

STUDIES ON AUSTRALIAN MOLLUSCA.

PART I.

BY C. HEDLEY, F.L.S.

(Plates iii.-iv.)

As the result of collecting on holidays and examining material in hours not engaged in official duties, a considerable amount of information comes into my possession. In previous communications some of this was embodied; a further contribution is now tendered, and I trust that under this title I may offer more in the future.

I am constrained to apologise for the disconnected and fragmentary state of the various items; they are but leaves from the journal of a working naturalist, and their order is that in which chance may present facts.

The first requisite of my fellow students and myself is to assure ourselves of the identity of the species we handle; questions of structure and of higher classification, though of great importance, cannot be approached until specific identity is assured. Certain English writers who have dealt with our fauna have presented us with brief Latin descriptions of species unaccompanied by figures. The earlier Australian conchologists unfortunately selected this style for their model. Personally I have failed to identify species from writings of this class; I hear from correspondents the same confession, and observe that species thus unfigured and briefly diagnosed have suffered reduplication of names at the hands of the most distinguished European specialists.

It has been therefore my first aim to fix by illustration the identity of such unfigured species as I can procure. The occurrence of species on the coast of N.S. Wales not previously recorded thence will be given prominence.

SIRIUS, gen.nov.

(Plate iii., fig. 8.)

A genus of the *Trichotropidae*, differing by a turbinate instead of conical shape, thin, without (as far as my information goes) the characteristic epidermis of the type. Especially is it distinguished by a concave, expanded pillar, broadening anteriorly to an abrupt termination, and failing to reach the siphonal notch. There is considerable similarity between *Crossea* and *Sirius* in general shape and in the features of the base.

Type *Raulinia badia*, Tenison-Woods.

The type of my new genus was specifically described by Tenison-Woods in these Proceedings (Vol. ii. 1876, p. 264), and discussed at some length. His reference of a living species to the genus *Raulinia*, Mayer, created for a European Miocene fossil has received the attention of subsequent textbooks. The arguments advanced by Woods fail to convince me. I can trace no sequence of family or genus between *R. alligata* and *Sirius badius*. The salient character of the fossil is a sharp transverse median fold on the columella; to this the broad, smooth columella of *Sirius badius* presents no counterpart. In support of this statement a figure of the Australian species (fig. 8) is now submitted for contrast with that of *R. alligata*, Deshayes (Journ. de Conch. xii. 1864, pl. ix. fig. 8).

As far as literature, in the absence of specimens, enables a judgment to be formed, I am in accord with Prof. Tate (Proc. Roy. Soc. N.S.W., xxviii., 1893 [1894], p. 182) in considering the genus *Raulinia* indistinguishable from the prior *Isapis*, H. & A. Adams.

Mr. Brazier informs me that the locality quoted by Woods is erroneous, and that the specimen he furnished to that author was procured in 1874 from sand and shingle at the entrance to the Crookhaven River, Shoalhaven, N.S. Wales. I have seen the species from Port Stephens, and have taken it dead in sand in a cleft in the cliffs a mile south of the South Head Lighthouse; and the example now figured from Balmoral Beach, Middle Harbour, The original of my figure is 5 mm. in length.

FOSSARUS SYDNEYENSIS, sp.nov.

(Plate iii., fig. 12.)

Shell broadly ovate, rather solid and narrowly perforate, body whorl large, spire short and turreted. Colour dead white (?bleached). Whorls four, flattened for a space below the suture, a little inflated at the periphery and gently rounded to the base. Sculpture: the first two whorls are smooth, the next has three raised spiral cords, while the last is encircled by eleven, sharply elevated, narrow, spiral cords, separated by interstices of twice or thrice their own breadth, two on the shoulder and two on the base are more prominent than the rest, the basal ones wind obliquely into the narrow umbilical fissure, minute striæ in the direction of growth lines decussate the troughs between the smooth-topped ridges. Suture impressed. Aperture oblique, ovate, exceeding half the length of the shell, angled above, rounded beneath, furrowed within by the print of the external sculpture; outer lip sharp, denticulated by the sculpture. Columella arched, broad, above plastered on the body whorl and over the axial perforation, below spreading and reflected; at its anterior termination is the faint rudiment of a channel. Length 4.5, breadth 3 mm.

