourg.
engaddensis, Bourg. Judaea; Dead Sea.
v. concolor, Bourg. Nazareth; Jerusalem.
pycnia, Bourg. Nazareth.
baristata, Bourg. Between Alexandrette and Orfa.
racopsis, Bourg. Beyrouth.
achidaea, Bourg. Tarablus.

SOME NOTES ON THE GENUS PRISMA, SIMROTH.

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The University, Birmingham.

(Plate ix.)

The genus *Prisma* was constituted by Simroth [1] in 1891 for the reception of the following molluscs: the *Vaginula tourannensis* of Souleyet, the *V. prismatica* of Tapperone-Canefri, the *V. trigonus* of Semper, the *V. pulverulenta* of Benson, and a new species *Prisma heynemanni*. Of these, the two first and the last mentioned are probably true Prismas; and only *P. tourannense* and *P. prismatica* have been figured.

Simroth does not give any detailed description of the genus, and nothing whatever is known of the anatomy. The most characteristic external feature is the triangular shape of the body, when seen in cross section. Simroth in 1891 wrote (op. cit., p. 596) "it is open to question whether *Prisma* is a sub-genus of *Vaginula* or of *Atopos* or whether it constitutes a genus of its own, which is most probable."

Through the kindness of Mr. Edgar A. Smith, I have been able to examine the examples of this genus in the collection of the British Museum, and also to figure them. There are three specimens all labelled *V. prismatica*, Tap.-Can., the localities of these are as follows:

i. Huon Gulf, New Guinea (Dr. Comrie). Length (in alcohol) 39 millim.

ii. An island in the Torres Straits, or New Guinea. Length (in alcohol) 36·5 millim.

iii. New Guinea. Length (in alcohol) 56·5 millim.

I am entirely in accord with Simroth, who regards the Huon Gulf specimen (i) as a distinct species, *viz.* the *P. heynemanni* of Simroth. The second specimen (ii) is undoubtedly *Prisma prismatica*, Tap.-Can.,[2] while the third (iii) is quite distinct from either i or ii, and I am here describing it as a new species under the name of *Prisma smithi*, after Mr. Edgar A. Smith, as a mark of appreciation, for the facilities he has so kindly extended to me when examining these and other specimens in the British Museum collection, and for his permission to figure the three examples.

Heynemann[3] was undoubtedly wrong in fancying that the drawings of *P. tourannense*, Soul., and those of *P. prismatica*, Tap.-Can., were of one and the same species.

Prisma smithi, n. sp.

Pl. ix, figs. 1-3.

Colour of the notum greyish-brown, with small black spots arranged in a stellate manner; underside (perinotum?) yellowish-brown with a few very minute black spots; foot-sole yellowish-brown; keel prominent, slightly lighter in colour than the rest of the notum. Length of notum (in alcohol) 56·5, breadth 10, height 9 millim. Breadth of foot-sole 5 millim.

Hab.—New Guinea.

Type in the collection of the British Museum.

Prisma prismatica, Tap.-Can.

Pl. ix, figs. 4-6.

Veronicella prismatica, Tap.-Can.: Ann. d. Mus. Civ. de St. Nat. Genova, 1883, vol. xix, p. 207, Tav. xi, figs. 6-8.

Tapperone-Canefri has given three uncoloured figures of this species,

1. Zeit. f. wiss. Zool., 1891, Bd. lii.
2. Ann. d. Mus. Civ. di St. Nat. Genova, 1883, vol. xix, p. 207.
3. Jahrb. d. Deutsch. Malak. Gesell., 1885.

but they are not very satisfactory. As the type of the genus *P. tourannense*, Soul.,[4] is so beautifully represented, I have had two coloured figures made of *P. prismatica*.

The dimensions of the specimens in the collection of the British Museum are: length of notum (in alcohol) 36·5, breadth 7, height 6 millim., breadth of foot-sole 2 millim.

Hab.—An island in the Torres Straits, or New Guinea.

The type, from the Island of Sorong, measured 138 millim. in length.

The foot-sole in this species is less than half the breadth of that in *P. smithi* or *P. heynemanni*.

Prisma heynemanni, Simr.

Pl. ix, figs. 7-9.

Prisma heynemanni, Simr.: Zeit. f. wiss. Zool., 1891, Bd. lii, p. 596.

Colour of the notum greyish-yellow, spotted with black, closely and finely graulated; underside (perinotum?) ochreous, foot-sole same colour; keel prominent. Length of notum (in alcohol) 39, breadth 8, height 6 millim. Breadth of foot-sole 4·8 millim. Female generative orifice 4⅓ millim. from the head.

Hab.—Huon Gulf, New Guinea (Dr. Comrie).

