

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.

Contributors

Collinge, Walter Edward, 1867-
Royal College of Surgeons of England

Publication/Creation

London : Dulau, 1902.

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[*Reprinted from the Journal of Malacology, 1902, Vol. IX, pt. 3.*]

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.

LONDON - - - DULAU & Co.

BERLIN - - - R. FRIEDLÄNDER & SOHN.

PRINTED BY MUNNS & ALLEN, 314, BROAD STREET, BIRMINGHAM.



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(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 *Nachrichtenblatt 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. 1a-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 Lige.

This species is probably allied to *S. theaeocola*, 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 Ligei.

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 postero-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 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.

Hemiplecta, Albers.

Hemiplecta 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.—Kuala 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, 8a-c.

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

Four specimens.

Chloritis, Beck.

Chloritis malayana, Mliff.

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

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

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. 2a, 2b.

Hab.—Kwala Aring, State of Kelantan.

PUPIDAE.

Hypselostoma, Bens.

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. 7a, 7b.

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

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 Lige; 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.

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

Hab.—Belimbing, State of Lige.

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 Lige.

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.

RATHOUIIIDAE.

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. taunayi*, 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, 2a) 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 *Rathousia*. 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, 1a) gave a description and figures of a further new species of *Rathousia* (*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, 23a), described a further new species of *Rathousia* (*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 *Rathousiinae*, as a sub-family for the genera *Rathousia*, *Atopos* and *Prisma*. He further pointed out that a specimen in the British

† J. Mus. Godeffr., 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 resemblances 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 resemblances 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 *Rathousia* 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 *Rathousiidae*, 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*, Clge. (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 resemblances as a case of parallel evolution rather than one of direct affinity.

Respecting the generic or sub-generic distinctiveness of *Rathousia*, *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.

RATHOUIIIDAE, 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 *Paulangia*. 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 toward 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 Ligor.

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 subgenerically 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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<i>alb. gl.</i>	Albumen gland.	<i>ov.</i>	Oviduct.
<i>an.</i>	Anus.	<i>p.</i>	Penis.
<i>b.c.</i>	Buccal cavity	<i>pc.</i>	Pericardium.
<i>b.r.</i>	Buccal retractor.	<i>pr.</i>	Prostate.
<i>c.m.</i>	Columellar muscle.	<i>p.p.</i>	Penis papilla.
<i>c.m.f.</i>	Circular muscle fibres.	<i>pr.</i>	Pedal retractor.
<i>cr.</i>	Crop.	<i>p.v.</i>	Pulmonary vein.
<i>d.</i>	Dart.	<i>r.</i>	Rectum.
<i>d. gl.</i>	Dart-gland.	<i>r. ap.</i>	Renal aperture.
<i>d.s.</i>	Dart sac.	<i>r.d.</i>	Receptacular duct.
<i>di. gl.</i>	Digestive gland.	<i>r.m.</i>	Retractor muscle.
<i>div.</i>	Diverticulum.	<i>r. or.</i>	Respiratory orifice.
<i>ep.</i>	Epiphallus.	<i>r.s.</i>	Receptaculum seminis.
<i>fl.</i>	Flagellum.	<i>s.d.</i>	Salivary duct.
<i>f. ov.</i>	Free-oviduct.	<i>s. gl.</i>	Salivary gland.
<i>f.s.</i>	Foot-sole.	<i>S. gl.</i>	Simroth's gland.
<i>gl. c.</i>	Gland cells.	<i>st.</i>	Stomach.
<i>h.d.</i>	Hermaphrodite duct.	<i>T.</i>	Superior tentacular retractor.
<i>h. gl.</i>	Hermaphrodite gland.	<i>t.</i>	Inferior tentacular retractor.
<i>int. 1-4</i>	Loops of intestine.	<i>Tu.</i>	Superior tentacle.
<i>k.</i>	Kidney.	<i>tu.</i>	Inferior tentacle.
<i>k.s.</i>	Kalk-sac.	<i>ur.</i>	Ureter.
<i>l.o.r.</i>	Left ocular retractor.	<i>v.</i>	Vestibule.
<i>m, m. 2</i>	Muscles.	<i>vg.</i>	Vagina.
<i>m. gl.</i>	Mid-gut gland.	<i>v.d.</i>	Vas deferens.
<i>n.</i>	Notum.	<i>w.d.s.</i>	Wall of dart-sac.
<i>o.</i>	Ovary.	<i>w.p.c.</i>	Wall of pulmonary cavity.
<i>ob. m.</i>	Oblique muscles.	δ	Male generative orifice.
<i>oc.</i>	Oesophagus.	φ	Female generative orifice.