Hab.—Balmoral Beach, near Sydney; several specimens among shell sand.

Type to be presented to the Australian Museum.

COUTHOUYIA ACULEATA, sp.nov.

(Plate iii., fig. 10.)

Shell ovate, with a slender acuminate spire and inflated body whorl. Colour dead white (?bleached). Whorls six, rapidly increasing, divided by a narrowly but deeply grooved suture. The last whorl just previous to the aperture, is free from its predecessor. Sculpture: the last whorl is encircled by nine narrow, sharp, projecting, spiral ridges; passing from suture to base these ridges gradually and proportionately grow larger and

farther apart. The lowest overhangs the umbilical fissure. Interstitial threads develop in the two lowest furrows. All the ridges and furrows are crossed by fine, sharp, obliquely ascending threads, of which there are on the body whorl about thirty-three. The major spiral, and minor transverse, lines enclose deep square pits; at their intersection arise sharp little prickles. A corresponding sculpture occurs on the upper whorls and fades gradually away towards the apex. Aperture oblique, almost D-shaped, but rounded off at the angles. Outer lip sharp, frilled by the sculpture. Inner lip distant from the whorl, nearly straight, edge a trifle curled, broadened at the anterior corner, where the circum-umbilical ridge arches in to meet it. Here is the shallow impression of a rudimentary siphonal notch. Umbilicus a long, deep, narrow cavity whose inner wall is smooth. Length 4, breadth 2.5 mm.

Hab.—Off Bet Island, Torres Straits; two specimens dredged by Mr. J. Brazier in 11 fathoms.

Type to be presented to the Australian Museum.

The genus *Couthouyia* (Ann. Mag. N.H. ser. 3, v., May, 1860, p. 410) has not been previously seen in Australian waters.

MENON, gen.nov.

A genus of the *Eulimidae*. Shell perforate, solid, dull, compressed from back to front, and distinguished especially by a continuous series of varices on each side.

Type *M. anceps*.

MENON ANCEPS, sp.nov.

(Plate iii., figs. 5, 6 & 7.)

Shell elongate-ovate, compressed from back to front, opaque, more dull and thick than is usual in the *Eulimidae*. Colour dull pale yellow. Apical whorls two and a half, first planulate (? a plug), adult whorls four, each successive whorl becoming proportionately longer, the last exceeding half the length of the shell, each sloping to a faint shoulder angle, slightly curved on the side and roundly incurved at the base. Sculpture: fine spiral

grooves occur on the two topmost whorls and there cease, the rest of the shell is faintly and irregularly ribbed by arcuate growth lines; from the aperture to the apex and upon the opposite side of the shell a series of strong cord-like varices project and mount the shell perpendicularly. The end of the penultimate varix is thrust into the aperture. The suture is impressed and ragged from the irregular longitudinal sculpture. Aperture ovate-oblong, above solute, subangled and channelled; beneath rounded. Outer lip sharp, curving forward anteriorly; columella long and very straight, above narrow and appressed to the body whorl, beneath broadened and reflected. Umbilicus a narrow triangular deep pit, walled in by the reflected columella, the penultimate and incipient varices. Length 5, breadth 2 mm.

Hab.—Little Coogee Bay, near Sydney; in shell sand. I am indebted to Mr. J. Brazier for a specimen which he collected in July, 1895.

Type to be presented to the Australian Museum.

My illustrations show the shell seen in front, the apex from behind, and the base, with varix in profile, from beneath, all enlarged.

This genus appears to link the bizarre form *Hoplopteron* (Fischer, Journ. de Conch. xxiv., 1876, p. 232) to the more normal *Eulimidae*. The difference between the varices of *Menon* and of *Hoplopteron* is rather one of degree than one of kind. Indistinct varices occur in *Eulima* proper. On a specimen of *E. tessellata*, Sowerby, I find a series of inconspicuous varices on the upper whorls.

The apex described above is likely to prove a plug formed in life before the loss of the apical whorls.

SEILA ATTENUATA, n.sp.

(Plate iii., figs. 9, 9a.)