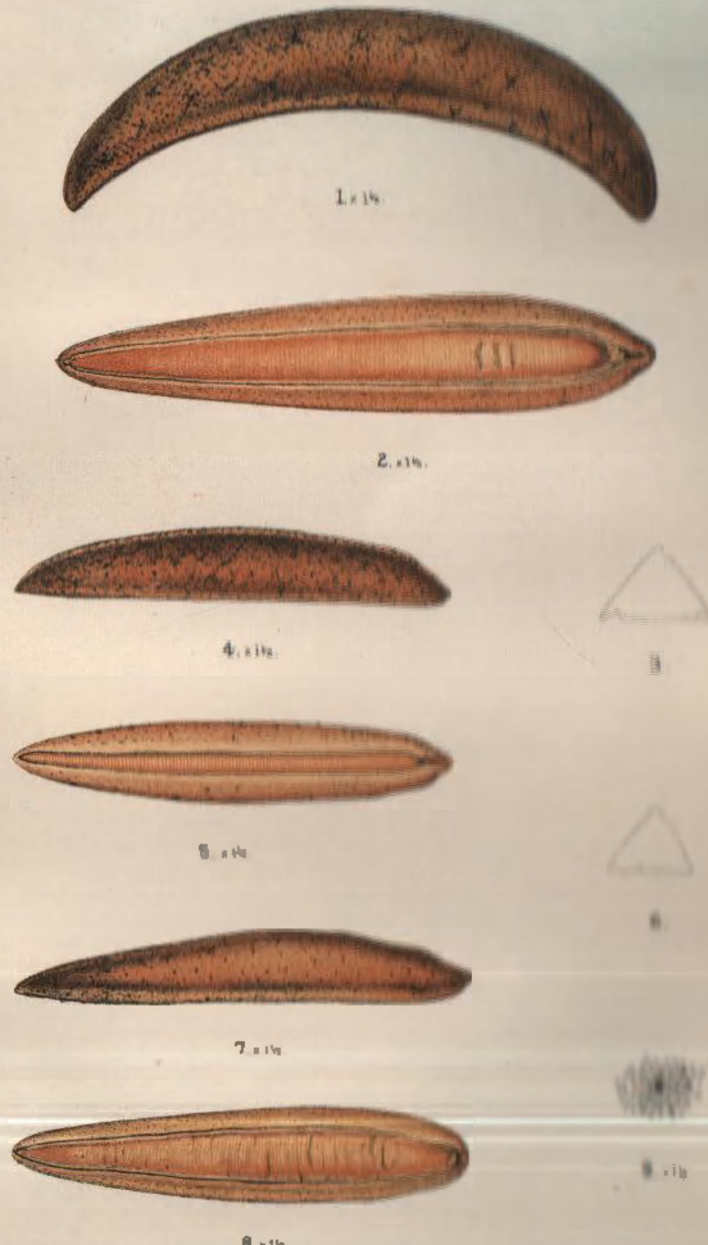
Type in the collection of the British Museum.

Simroth[5] quoting Heynemann,[6] rightly gives the length of this specimen as 39 millim., but Cockerell[7] states 36.

Although our knowledge of this genus is as yet very imperfect, I think there can be no doubt as to its distinctiveness from *Veronicella* on the one hand, and *Atopos*, Simr., and *Rathouisia*, Heude, on the other. The examination of further material will alone indicate its true position, and in connection with the members of this genus, as also those of *Atopos* and *Rathouisia*, the Testacella-like teeth may possibly be concomitant with habits similar to the *Testacellidae*, which future collectors would do well to bear in mind.

My best thanks are due, and are here tendered to Mr. C. Butterworth, for the care he has bestowed upon the figures, and to the Council of the Royal Society, out of a Grant from which, the cost has been defrayed.

4. Voyage sur le Bonite, 1852, T. ii.
5. Op. cit.
6. Op. cit.
7. Conchologist, 1893, vol. ii, p. 223.



C. Butterworth, del. et pinx ad nat.

Huth, lith London

THE GENUS PRISMA, SIMROTH

EXPLANATION OF PLATE IX.

Fig. 1.	*Prisma smithi*, n. sp.	Right lateral view. × 1½
Fig. 2.	„ „ „	Ventral view. × 1½
Fig. 3.	„ „ „	Diagrammatic transverse section.
Fig. 4.	*Prisma prismatica*, Tap.-Can.	Right lateral view. × 1½
Fig. 5.	„ „ „	Ventral view. × 1½.
Fig. 6.	„ „ „	Diagrammatic transverse section.
Fig. 7.	*Prisma heynemanni*, Simr.	Right lateral view. × 1½
Fig. 8.	„ „ „	Ventral view. × 1½
Fig. 9.	„ „ „	Portion of the notum, much enlarged.

FURTHER NOTES ON AMALIA CARINATA, RISSO.

By WALTER E. COLLINGE, B.Sc.

In response to my appeal in the June issue of this Journal,[1] I have received numerous examples of *Amalia sowerbyi*, Fér., from all parts of the British Isles, particularly interesting amongst which are some from Ireland.

When I wrote my previous note, I had for the moment overlooked the fact that Dr. Scharff[2] had recorded *A. carinata*, Risso, from Ireland, the specimens being verified by Dr. Simroth. I have not seen Dr. Scharff's specimens, but I cannot agree with him in regarding Risso's species as synonymous with the *A. sowerbyi* of Férussac. An example of this last mentioned species referable to the variety *nigrescens*, Ckll., from Woodenbridge, Co. Wicklow, and two examples of the ordinary form from Piperstown, Co. Louth, received from Dr. Scharff, are certainly quite unlike examples of *A. carinata*, Risso, which I have in my collection from Nizza, Northern Italy, and from Algiers, as also are many other specimens which I have in recent years examined from various Irish localities. Further they are very distinct from the two Amalias which I recorded in my previous note, which latter agree very closely with the Italian examples of *A. carinata*, but much less so with the Algerian specimens.

