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MOLLUSCA.

PART I.

By CHARLES HEDLEY,
Conchologist, Australian Museum.

BRACHIOPODA AND PELECYPODA.

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PART I.

As explained by Mr. E. R. Waite in the Introduction to this Memoir, the object of the Trawling Expedition was primarily the capture of food fishes, biological investigation taking a second place. Except a few of great bulk, the Mollusca, by reason of their small size, escaped the meshes of the trawling net. At two stations only, Nos. 13 and 49, did our colleague succeed in procuring small quantities of the sea bottom. These have yielded most of the material dealt with in the following pages.

Since the "Thetis" reached in water from 20-80 fathoms, a region almost unknown to Australian investigators, it follows naturally that a high percentage of the species taken is new to science. The known species are those which extend upwards to the littoral zone on this coast, or those which frequent shoal water in Tasmania. To the latter apply the law enunciated by Forbes,* that "parallels in latitude are equivalent to regions in depth." This truth so amply demonstrated for the northern hemisphere, is here first established for Australian waters.

My acquaintance with Australian Tertiary mollusca is too slight to permit a full comparison, but I am within the mark in stating that the collection here dealt with presents a closer relation to the Tertiary fauna than any recent shells yet examined. Survivors specifically unchanged are *Trigonia margaritacea*, var. *acuticostata*, McCoy, *Nucula obliqua*, Lamarck, *Limopsis tenisoni*, Ten. Woods, and *Sarepta obolella*, Tate. The fossil *Pecten polymorphoides*, Zittel, is hardly to be distinguished from

* Forbes—Rep. Brit. Assoc. for 1843 (1844), p. 175.

Chlamys fenestrata, Hedley. The Eocene *Dimya sigillata*, Tate, corresponds to the recent *D. corrugata*. Though not represented in the collection here discussed, two other recent New South Wales bivalves may be referred to: *Cardium bechei*, Reeve, which is barely separable from the Eocene *C. antisemigranulatum*, McCoy, by the reversed cardinal teeth; and *Cucullæa concamerata*, Martyn, doubtfully distinct from *C. corioensis*, McCoy.

The above facts suggest certain inferences. Firstly, that such beds as the Eocene of Muddy Creek, Victoria, represent a fauna of the hundred fathom zone; and that if the age of the Tertiary beds are to be calculated by Lyellian percentages, an exploration of the hundred fathom zone in existing Australian seas must precede an estimation of the dates of Australian Tertiaries. Secondly, that some living representatives of the Eocene Mollusca of Victoria now dwell six or seven degrees north of where their predecessors lie; a conclusion agreeable to the hypothesis that the Eocene climate was warmer than the present.

In this Report strange names frequently replace familiar ones. The Pelecypoda of New South Wales have heretofore been named according to the lists published by Angas, in the Proceedings of the Zoological Society, and by Smith, in the Reports of the Challenger Expedition. Neither of these writers paid much regard to priority of nomenclature, and many of the names they selected must now pass into synonymy.

In preparing this Report I have been greatly aided by the help of a volunteer assistant, Mr. H. L. Kesteven, to whom my thanks are due for the laborious work of separating and sorting the small shells from the dredgings.

BRACHIOPODA.

Family TEREBRATULIDÆ.

TEREBRATULINA, *D'Orbigny*.

TEREBRATULINA CANCELLATA, *Koch*, sp.

Terebratula cancellata, Koch, Conch. Cab., vii., 1843, p. 35, pl. 26b, f. 11-13. *Terebratulina cancellata*, Davidson, Trans. Linn. Soc., iv., 1886, p. 35, pl. vi., f. 1-8.

Station 46.

One specimen from 50-66 fathoms off Jibbon.

LIOTHYRIS, *Douvillé*.LIOTHYRIS UVA, *Broderip*, sp.

Terebratula uva, Broderip, Trans. Zool. Soc., i., 1853, p. 142,
pl. xxii., f. 2.

Liothyris uva, Davidson, Trans. Linn. Soc., iv., 1886, p. 10, pl. ii.,
f. 5-7.

Stations 44, 56.

A few specimens were secured off Coogee in 49-50 fathoms, and
one individual off Botany Bay in 79-80 fathoms.

MAGELLANIA, *Bayle*.MAGELLANIA FLAVESCENS, *Lamarck*, sp.

Terebratula flavescens, Lamarck, Anim. s. vert., iv., 1819, p. 246.

Waldheimia flavescens, Davidson, Trans. Linn. Soc., iv., 1886,
p. 41, pl. vii., f. 6-19.

Station 55.

One specimen was obtained from 11-15 fathoms, off the Crook-
haven River.