Shell dextral, very tall and slender, gently tapering, varies a little in proportion. Whorls thirteen, gradually increasing, rounded, contracted at the sutures. Colour varying from deep

chocolate to pale ochre, the primary whorls always darker than the remainder. Sculpture: four, evenly spaced, spiral, sharp cords ascend the whorls, midway in their interspaces on the upper whorls threads appear, which increasing in more rapid proportion rival on the last whorl the primary cords; one specimen before me thus exhibits on the last whorl nine equally sized and spaced cords. Both cords and interspaces are crossed by coarse, irregular, arcuate growth-striæ. The apical whorls are obliquely, longitudinally ribbed, thus recalling normal *Cerithiopsis* sculpture. A keel appears, the ribbing diminishes, and by gradual transition the adult sculpture is attained. The base is concave, above smooth, below faintly spirally ribbed. Columella arched, canal short and straight. The dark specimen figured measures—length 9 mm., breadth 2 mm. A pale, more strongly ribbed shell measures—length 10 mm., breadth 2.5 mm.

Hab.—Balmoral Beach, Middle Harbour, near Sydney. I have collected a dozen dead specimens.

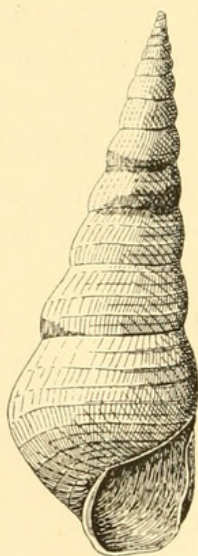
No members of *Seila* (A. Ad.; Ann. Mag. N. H. [3], vii. 1861, p. 130) have been yet noticed in Australia. The present species differs from the type *S. dextroversa*, Ad. & Rv., (Voy. Samarang, Zool. pl. xi. p. 31) by more lyræ, more rounded whorls, and a straighter canal.

Type to be presented to the Australian Museum.

STYLIFER LODDERÆ, Petterd.

Petterd, Journ. of Conchology, ix. 1884, p. 140.

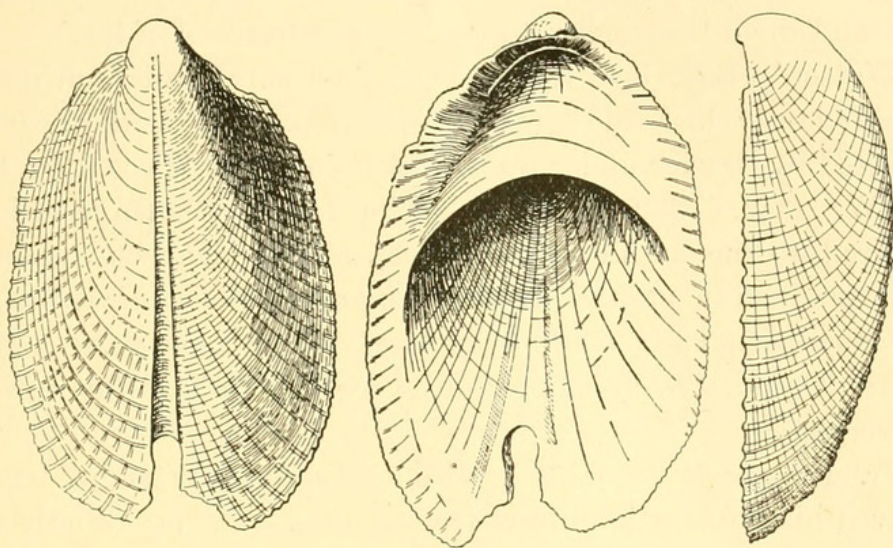
Mr. A. U. Henn has already reported in these Proceedings (Vol. xxi. p. 500) finding this species at Long Bay. A single, worn specimen lately occurred to me on Balmoral Beach. To facilitate the recognition of the species by others I add now an illustration of a fresh and coloured Tasmanian example, kindly lent me for the purpose by the active lady conchologist whose name it bears.



ZEIDORA TASMANICA, Beddome.

Beddome, Proc. Roy. Soc. Tas. 1882 [1883], p. 169.

In the note quoted under the preceding species, Mr. Henn published the first occurrence of this species in our waters. I can again confirm his discovery, having taken a young specimen in sand in a cleft of the cliffs a mile south of the South Head



Lighthouse. Mr. H. L. Kesteven has shown me a specimen which he collected at Botany Head. As the species has never been figured, and as my example is too young to use, I have derived an illustration from an authentic Tasmanian example, kindly lent me by Miss Lodder.