I have now to record two Amalias from Kingstown, Co. Dublin, which leave no doubt in my mind that *A. carinata*, Risso, certainly occurs in Ireland, in addition to *A. sowerbyi*, Fér. These two specimens are intermediate, in colouring and markings, between the Italian and Algerian specimens mentioned above, and cannot in my opinion, be referred to Férussac's species.

1. See ante p. 64.
2. Trans. Roy. Dublin Soc., 1891, vol. iv. (ser. ii), p. 531.

I think, there can be little doubt but that Risso's species has been confused with *A. sowerbyi* in this country, and that on more careful examination it will be found to be fairly well distributed. I hope at a later date to give coloured figures of the British examples, and also figures of the internal anatomy.

In the meantime, I shall still be pleased to receive further examples from any parts of the British Isles.

Distribution in British Isles.

Devon.—Barnstaple (F. J. Partridge).

Warwick.—Near Birmingham (Bromley Peebles).

Dublin—Kingstown. Dr. Scharff[3] does not distinguish between *A. carinata*, Risso, and *A. sowerbyi*, Fer., in his list.

THE ANATOMY OF THE BRITISH SPECIES OF THE GENUS SOLEN.

Part IV. *

By H. H. BLOOMER.

Plate x.

Solen pellucidus, Penn.

External Characters.

When compared with *S. ensis*, L., this species presents the following points of difference: The measurement from the dorsal to the ventral surface is proportionately greater. 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 (Pl. x, fig. 1, H.). What represents the fourth aperture is present at the posterio-ventral part of the pedal aperture. As in *S. ensis* it carries a tentacular fringe From specimens examined, I have not been able to find any trace of concrescence of the mantle lobes between the two apertures, but as this portion of the animal is easily ruptured, the question still remains a matter of uncertainty. The pedal aperture is larger, extending more posteriorly both dorsally and ventrally. The dorsal and anterior edges of the mantle lobes bordering it, carry a closely and finely crenulated fringe, while in the dorsal portion, the mantle lobes are joined together a little below their margins, thus forming a chamber, which apparently does not communicate with the pallial chamber. The foot (Pl. x, fig 1, *F.*)

3. Irish Naturalist, 1895, vol. 1, p. 85.

* See ante p. 18.

is large, particularly as it approaches its distal end, where it is axe-shaped and of considerable depth. The bases of the inner gills are connected with each other as in *S. marginatus*, Pult. and Don.

Musculature.

The musculature of *S. pellucidus* differs from that of *S. ensis* in the following particulars.

i. The Pallial Muscles.—The muscles along the edges of the mantle lobes are deeper than in *S. ensis*, and anteriorly describe a semi circular curve to the anterior end of the anterior adductor muscle (Pl. x, fig. 1, *H.*), while posteriorly, where forming the proximal portion of the siphon, they are much more developed (Pl. x, fig. 1, E.S.C. and I.S.C.).

The posterior portion of the anterior adductor is deeper but the depth gradually diminishes towards the anterior end, which curves dorsally to the teeth of the shell (Pl. x, fig. 1, *A.A.*).

The posterior adductor is correspondingly smaller (Pl. x, fig. 1, *P.A.*).

ii. The Pedal Muscles.—The foot increases in size towards its distal end. In this part the muscles are frayed out, and form a large fibrous network. The retractor pedis posterior muscles are longer, their terminal parts being situated more posteriorly than in *S. ensis* (Pl. x, fig. 1, *P.R.A.*)

In the retractor pedis anterior muscles, the posterior bifurcation (Fig. 1, *P.R.A.*) is short and thick, while the anterior one (Fig. 1, *P.R.A.'*) is long and narrow extending over the greater portion of the anterior adductor muscle. The fibres of the muscle cross the foot, as in *S. marginatus*, and pass underneath instead of over the longitudinal muscles, eventually becoming buried in the muscular integument.

The Alimentary Canal.

The oesophagus (Pl. x, figs. 2 and 3. *Oe.*) is long and narrow, passing in a posterior direction to the stomach, in consequence of which, the latter is situated more posteriorly than in *S. ensis*. The divisions of the stomach are very pronounced. The cardiac portion (Fig. 2, *C. St.*) is a narrow, deep, pocket-shaped sac. The pyloric portion (Fig. 2, *P. St.*) and the proximal portion of the caecum of the crystalline style (*C.C.*) are very large, while the latter is of considerable length and extends along the greater portion of the pedal cavity. The intestine (*In.*) proceeds from the pyloric portion, close to the caecum of the crystalline style, to within a short distance of its distal end, where it bends and returns along the opposite side, traverses round the posterior dorsal end of the stomach and folding upon itself, passes into the rectum (*R.*). If contrasted with the description of *S. ensis* and *S. marginatus*, it will

be seen that in many respects the alimentary canal more closely resembles that of the latter than that of the former, the more important differences being the relatively larger size of the pyloric portion of the stomach and of the distal part of the caecum of the crystalline style, and the absence of folds in the intestine shortly after leaving the stomach.

The position of the liver (Fig. 1, *L.*) is similar to that of *S. ensis*.

Nervous System.

The nervous system of *S. pellucidus* resembles that of *S. ensis*, differing from it, however, in the number and distribution of the pallial nerves.