EXPLANATION OF PLATES IV-VI.

PLATE IV.

- | | | | |
|----------|---|---|------|
| Fig. 1. | <i>Streplaxis sykesi</i> , n. sp. | Dorsal view of the shell. | × 2. |
| Fig. 2. | " " | Ventral view of the shell. | × 2. |
| Fig. 3. | <i>Streplaxis striatula</i> , n. sp. | Dorsal view of the shell. | × 1. |
| Fig. 4. | " " | Ventral view of the shell. | × 1. |
| Fig. 5. | <i>Apofarmarion partridgii</i> , 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. | <i>Girasia peguensis</i> , Theob. | Generative organs. | × 3. |
| Fig. 14. | " " | The same showing the penis, etc., in natural position. The dart-gland (<i>d. gl.</i>) has been moved slightly to the left. The receptaculum seminis and free-oviduct are not shown. | |
| Fig. 15. | <i>Cryptosoma</i> , sp. | Terminal ducts of the generative organs, enlarged. | |
| Fig. 16. | <i>Hemiplecta humphreysiana</i> , 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. | <i>Hemiplecta humphreysiana</i> , 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. | <i>Amphidromus perversus</i> , L. | Generative organs. | |
| Fig. 25. | " " | " " | |

PLATE V.

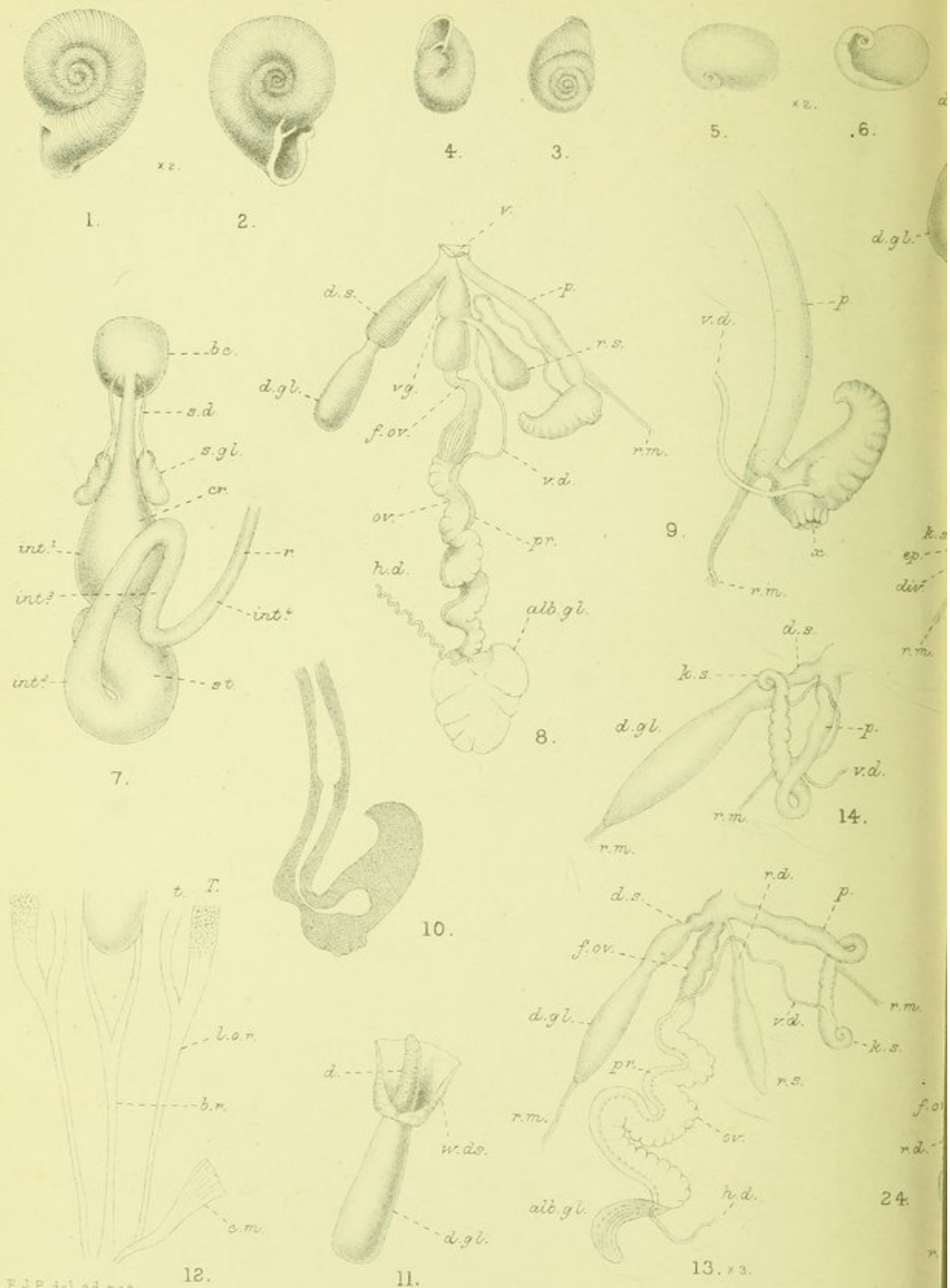
- | | | |
|----------|---|---|
| Fig. 26. | <i>Amphidromus perversus</i> , L. | Penis dissected to show the internal walls and penis papilla. |
| Fig. 27. | " " | Free muscles, enlarged. |
| Fig. 28. | " " | The pallial complex. |
| Fig. 29. | <i>Hypselostoma laidlawi</i> , n. sp. | Shell. |
| Fig. 30. | " " | Ventral view. |
| Fig. 31. | <i>Apofarmarion partridgii</i> , n. sp. | Right lateral view. |
| Fig. 32. | " " | Dorsal view. |
| Fig. 33. | " " | Left lateral view. |