Professor Tate recognised the occurrence of this genus in South Australia in a species probably conspecific with the Tasmanian (Trans. Roy. Soc. S.A. xviii. 1894, p. 118). A strict comparison between specimens yet remains to be instituted.

HELIACUS FOVEOLATUS, Tate.

Tate, Trans. Roy. Soc. S.A. xvii. 1893, p. 191, pl. i. figs. 13, 13a.

I have lately taken several examples of this species upon Balmoral Beach. The identification is based upon comparison

with specimens kindly forwarded by the author. It had not been previously noticed beyond the borders of South Australia.

AMAUOPSIS MOERCHI, Adams & Angas.

(Plate iii., fig. 4.)

Adams & Angas, Proc. Zool. Soc. 1863, p. 423.

Only two examples of this rare species were taken by Angas; he found them "adhering to the under surface of a large stone, at Watson's Bay, just inside Port Jackson Heads, during an unprecedentedly low tide" (P.Z.S. 1867, p. 198). Another was collected by Brazier under a stone at Point Piper (Proc. Roy. Soc. N.S.W. xxiii. 1889, p. 259). The fourth known specimen occurred to me at Twemlow's Reef, Middle Harbour, under a stone on muddy ground in the mangrove (*Avicennia*) zone, in company with such mud-loving species as *Phenacolepas cinnamomea*, Gould, *Plecotrema bicolor*, Pfr., and *Columbella regulus*, Souverbie.

Mr. Brazier is acquainted with the species by sight, having derived his information direct from Angas. He has kindly confirmed my determination, indeed from literature alone no identification could be made. To assist future observers I now tender a drawing of my specimen, which is 5 mm. in diameter. Angas describes his as 5 lines in length. The youth of my example is perhaps the reason why it fails to agree with the diagnosis by being perforate.

LODDERIA MINIMA, T. Woods.

(Plate iii., figs. 1, 2 & 3.)

T. Woods, Trans. Roy. Soc. Vic. xiv. 1877 [1878], p. 58; Tate, Trans. Roy. Soc. S.A. xxiii. 1899, p. 222.

This tiny shell has not been previously known from this coast. I have been fortunate enough to detect several specimens in sand in a rock pool at the base of the cliff on the east side of Middle Head, Sydney Harbour. These were identified by comparison

with Victorian specimens from Western Port, kindly supplied by Mr. J. H. Gatliff.

The species is omitted from Tryon's Manual, and the original description is insufficient for the recognition of the species. To figures of one of my specimens, therefore, I add the following description :—

Shell minute, above almost flat, below rounded and widely umbilicate. Whorls two and a half, very rapidly increasing, so that the outline of the shell approaches the figure of the Arabic numeral 6. Apical whorls smooth, one and a half. Sculpture: throughout closely, finely, spirally grooved; above is one and on the base are two prominent spiral lyræ. The whole shell is crossed by transverse sculpture, which is nearly suppressed for most of its course, but appears in a series of fine denticules below the suture, in beading on the major lyræ, and in basal ribs projecting teeth into the umbilicus. A small varix appears at a whorl behind the aperture. Aperture very oblique, a round, trumpet mouth, with a double, widely expanded lip, fortified behind with a heavy varix. Major diameter 1·16, minor ·84; height ·64 mm.

FISSURIDEA LINEATA, Sowerby.

(Plate iii., fig. 11.)

This species was included by the earlier writers in the genus *Fissurella*. Pilsbry in the Manual of Conchology placed it in *Glyphis*, but he afterwards abandoned that name in favour of *Fissuridea* of Swainson (The Nautilus, v., Jan. 1892, p. 104).