The anterior pallial nerve only gives rise to two branches. The first branch leaves the nerve after it has passed a little distance under the ventral surface of the anterior adductor muscle, and the second a short distance before reaching the anterior edge of the muscle; both branches cross the mantle lobe and join 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, which anteriorly passes along the dorsal portion of the muscular part of the mantle lobe, and gradually attains a ventral position as it proceeds posteriorly. It is to be observed that the two anterior pallial nerves fuse together close to where the teeth of the shell are connected with the dorsal integument, forming a small ganglionic mass, and then separating, pass along the mantle lobes.

Circulatory System.

The general features resemble those of *S. ensis*, but owing to the smallness of the specimens examined it has not been possible to follow it out in all its detail.

From the foregoing morphological account of the different species, and from further work shortly to be published, I purpose at no distant date to review the present classification of the genus *Solen*.

EXPLANATION OF PLATE X.

Solen pellucidus, Penn.

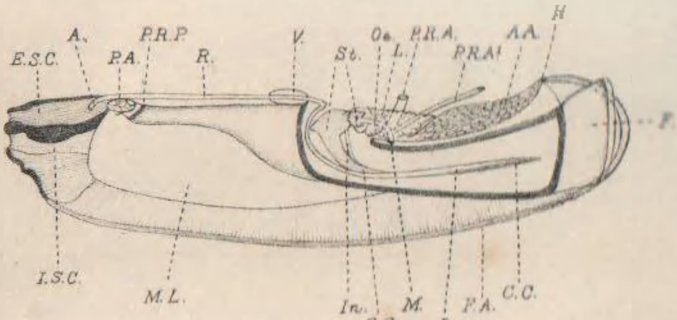
Fig. 1. View from the right side, alimentary canal, &c. × 3.

Fig. 2. Longitudinal section of the stomach, showing the internal structure of the left side. × 12.

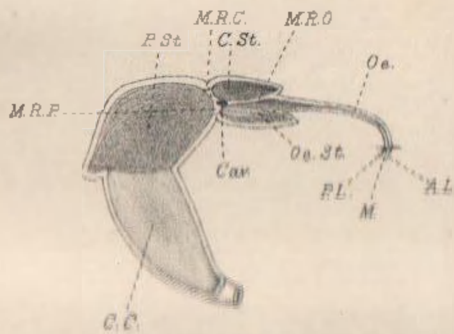
Fig. 3. Longitudinal section of the stomach, showing the internal structure of the right side. × 12.

REFERENCE LETTERS.

A. Anus.
A.A. Anterior adductor muscle.
A.L. Anterior lip.
Cav. Small cavity receiving the small bile duct.
C.C. Caecum of crystalline style.
C.S. Crystalline style.
C. St. Cardiac portion of stomach.
E.S.C. Exhalent siphonal chamber.
F. Foot.
F.A. Fourth aperture.
H. Point where the dorsal integument is connected with the teeth of the shell.
In. Intestine.
I.S.C. Inhalent siphonal chamber.
L. Liver.
M. Mouth.
M.L. Mantle lobe.
M.R.C. Muscular ridge separating the cardiac from the pyloric portion of the stomach.
M.R.O. Muscular ridge separating the oesophagael from the cardiac portion of the stomach.
M.R.P. Muscular ridge separating the small cavity receiving small bile duct from pyloric portion.
Oe. Oesophagus.
Oe. St. Oesophagael portion of stomach.
P.A. Posterior adductor muscle.
P.L. Posterior lip.
P.R.A., *P.R.A.'* Bifurcated parts of retractor pedis anterior.
P.R.P. Bifurcation of retractor pedis posterior.
P. St. Pyloric portion of stomach.
R. Rectum.
St. Stomach.
V. Ventricle.



1. × 3.



2. × 12.

3. × 12.

H.R.B. del. ad nat. Huth, lith. London

ANATOMY OF SOLEN.

OBITUARY.

Alexander Onufrievitch Kowalevsky.

Born November 20th, 1840. Died November 22nd, 1901.

The death of Professor Kowalevsky removes a zoologist of renown, and one whose studies ranged over a wide field. In the Mollusca he investigated the development of *Chiton* and *Dentale*, the structure of *Pseudovermis* and the *Hedylidae*, and in conjunction with Professor A. F. Marion, the Solenogastres, and with Ovsyannikov, the central nervous system and auditory organ of the Cephalopoda.

Oliver Collett.

Born 1867. Died June 13th, 1902.

By the untimely death of Mr. Oliver Collett, Malacology has lost a devoted and single hearted student of the Cingalese mollusca.

When, in 1898, I resumed the Editorship of this Journal, Mr. Collett wrote me inquiring if, in connection with my work on Asiatic molluscs, I cared to examine any of those from Ceylon; this was the commencement of a regular correspondence, which, alas! has all too soon ceased. As I write, there lies before me the latest consignment from him (one of very many which he has sent me, and which, as yet, have been little more than examined in opening), containing examples of *Nilgira*, *Ariophanta*, *Euplecta*, *Veronicella*, etc., all beautifully preserved.

Mr. Collett while engaged in his vocation as a tea planter, found time for much zoological work. As a member of the Ceylon branch of the Royal Asiatic Society, he contributed various papers to their Journal.

He died on June 13th, somewhat suddenly at Columbo, from an attack of dysentery.