Family RHYNCHONELLIDÆ.ATRETIA, *Jeffreys*.ATRETIA BRAZIERI, *Davidson*.

Atretia brazieri (Davidson), Crane, Proc. Zool. Soc., 1886, p. 183;
Id., Trans. Linn. Soc., iv., 1887, p. 175, pl. xxv., f. 16-17.

Stations 13, 49.

Numerous separate valves were taken off Port Kembla in 63-
75 fathoms, and a few off Cape Three Points in 41-50 fathoms.

PELECYPODA.

Family NUCULIDÆ.

PRONUCULA, gen. nov.

This genus differs from *Nucula* by having the hinge line arched instead of angulated, the rows of teeth do not meet or overlap beneath the umbones, but are distant from the chondrophore, which is not oblique as in *Nucula*, but perpendicular. Briefly, the constituents of the hinge, which in *Nucula* are much compressed and perhaps slightly rotated, are here wide spread. The shell has not the trigonal contour of *Nucula*, is far thinner and the radial sculpture more pronounced than in that genus. Neither lunule nor escutcheon are present.

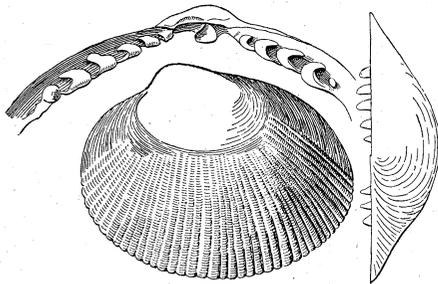
Type *Pronucula decorosa*, Hedley.

PRONUCULA DECOROSA, sp. nov.

(Fig. 39.)

Station 49.

Shell small, ovate-oblong, moderately inflated, very inequilateral, thin, closed, covered by a dense, tough, brown epidermis, on which numerous pustules are irregularly arranged. Beneath the epidermis the shell is white, glossy and brilliantly nacreous. Sculpture: until about one-third grown, the shell is rather smooth;



PRONUCULA DECOROSA.
Fig. 39.

after that stage, about thirty fine radiating riblets arise and traverse the whole valve, except a small anterior and posterior space; these are over-ridden by fine close concentric hair lines, which extend the whole length of the valve. Ventral margin rounded, denticulate by the radial riblets. Beak prominent, bear-

ing a conspicuous prodissoconch on the summit, situated at a third of the shell's length from the posterior end. Hinge plate arched; chondrophore projecting, almost symmetrical and perpendicular, distant from the teeth. On the anterior side five, on the posterior four, well developed teeth, besides a rudimentary tooth at the conclusion of each series. Apparently a thin amphidetic ligament exists, but I could not assure myself of this feature. Pallial line indistinguishable. Length, 2.5; height, 2; breadth of single valve, .7 mm.

Two complete specimens and a few separate valves were taken off Port Kembla in 63-75 fathoms.

PRONUCULA MINUTA, *Ten. Woods*, sp.

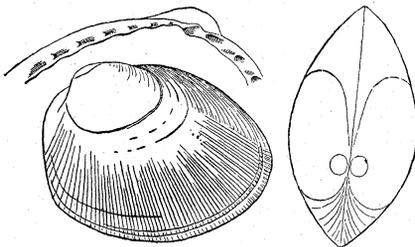
Nucula minuta, Ten. Woods, Proc. Roy. Soc. Tas. for 1876 (1877), p. 156 [not *N. minuta* of Philippi, Gould, or Montagu.]

(Fig. 40.)

Station 49.

I have identified this species by comparison with the author's types, kindly lent me by Mr. A. Morton, the Curator of the Tasmanian Museum. The "Thetis" shell here figured is 1.6 mm. long and 1.2 high; whether it is adult or not my series is insufficient to decide, but I incline to the opinion that it is. Tate and May have united this* with *N. antipodum*, Hanley, and *N. micans*, Angas. As the species of Woods does not agree with the descriptions of Hanley or Angas, or with specimens determined as *antipodum* and *micans* respectively, their conclusions are not here accepted.

A few examples which the "Thetis" took came from off Port Kembla in 63-75 fathoms.



PRONUCULA MINUTA.
Fig. 40.

* Tate & May—Proc. Linn. Soc. N.S.W., xxvi., 1901, p. 435.

NUCULA, *Lamarck.*NUCULA OBLIQUA, *Lamarck.*

Nucula obliqua, Lamarck (not Hanley, Smith, &c.), Anim. s. vert., vi., 1, 1819, p. 59; *Id.*, Chenu, Man. Conch., ii., 1862, p. 179, f. 897. *N. tenisoni*, Pritchard, Proc. Roy. Soc. Vic., viii., 1896, p. 128.