The animal has not been yet described. It is not uncommon in Sydney Harbour, living on rocks and among piles of loose stones in clear sea water. Its movements are very sluggish; in crawling the animal raises its shell to a considerable height as if holding an umbrella over itself. When fully extended no part of the animal envelops the shell. In striking contrast to the asymmetrical, forward position of the shell in *Lucapinella nigrita* (*vide* Proc. Roy. Soc. Vic. 1894, pl. xi.) is the central position of

the shell in *F. lineata*. The animal can quite conceal itself within the shell; when entirely retracted the shell touches the ground at the anterior end, but a slight gape remains behind. When fully exerted, as in my figure, a series of filaments project from beneath the margin of the shell, each answering to a radial of the shell sculpture; beneath and beyond these, the mantle skirt depends; the latter is often puckered into waves and can be extended to about twice the length of the filaments. Below the mantle is the usual row of epipodial filaments. Muzzle slightly bilobed. Tentacles moderately stout, slightly tapering, sharply pointed, frequently engaged in searching the ground with a slow sweeping motion. Tail short and blunt. Anal tube very little exerted, surrounded by a dozen small papillæ. Mantle and filaments pale yellow, remainder of body creamy white, anal tube dark brown.

CERITHIUM TENUE, Sowerby.

Sowerby, Thesaurus Conch. ii. 1855, p. 876, pl. clxxxiv. fig. 212 (202).

This species was originally described from Port Lincoln, South Australia. An examination of South Australian specimens induces me to unite with it *Bittium variegatum*, Brazier, described in these Proceedings (Second Series, ix. 1894, p. 172, pl. xiv. fig. 9).

TEINOSTOMA ORBITUM, n.sp.

(Plate iii., figs. 13, 14 & 15.)

Shell large for the genus, solid, opaque, glossy, subdiscoial, spire hardly elevated, bluntly angled at the periphery, flattened on the base, and narrowly perforate. Whorls three and a half, rapidly increasing, separated by a deeply furrowed suture. Colour white. Sculpture: to the unaided eye the shell is smooth, under the lens it is seen to be finely, closely spirally grooved throughout, except on the umbilical funicle. On the upper whorls are half-developed low, broad, radiating costæ, which gradually disappear on the penultimate whorl. Everywhere the grooves are crossed by delicate growth-lines, which increase

behind the aperture to a few crowded riblets. Base flattened. Umbilicus narrow, semicircular, deep, oblique, bounded by a heavy, outstanding, obliquely-entering funicle. Aperture very oblique, ovate. Lip thickened within. Columella united to the umbilical funicle and spreading above a callous pad on the preceding whorl. Major diameter 6, minor 5, height 2 mm.

Hab.—Port Darwin; one specimen, collected from the beach by Mr. Spalding, was communicated to me by Mr. J. Brazier. Two young shells dredged in 11 fathoms off Bet Island, Torres Straits, by Mr. Brazier appear to belong to the same species.

Type to be presented to the Australian Museum.

In the last volume of these Proceedings (p. 433) I described as *Teinostoma starkeyæ* the first Australian member of the subgenus *Solariorbis*. Professor Tate immediately followed with a second one named *Cyclostrema caperatum* (Trans. Roy. Soc. S.A. 1899, p. 216, pl. vii. figs. 1a-b). The present is the third. Its affinities are with *T. starkeyæ*, from which it differs by spiral sculpture and greater size, opacity and solidity.

NOTARCHUS GLAUCUS, Cheeseman.

(Plate iv.)

About five years ago I collected from time to time, at the edge of a *Zostera* flat on the west side of Rose Bay, near Sydney, several examples of the species now depicted. Most of them were rolled up dead or dying from the injurious effects of the volume of fresh water which heavy rains had poured into the Bay. One, however, was found in a healthy and expanded condition; from it my drawing was immediately made.

I have referred, but not with certainty, the species to *Aclesia glauca*, Cheeseman, judging it from the account given in the Proc. Zool. Soc. (1878, p. 277, pl. xv. fig. 4). Further information is required upon several points not noticed there; to supply which I have endeavoured without success to procure specimens from New Zealand, where I am told the species is rare.

I have not had an opportunity of late years of searching the locality, and reclamation works now proceeding there are likely to ruin the Bay for a collecting ground. Since there is no immediate prospect of learning more about the animal and as it is an addition both generically and specifically to the Australian fauna, it seems best to no longer reserve the little information now given.

MEGALATRACTUS ARUANUS, Linn.