Much of the material collected by Mr. Collett has been described by Dr. Blanford, Mr. E. R. Sykes, Lt. Col. Godwin-Austen, myself and others. Some, however, he described himself in the following papers:

1. "Description of *Streptaxis gracilis*, n. sp., from Ceylon." Proc. Malac. Soc. London, 1897, vol. iii, p 1. fig.
2. "The Terrestrial Mollusca of Ambagamuwa." Journ. Ceylon Asiat. Soc., 1897, vol. xv, pp. 12—21.
3. "On two new varieties of *Cataulus nietneri*, G. and H. Nev., from Ceylon." Journ. of Malac., 1899, vol. vii, pp. 85, 86, 3 figs.
4. "Description of a new Helicoid land shell from the Southern

Province." Journ. Ceylon Asiat. Soc., 1899, vol. xv, pp. 153, 154, 1 pl.

5. "Pearl Oysters and Pearl Fisheries." Ceylon Observer, 1900, pp. 1—12.
6. "The Terrestrial Mollusca of Ambagamuwa." Journ. Ceylon Asiat. Soc., 1901, vol. xvi, pp. 1—8.

James G. Cooper.

Born June 19th, 1830. Died July 19th, 1902.

By the death of Dr. Cooper, Western America loses another of its pioneer zoologists. Born in New York in 1830, he received his degree in 1851, and two years later he was appointed physician on a government survey between St. Paul and Puget Sound. Here part of his duty was to make zoological and botanical collections, and after the abandonment of the survey in 1855, he continued his field work on the Pacific coast until 1860. In that year he was appointed Zoologist of the California State Geological Survey. Later he served as a surgeon in the Civil War, after which his life was spent in the practice of his profession.

Although interested in many branches of zoology, he published upwards of forty papers on the mollusca, many of great value and interest.

NOTES.

Physa virgata mut. alba, nov.—Shell pure white. Salt River at Tempe, Arizona, 1902, with the ordinary form.—T. D. A. COCKERELL.

Limax maximus, L., in the Hawaiian Islands.—I have recently received from Professor H. W. Henshaw a small collection of slugs from the neighbourhood of Hilo, amongst which is an example of *Limax maximus*, L. Externally the body is a deep yellow (in alcohol) with about nine irregular and broken black bands, the mantle is spotted with numerous black spots, mostly smaller than those composing the bands. The generative organs differ slightly from those of British or Continental specimens. This species has not hitherto been recorded from the Hawaiian Islands.—WALTER E. COLLINGE.

PROCEEDINGS OF THE MIDLAND MALACOLOGICAL SOCIETY.

37TH MEETING, JUNE 13TH, 1902.

The President in the chair.

EXHIBITS.

By Mr. F. J. Partridge: *Succinea oblonga* from Braunton Marshes, North Devon, and examples of *Hydrobia jenkinsi*.

By Mr. Overton: *Planorbis umbilicatus* and monstrosities, *P. corneus*, *Limnaea stagnalis*, *L. peregr*, and *Bythinia tentaculata*, from the Derby canal; also *Limnaea stagnalis* from Sutton Coldfield.

By Mr. Collinge: *Limax arcticus*, Bgt., from Washington, D.C., *Otoconcha dimidiata*, Pfr., from North Island, New Zealand, and a small collection of slugs from North America.

38TH MEETING, NOVEMBER 15TH, 1902.

The Meeting was held at the President's house.

The President in the chair.

It was unanimously decided (i) to undertake the preparation of a Record of the Molluscan Fauna of Warwickshire, and that Mr. H. Overton be the Recorder. Also (ii) the collection of statistics on the Early Colour Changes, Protective and Mimetic Colouring of Molluscs, and that Mr. Walter E. Collinge be the Recorder.

EXHIBITS.

The President exhibited part of his collection of Slugs, and Land and Freshwater Molluscs and Nudibranchs (in alcohol); the eggs of many species of molluscs, and a series of monographs and memoirs upon the anatomy of the Mollusca.

CURRENT LITERATURE.

Pilsbry, Henry A.—Tryon's Manual of Conchology, ser. ii, Index volume, pp. i—xcix; vol. xv (pt. 57), pp. 1—48, pls. 1—15. Philadelphia: Academy of Natural Sciences.

The very useful Index volume contains a classification of the Bulimoid molluscs described in volumes x—xiv of the "Manual." Dr. Pilsbry explains that owing in part to the absence of anatomical data, and in part to the want of sufficient knowledge to interpret the facts in his possession, a number of groups belonging to the *Helicidae* were formerly referred to the *Bulimulidae* or "*Bulimidae*," by reason of the lengthened and Bulimoid contour of their shells. Investigations however, made during the progress of the volumes on the Bulimi, have shown the true relationships of several of these genera. We can scarcely over-estimate the value of this epitome.

Among a few of the changes we may cite the genus of *Gonyostomus*, Beck, formerly considered a sub-genus of *Bulimulidae* subordinate to *Auris*. Anatomical research, however, shows that it has no relation to *Auris* or other Bulimuline genera, but is a member of the *Strophochilinae*, and closely related to *Strophocheilus*. *Thaumastus*, Albers, formerly considered a sub-genus of *Strophocheilus*, is shown to be more nearly related to *Bulimulus*, *Auris* and *Plekocheilus*. Anatomical details are given of numerous other genera, and their bearing upon the classification considered.

In commencing volume xv we note a great improvement in the type, which has been changed from Long Primer to Small Pica, and the quality of the paper. White paper for the plates is still a desideratum. The volume opens with a consideration of the genera *Eucalodium*, Cr. and Fisch., *Anisospira*, Strebel, and *Coelocentrum*, Cr. and Fisch. In the last mentioned genus a

new variety, *estefaniae*, of *C. arctispira*, Pfr., is described and figured, and a new species *C. dispar*, from Guatemala.