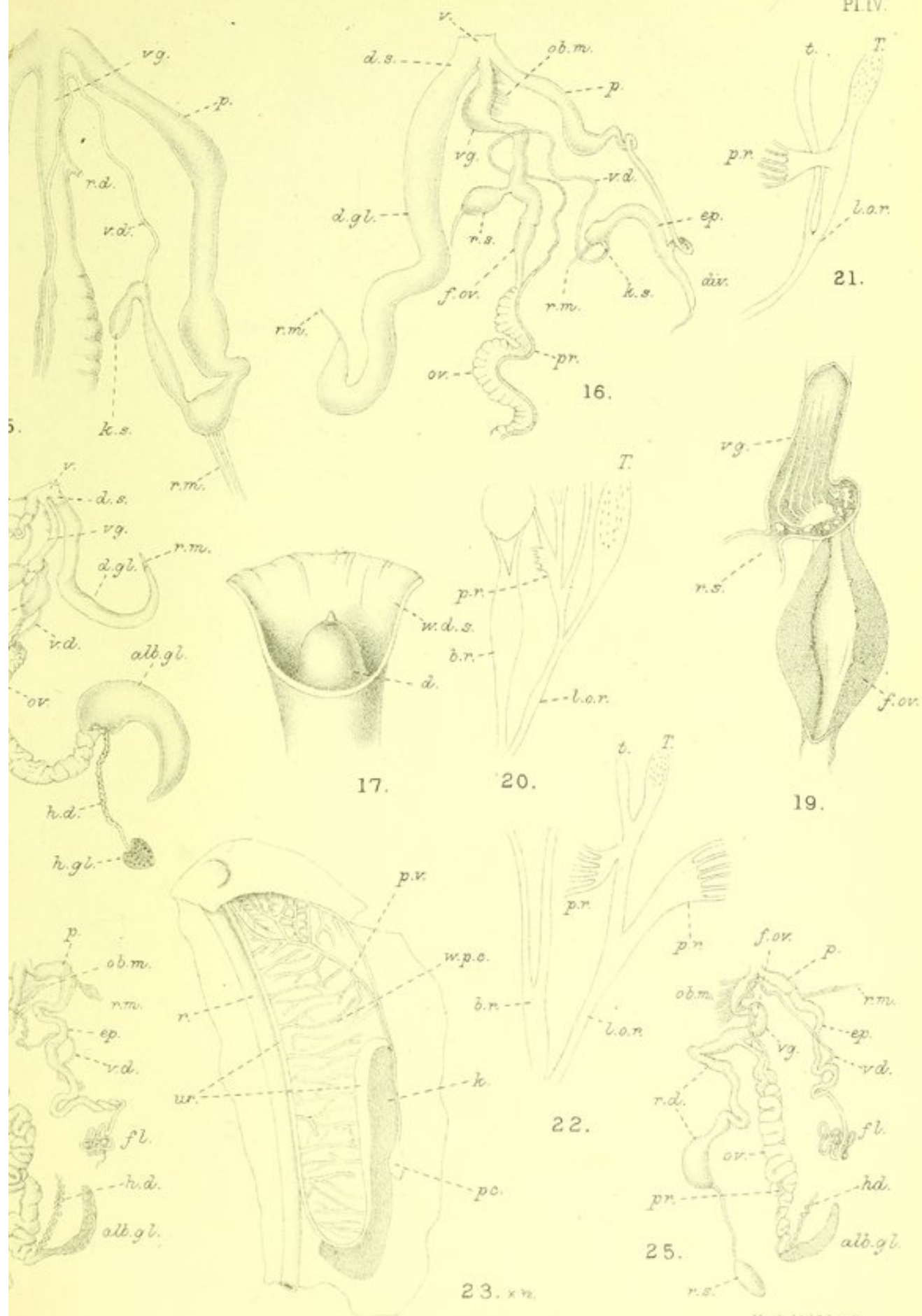
- Fig. 34. *Parafarmarion elongatus*, n. sp. Right lateral view. $\times 1\frac{1}{2}$.
 Fig. 35. " " Dorsal view. $\times 1\frac{1}{2}$.
 Fig. 36. " " Left lateral view. $\times 1\frac{1}{2}$.
 Fig. 37. *Cryptosemelus gracilis*, n. sp. Right lateral view. $\times 1\frac{1}{2}$.
 Fig. 38. " " Dorsal view. $\times 1\frac{1}{2}$.
 Fig. 39. " " Left lateral view. $\times 1\frac{1}{2}$.
 Fig. 40. *Atopos sarasini*, n. sp. Right lateral view. $\times 1$.
 Fig. 41. " " Dorsal view. $\times 1$.
 Fig. 42. " " Ventral view. $\times 1$.
 Fig. 43. *Atopos harmeri*, n. sp. Right lateral view. $\times 1$.
 Fig. 44. " " Dorsal view. $\times 1$.
 Fig. 45. " " Ventral view. $\times 1$.
 Fig. 46. *Atopos rugosus*, n. sp. Right lateral view. $\times 1$.
 Fig. 47. " " Dorsal view. $\times 1$.
 Fig. 48. " " Ventral view. $\times 1$.
 Fig. 49. *Atopos punctata*, n. sp. Right lateral view. $\times 1$.
 Fig. 50. " " Dorsal view. $\times 1$.
 Fig. 51. " " Ventral view. $\times 1$.
 Fig. 52. " " Portion of the notum, enlarged, to show the varying sizes of the papilla, which give to the body a granulated appearance.
 Fig. 53. *Atopos laidlawi*, n. sp. Right lateral view. $\times 2$.
 Fig. 54. " " Dorsal view. $\times 2$.
 Fig. 55. " " Ventral view. $\times 2$.
 Fig. 56. *Atopos sarasini*, n. sp. View of the ventral side of the body with the notum pulled forward to show the tentacles. $\times 1$.
 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.