Hanley has shown (*Ipsa Linnæi Conchyliæ*, 1855, p. 301, and *Journ. Linn. Soc. Zool.* iv. 1860, p. 78) that the Linnean species "*Murex aruanus*" referred by nomenclature, description and bibliography to two species. One, an American shell, was separated in 1788 from *aruanus* by Gmelin as "*Murex carica*." The other, an Australian shell, was renamed "*Fusus probosciferus*" by Lamarck in 1822.

Unless we consent to altogether erase the Linnean name, it is obvious that the names of both Gmelin and Lamarck cannot be maintained.

Gmelin's classification has been accepted by Dillwyn (*Decr. Cat. Recent Shells*, ii. 1817, p. 723), by Binney (*Journ. Nat. Hist. Boston*, i. 1833, p. 67), and by Swainson (*Exotic Conchology*, 1841, p. 6).

The supporters of Lamarck's nomenclature have usually evaded its consequences, and while using *probosciferus* for the Australian shell, have illogically called the American one "*carica*."

Apart from law, the misapplication of the geographic term *aruanus* to the American shell has naturally been distasteful to conchologists. Rarely have American authors taken a position like Arango, who (*Fauna Mal. Cuba*, 1878, p. 216) uses for the American shell the term "*Busycon aruanum*, Linné." And in law I would argue that as the Linnean designation covered two species, the proper course to adopt is to accept the first revision—in this case Gmelin's. If this is correct we shall lose a familiar name in *probosciferus*, but we shall gain in the undisputed possession of a still more familiar name of *carica*.

There are several other Linnean specific names which concern the Australian student, such as *ianthina*, *delphinula* and *lima*, which Lamarckian usage has banished from their rightful place.

The nepionic shell of *M. aruanus* has a literature of its own. Tryon described it (Manual Conch. ix. p. 142, pl. xxvi. fig. 16) as *Cerithium brazieri*. Pilsbry followed (Nautilus, viii. June, 1894, p. 17) by erecting for its reception a new genus *Perostylus* and adding a supposed second species *P. fordianus*. Tryon's error was recognised by Tate, who showed in these Proceedings (Second Series, viii. 1893 [1894], p. 244) that "it is nothing more than the embryo of *Fusus probosciferus*." Pilsbry then in an article entitled "*Perostylus*, the embryo of *Megalatractus*" (Nautilus, viii. p. 67) at once withdrew his genus and species.

Megalatractus was proposed as a subgenus for this species by Fischer (Manual, 1884, p. 623); Pilsbry remarks that its use as a full genus is justified by the remarkable apex.

Melvill and Standen mention (Journ. Linn. Soc. Zool. xxvii. 1899, p. 158) "a mass of nidamental capsules" as being produced by this mollusc. Further information on this subject would be acceptable.

As little has appeared in literature about the size of this gigantic shell, it may not be amiss to say that a specimen now in the collection of my friend, Mr. P. G. Black, though imperfect at both extremities, still measures 22 inches in length and $9\frac{1}{2}$ in breadth. Brazier has in these Proceedings (Vol. ii., 1878, p. 368) mentioned a maximum length of 24 inches.

The Australian range of the species is from the Dampier Archipelago in the north-west continuously to the Great Barrier Reef in the north-east.

EXPLANATION OF PLATES.

Plate iii.

Figs. 1-3.—*Lodderia minima*, Tenison-Woods; in different aspects.

Fig. 4.—*Amauropsis moerchi*, Adams & Angas.

Fig. 5.—*Menon anceps*, Hedley.

Fig. 6.—*Menon anceps*, Hedley, viewed in profile from the base to show the varix.

Fig. 7.—*Menon anceps*, Hedley ; apex.

Fig. 8.—*Sirius badius*, Tenison-Woods.

Fig. 9.—*Seila attenuata*, Hedley.

Fig. 9a.—*Seila attenuata*, Hedley ; apex.

Fig. 10.—*Couthouyia aculeata*, Hedley.

Fig. 11.—*Fissuridea lineata*, Sowerby; animal.

Fig. 12.—*Fossarus sydneyensis*, Hedley.

Figs. 13-15.—*Teinostoma orbitum*, Hedley; in different aspects.

Fig. 11 slightly reduced, the rest enlarged in various proportions.

Plate iv.

Fig. 1.—*Notarchus glaucus*, Cheeseman ; the animal from life ; reduced by one-third.



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