Kowalevsky, A.—Études anatomiques sur le genre *Pseudovermis*. Mém. de l'Acad. Imp. d. Sci. St. Pétersb., 1901, T. xii., pp. 1—28, pl. i—iv.

The author returns to a further study of *Pseudovermis*, and confirms the opinion expressed in 1899 that it is a mollusc. It is classed among the Nudibranchia, and is most nearly related to *Eolis*. A new species, *P. papillifera*, is described from Mytilene, and the anatomy of that species and *P. paradoxus* are described, and illustrated by four very beautiful plates.

Thiele, Johannes.—*Proneomenia amboinensis*, n. sp. Jen. Denkschriften, 1902, Bd. viii, pp. 735—737, T. lxvi, figs. 5—9.

Dr. Thiele gives a description of this new species from Amboina, and a short account of the anatomy.

Kesteven, H. L.—The Protoconchs of certain Port Jackson Gasteropoda. Proc. Linn. Soc. N.S.W., 1901, pp. 709—716, pls. xxxv—xxxvi.

The author describes and figures the protoconchs of eleven species of Gasteropoda found in various bays in and around Port Jackson. The suggestion is made that where no varix has been thrown up, it may be that the mollusc has left no conchological record of the nepionic period.

Keller, W.—Die Anatomie von *Vaginula gayi* Fischer. Zool. Jahrb., Suppl. v, 1902, pp. 607—642, T. 18.

The author has investigated the anatomy of *V. gayi*, Fisch., on material brought home by Prof. Plate from Chili. After a description of the external features, and the structure of the integument, the pallial complex is described. The kidney is somewhat triangular in shape; the ureter is folded showing three limbs, the third opening into the base of the lung. The author also gives a corrected account of the kidney in *V. willeyi*, Cllge. The alimentary canal shows a well marked division into oesophagus, stomach, with cardiac and pyloric portions, and a strong, muscular, true stomach. The "liver" is divided into a fore-and hind-liver, the former consisting of eight lobes, and the latter of two. The generative organs are of the usual type.

The central nervous system is characterised by the extraordinary way in which the cerebral, pedal and visceral ganglia approximate to one another, and also with the small buccal ganglion. The nervous apparatus of the foot consists of a thick network of anastomosing fibres in connection with the pedal nerves.

Thiele, Joh.—Die systematische Stellung der Solenogastren und die Phylogenie der Mollusken. Zeit. f. wiss. Zool., 1902, Bd. lxxii, pp. 249—466, Tafn. xviii—xxvii u. 21 figs.

The author, after an exhaustive survey of the anatomy and phylogeny of the Amphineura, concludes that the Solenogastres are really a group of worms allied to the thread-worms *(Gordiidae)* and annelids, but, in the relation of the heart to the uterus, and in the possession of a rudimentary radula they approximate to the Mollusca, more especially to the *Chitonidae*.

Fleure, H. J.—Notes on the Relations of the Kidneys in *Haliotis tuberculata*, etc. Quart. Journ. Micro. Sci., 1902, vol. 46, pp. 77—96, pl. 6.

In connection with studies upon the Gastropod kidney, the author here gives an account of the relations of the kidneys in *Haliotis*, together with certain suggestions concerning the kidney and reproductive organs of the Monotocardia,

He is of opinion that in *H. tuberculata* there are two separate kidneys right and left of the pericardium, which open externally by separate apertures. The right kidney is the functional excretory organ. It communicates with the pericardium, and opening into it is the gonaduct. The left kidney, which does not communicate with the pericardium, is partly degenerating into lymphatic tissue, and is becoming connected with the efferent branchial vein by direct blood-channels. Practically the large anterior lobe of the right kidney, is an accessory genital organ *in posse*, and the external opening of the right kidney is evidently becoming a genital pore. This being so, the functional kidney must find an exit for its excretory products, and it seems probable that this is provided for by the external opening of the left kidney, which would thus be the homologue of the Monotocardian excretory aperture.

Mr. Fleure then discusses the views of various workers upon the derivation of the accessory reproductive organs of the Taenioglossa, and of their descendants the Opisthobranchs and Pulmonates, and the bearing of his investigations upon the same.

Hensgen, C.—Biometrische Untersuchungen über die Spielarten von *Helix nemoralis*. Biometrika, 1902, vol. 1, pp. 468—492, with 3 maps and 10 figs.

The author has made an elaborate study on the distribution of the markings on the shell of *Helix nemoralis* found in the ditches and ramparts of the old Strasburg fortifications, which illustrates the influence of segregation and environment. Statistics of the markings prove that many mathematically possible combinations are not necessarily represented in nature. The basis is laid for further biometric work on other local races of this species, and for observing on captive individuals the laws of inheritance in the shell markings thus classified.

Hedley, Charles.—Scientific Results of the Trawling Expedition of H.M.C.S. "Thetis."—Mollusca, pt. i. Mem. Aust. Mus., 1902, vol. iv, pp. 287—324, figs. 39—60.