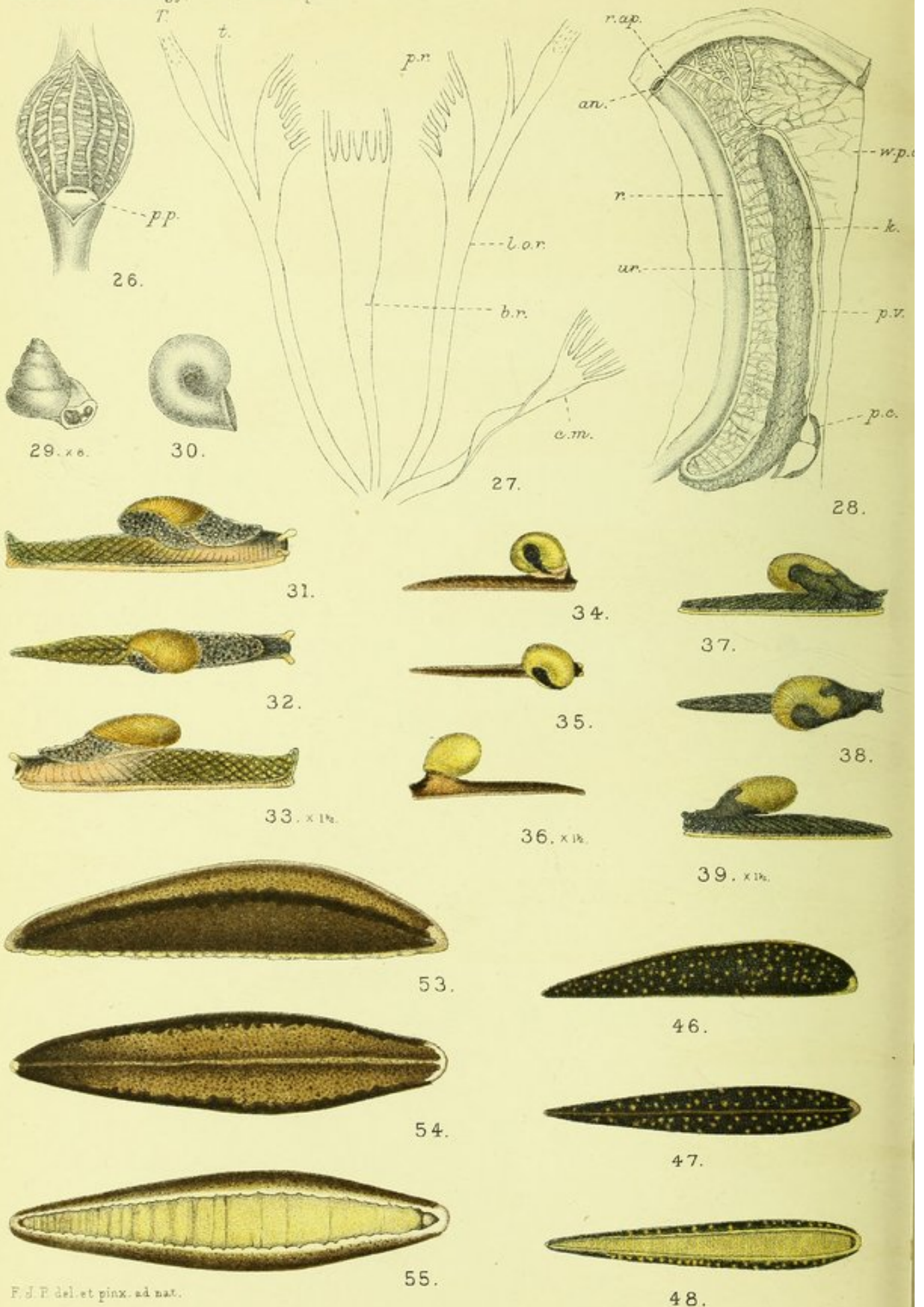
- Fig. 60. *Atopos sarasini*, n. sp. Female generative organs, enlarged.
 Fig. 61. " " Male generative organs and right Simroth gland. $\times 2$.
 Fig. 62. " " Portion of a transverse section through the distal portion of the Simroth gland.
 Fig. 63. " " Diagrammatic section of the gland.
 Fig. 64. " " The penis dissected to show the internal walls, penis papilla, and orifice from duct. $\times 6$.
 Fig. 65. " " The pedal gland. $\times 1\frac{1}{2}$.
 Fig. 66. *Apera burnupi*, E. A. Smith. Generative organs. $\times 4$.