Station 49.

Lamarck notes that his species was gathered at the "Cap aux Huitres," by Peron. There can be no reasonable doubt that this place is Oyster Bay, Maria Island, Tasmania, where Peron made a large collection of shells in February, 1802. The "Thetis" shells, taken off Port Kembla in 63-75 fathoms, are so named because they correspond not only with Lamarck's description and Chenu's figure of the type, but also with specimens from the Derwent River, Tasmania, presented by Mr. W. L. May. But if they are rightly regarded as *N. obliqua*, it follows that Lamarck's species has been misinterpreted by all later writers.

An allied species has been mistaken for *N. obliqua* by Hanley and Smith.* It is common off the coast of tropical Queensland, in a depth of about 20 fathoms. Whereas Lamarck describes the shell from the Cap aux Huitres as thin, with "margine integerimo," and 11 mm. long, the Queensland shell is very solid and the margin is microscopically crenulated, and it is the largest living species. I have taken it off the Palm Islands, 20 mm. long, and Dr. Coppinger's specimens from the Arafura Sea reached 28 mm. The northern species is longer in proportion to height than the Tasmanian, and differs by having just anterior to the long row of teeth a slight but constant inflexion of the dorsal margin. I propose to distinguish the Queensland species as *Nucula superba*, *nom. mut.*

After re-examining the question, the Curator (Mr. R. Etheridge, Junr.), and I support Mr. G. B. Pritchard in considering that there is no specific difference between *N. obliqua*, as here identified, and the Eocene fossils described by Tenison Woods as *N. tumida*.† Mr. R. Etheridge, Junr., has already pointed out‡ that the name *N. tumida* was preoccupied by Phillips.§ Pritchard adds that

* Hanley—Thes. Conch., 1860, iii., p. 156, pl. ccxxx., f. 150; Smith—Chall. Rep., Zool., xiii., 1885, p. 225.

† Ten. Woods—Proc. Roy. Soc. Tas. for 1876 (1877), p. 111.

‡ Etheridge—Cat. Australian Fossils, 1878, p. 155.

§ Phillips—Illustr. Geol. Yorkshire, 1836, pt. 2, pl. 5, f. 15.

it was also preoccupied by Hinds,* and on that account has proposed for it the name of *N. tenisoni*.†

Off Port Kembla in 63-75 fathoms.

Family LEDIDÆ.

LEDA, *Schumacher*.

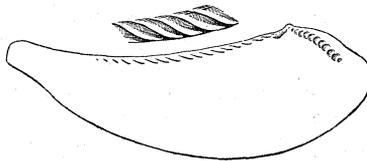
LEDA ENSICULA, *Angas*.

Leda ensicula, Angas, Proc. Zool. Soc., 1877, p. 177, pl. xxvi., f. 27; *Id.*, Smith, Chall. Rep., Zool., xiii., 1885, p. 239.

(Fig. 41.)

Station 49.

Smith writes of this: "Its form is so peculiar, and the description given by Angas so good, that there is little fear of its being confounded with any other species. I may mention that the teeth, which are not referred to by Angas, are elongate, very acute, and numerous, especially on the rostral side."



LEDA ENSICULA.

Fig. 41.

What seemed improbable to Smith has actually happened. Tate and May‡ have

united this with *Leda lefroyi*, Beddome. The two species can hardly, if at all, be separated from the external aspect of the valves. Smith's observations on the hinge enables me to recognise *L. ensicula*. The posterior, but not the anterior, half of the hinge corresponds with that figured and described by Tate§ for his genus *Poroleda*.

Numerous examples were taken off Port Kembla in 63-75 fathoms.

LEDA LEFROYI, *Beddome*.

Leda lefroyi, Beddome, Proc. Roy. Soc. Tas. for 1881 (1882), p. 21.

(Fig. 42.)

Station 49.

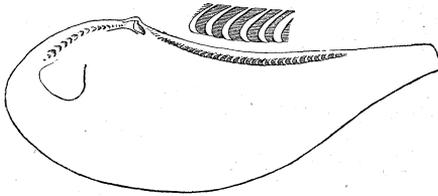
By the courtesy of Mr. A. Morton, Curator of the Tasmanian Museum, I am enabled to identify this species from Beddome's type.

* Hinds—Proc. Zool. Soc., 1843, p. 98.

† Pritchard—Proc. Roy. Soc. Vic., viii., 1896, p. 128.

‡ Tate & May—Proc. Linn. Soc. N.S.W., xxvi., 1901, p. 435.