In the present report the author treats of the Brachiopoda and Pelecypoda obtained on this expedition, four species are recorded of the former phylum and sixty-four of the latter. Among the Pelecypoda two new genera are described, viz., *Pronucula*, which differs from *Nucula* in the character of the hinge and in the possession of a more prominent radial sculpture (type *P. decorosa*, n. sp.), and *Cuna*, a genus of the *Crassatellitidae*, embracing *C. concentrica*, n. sp., the type, *Kellia atkinsoni*, T. Woods, *Cardiella delta*, Tate and May, etc. *Cyrilla dalli*, n. sp., and *Condylocardia projecta*, n. sp., add two new genera to the Australian fauna. There are thirteen other new species described and figured.

Hedley, Charles.—A new Australian Volute. Rec. Aust. Mus., 1902, vol. iv, p. 309, fig. 23.

Voluta perplicata, n. sp., allied to *V. thatcheri*, McCoy.

Hedley, C.—Studies on Australian Mollusca. Pt. vi. Proc. Linn. Soc., N.S.W., 1902, pp. 1—29, pls. i—iii.

Continuing this important series of papers Mr. Hedley describes as new *Bornia filosa*, *Congeria innata*, a genus new to the Australian fauna, *Mactra parkesiana*, *Pyrgulina perspectiva*, *P. senex*, *P. sea*, *P. umeralis*, *Crossea biconica*, *C. galliffi*, *Teniostoma involuta*, *Liotia corona*, *L. incidata*, and *Mecol-*

iotia spinosa. There are notes on numerous other species, on the genera *Chloceras* and *Lippistes*, and on Perry's Australian Shells. All the new species are figured, in addition to many others, and figures of the operculum, jaw, and radula of *Vermetus caperatus*, Tate and May, are also given.

Kesteven, H. L.—The Systematic Position of the genus *Fossarina*, A. Adams and Angus, and of *Fossarina varia*, Hutton. Rec. Aust. Mus., 1902, vol. iv, pp. 317—322, figs. 28—35.

From an examination of the radula and operculum of *F. patula*, the author is of opinion that *Minos*, Hutton, is only a synonym of *Fossarina*, which latter genus should be placed in the *Trochidae*, between *Gibbula* and *Margarita*.

Discussing next the *F. varia* of Hutton, the author shows that in addition to anatomical differences, which he proposes to describe later, it has a subspiral operculum, and a dentition showing relations to *Littorina*. It therefore becomes necessary to propose a new genus for its reception, to which the name *Risellopsis* is given. The teeth, operculum and shell are figured and described, and a new variety—*carinata*, described and figured.

Willey, Arthur.—Contribution to the Natural History of the Pearly Nautilus. A. Willey's Zool. Results, 1902, pt. vi, pp. 691-830, pls. lxxv-lxxxiii, a map, and 33 figs. in text.

Although Dr. Willey failed to obtain material for the study of the embryonic development of the pearly Nautilus, he has given given a most interesting account of his search for the same, and a valuable resumé of previous work upon Nautilus. Some of the new observations contained in the present memoir have been already published in a preliminary form, they are now published in detail, and relate principally to the following aspects of the subject:—binomics (habits, range, oviposition), branchial sense organs (csphradia), mechanism of respiration, injection of the vascular system, connections of the siphuncle, innervation of the ophthalmic tentacles, development of the accessory sexual organs, enumeration of the digital tentacles, orientation, and specific divergence.

When compared with its former world-wide distribution, the present restricted range of the genus has a special interest. It is wholly confined to the seas adjoining the islands of the Eastern Archipelago, which includes the East Indies, Philippines, New Guinea and its dependencies, Solomon Islands, New Caledonia, New Hebrides, and Fiji. The distribution of the species is still more interesting. *N. pompilius* is never taken in the New Caledonian Group of Islands, while *N. macromphalus* is never taken anywhere else. Of the three species *pompilius*, *macromphalus*, and *umbilicatus*, the first has the widest known range, occurring in the Philippines, Moluccas, Bismarck Archipelago, Torres Straits, New Hebrides, and Fiji; the second is confined to the New Caledonian Archipelago; while the third overlaps that of the first.

The paper is well illustrated by nine excellent plates, a map, and numerous figures in the text.

Bergh, R.—The Danish Expedition to Siam 1899-1900. Results of the Zoological Collections made by Dr. Th. Mortensen. I. Gasteropoda opisthobranchiata. Mém. d. l'Acad. Roy. de Danemark, 1902 (6th ser. Sect. d. Sci.), T. xii, pp. 161-218, T. i-iii and map.

The list of the Opisthobranchia obtained by Dr. Mortenson includes seven Tectibranchia, one Ascoglossa, and fourteen Nudibranchia. There are eight new species and one new genus, viz., *Aplysia immunda*, *Aplysiella incerta*, *Aclesia ocelligera*, *Idalia plebeia*, *Doriopsilla pallida*, *Marionia chloanthes*, *Melibe*

bucephala, and *Nossis* (gen. nov.) *indica*. This last genus is closely related to *Samla*. A welcome contribution to the anatomy of the little known genus *Aclesia* is supplied in the account of the structure of the new species, which is described in some detail.

Ridewood, W. G.—On the Structure of the Gills of Lamellibranchia. Proc. Roy. Soc., 1902, vol. lxx, pp. 499, 500.