40.



41.



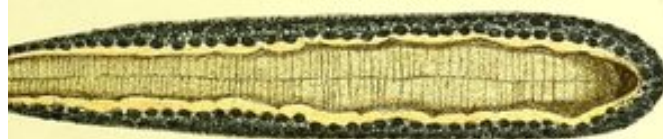
42.



43.



44.



45.



49.



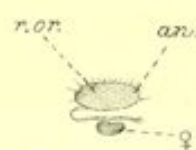
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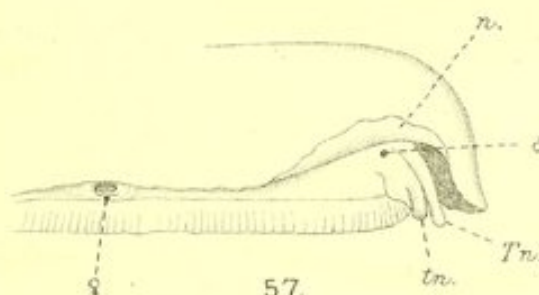
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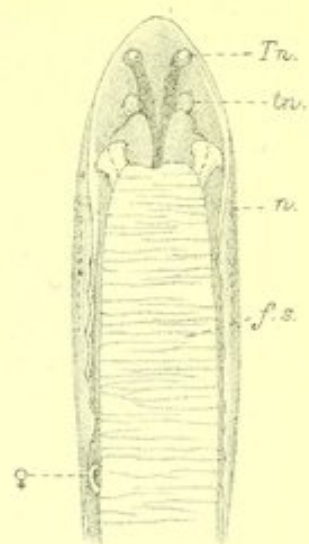
52.



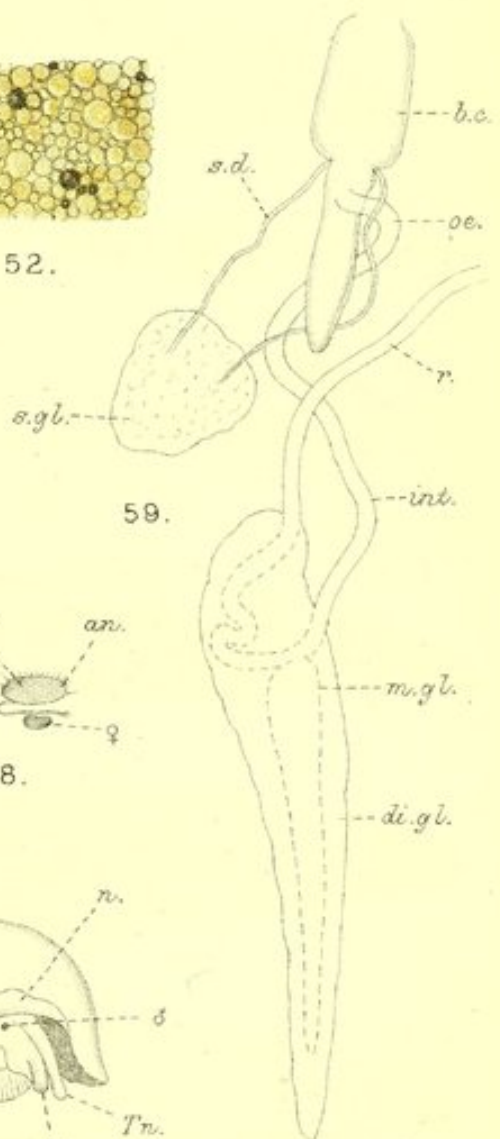
58.



57.



56.



59.