Dr. Ridewood has examined the structure of the gills in 215 species of Lamellibranchia, belonging to 118 genera. He is of opinion that the minute structure of the gill, like the gross, cannot, except in a very broad way, be regarded as an indication of genetic affinity. Three main types can be recognised. The first, found in the *Nuculidae* and *Solenomyidae*, is characterised by the mutual freedom of the gill lamellae. For these the author proposes to retain the term Protobranchia (Pelseneer). In the remaining two types the filaments are held in juxtaposition by interlocking cilia, which occur in circular patches on their anterior and posterior faces, or by regularly arranged horizontal bars of cellular tissue. For the former type the author proposes the term eleutherorhabdic, and for the latter synaptorhabdic.

We hope to give a further and longer review when the complete paper is published.

Gude, G. K.—A synopsis of the genus *Streptaxis* and its allies. Proc. Malac. Soc. Lond., 1902, vol. v, pp. 201-244, pl. iv.

Mr. Gude here gives a very valuable synopsis of the genera *Streptaxis*, Gray (with 165 species), *Happia*, Bourg. (with 13 species), and *Scolodonta*, Döring (with 17 species). *S. leonensis*, Pfr., *S. eburneus*, Pfr., *S. gibbosus*, Pfr., *S. sinuosus*, Pfr., *S. anceyi*, Mab., *S. subbulbulus*, Mlldff., and *S. diplodon*, Mlldff., are figured.

Sykes, E. R.—The Zoological Record, 1901, vol. xxxviii. Record vii. Mollusca. pp. 102, London, 1902.

We heartily welcome another year's Record, which still remains the most complete and thorough work of its kind.

Owing to ill-health, Mr. G. C. Crick has not been able to assist this year, and Mr. S. Pace has taken over a share of the work. A few alterations have been made which will still further facilitate reference. The Anatomical and Biological headings have been re-classified, and under the heading "Geological," the Teritary entries have been arranged geographically, finally a paragraph has been inserted giving details respecting Biographies, Obituary Notices, etc.

Sykes, E. R.—The Zoological Record, 1901, vol. xxxviii. Record viii. Brachiopoda. pp. 12, London, 1902.

No less than 98 titles of papers, etc., are given, which is by far the largest number for many years past.

Ihering, H. von.—As Melanias do Brazil. Rev. Museu Paulista, 1901 [1902], vol. v, pp. 653–681, figs. 1–3.

The author describes and figures the following new species: *Dorysa schuppi*, *D. rixosa*, and a new variety—*araguayana*—of *Hemisinus lemniscatus*, Rve. The distribution in space and time is discussed, and a key to the genera *Dorysa* and *Hemisinus* is given. In all 33 species are recorded.

Suter, H.—On the Land Mollusca of Little Barrier Island. Trans. N. Z. Inst., 1901, vol. xxxiv, pp. 204–206.

Mr. Suter records twelve species from this island.

Suter, H.—List of the species described in F. W. Hulton's Manual of the New Zealand Mollusca, with the corresponding names used at the present time. Ibid., pp. 207—224.

Suter, H.—Observations concernant les "Considérations sur les faunes malacologiques des parties Australes du globe par M. C. F. Ancey." Journ. de Conchyl., 1902, vol. xlix, pp. 316—324.

Babor, J. F.—Zur Histogenese der Bindesubstanzen bei Weichtieren. I. Entstehung der elastischen Fasern. II. Die Entwickelung des knorpeligen Schadels bei *Eledone moschata*. Verhandl. d V. Int. Zool. Con. Berlin, 1902, pp. 1—8.

H[armer], S. F.—Henri de Lacaze-Duthiers. 1821—1901. Year-Book of the Roy. Soc no. 6. 1902, pp. 1—5.

Hoyle, William E.—Two points in Nomenclature. Journ. Conch., 1902, vol. 10, p. 214.

Replying to a note by Mr. R. B. Newton, the author defends the use of the name *Cyprina*, and points out that the generic term *Antiopa* is preoccupied by Meigen, 1800, for a genus of Diptera.

Kennard, A. S. and Woodward, B.B.—Onthe non-marine Mollusca from the Holocene deposits at London Wall and Westminster. Proc. Malac. Soc. Lond., 1902, vol. v, pp. 180-182.

The authors' record from the London Wall excavations 6 species of marine and 34 non-marine, of the latter the most noteworthy are *Planorbis glaber*, *P. fontanus*, and *Sphaerium lacustre*. Those from Westminster, which are 22 in number, are all common forms in Holocene beds.

Wright, B. H. and **Walker, Bryant.**—Check List of North American Naiades. Detroit: 1902, pp. 19.

This useful check list is based upon Mr. C. T. Simpson's Synopsis, with certain corrections, and the addition of species described since the publication of that valuable work. The List is divided into two parts; the first giving a systematic arrangement and the second a catalogue of the species. The two might with great advantage have been put together.

Carter, C. S.—*Pisidium subtruncatum* near Louth, Linc. N. Nat., 1902, p. 292.

Smith, Edgar A.—On the supposed Similarity between the Mollusca of the Arctic and Antarctic Regions. Proc. Malac. Soc. Lond., 1902, vol. v, pp. 162-166.

EDITOR'S NOTES.

On completing another volume the Editor tenders his grateful thanks to all who have in any way furthered the interests of the Journal, during 1902.

During the year the number of subscribers has slightly increased, which has enabled me to continue the illustrations as heretofore, and will, I hope, permit of a further increase during 1903.

In maintaining and furthering the value and usefulness of the Journal, the Editor trusts to the co-operation of all subscribers.

INDEX TO VOLUME IX.