§ Tate—Proc. Roy. Soc. N.S.W., xxvii., 1893, p. 186.



LEDA LEFROYI.
Fig. 42.

L. lefroyi differs from the foregoing species in the posterior hinge, whose teeth are more bent, more numerous and less oblique to the dorsal margin. To better explain the difference I offer a sketch of each.

Several separate valves occurred off Port Kembla 63-75 fathoms.

LEDA CRASSA, *Hinds*, sp.

Stations 13, 49.

Nucula crassa, Hinds, Proc. Zool. Soc., 1843, p. 99; *Leda crassa*, Hanley, Thes. Conch., iii., 1860, p. 120, pl. 228, f. 69; *Id.*, Sowerby, Conch. Icon., xviii., 1871, Leda, pl. v., f. 27; *Id.*, Angas, Proc. Zool. Soc., 1877, p. 193; *Id.*, Smith, Chall. Rep., Zool., xiii., 1885, p. 237; *Id.*, Tate & May, Proc. Linn. Soc. N.S.W., xxvi., 1901, p. 435.

Leda chuva, Gray, Voy. Fly, ii., 1847, p. 360, pl. ii., f. 3; *Id.*, Hanley, *op. cit.*, p. 119, f. 67; *Id.*, Sowerby, *op. cit.*, f. 46.

Numerous separate valves were found off Port Kembla in 63-75 fathoms, and off Cape Three Points in 41-50 fathoms.

LEDA DOHRNI, *Hanley*.

Leda dohrni, Hanley, Proc. Zool. Soc., 1861, p. 242; *L. dohrnii* (A.Ad.), Sowerby, Conch. Icon., xviii., 1871, Leda, pl. ix., f. 54.

Leda hanleyi, Angas, Proc. Zool. Soc., 1873, p. 174, pl. xx., f. 7.

Stations 29, 49.

The specimens collected indicate that the form described by Angas is the adult of Hanley's species.

This species occurred, but more rarely than *L. crassa*, off Port Kembla, 63-75 fathoms; also at 18 fathoms, Manning Bight.

LEDA MILIACEA, sp. nov.

(Fig. 43.)

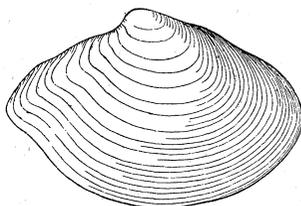
Stations 13, 49.

Shell small, solid, rather inflated, anterior side the longer, posterior slightly rostrate, umbo prominent. Externally smooth and glossy, with faint growth striae. Colour pale yellow. Teeth of the pattern of *L. crassa*, 9 on the posterior, 12 on the anterior side.

Length, 2.25; height, 1.5 mm.

From all known Australian species the present may be readily known by its smoothness and small size.

Numerous separate valves were taken off Port Kembla in 63-75 fathoms, and off Cape Three Points in 41-50 fathoms.



LEDA MILIACEA.

Fig. 43.

SAREPTA, *A. Adams.*SAREPTA OBOLELLA, *Tate, sp.*

Leda obolella, Tate, Trans. Roy. Soc. S.A., viii., 1886, p. 129, pl. v., f. 3a-b.

Sarepta tellinaeformis, Hedley, Rec. Aust. Mus., iv., 1901, p. 26, f. 8.

Stations 13, 49.

Mr. T. S. Hall has kindly sent me a series of *Leda obolella*, Tate, from the Eocene beds of Clifton Bank, Muddy Creek, Victoria, and suggested a relationship with my *S. tellinaeformis*.

The different stages of growth differ in the proportions of length to depth and height; adult specimens also vary in contour, so that it is not easy to institute exact comparison. There is, however, one valve among the fossils which so nearly matches my type that I am satisfied to withdraw my specific name. I would, however, retain the genus to which I assigned it. Among the "Thetis" shells a pair of valves was found connected by an external ligament. This fact dissipates the doubt I previously expressed in using the name *Sarepta*.

The "Thetis" took this off Port Kembla in 63-75 fathoms, and off Cape Three Points in 41-50 fathoms.

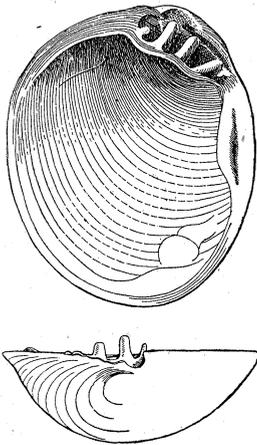
CYRILLA, *A. Adams.*

CYRILLA DALLI, *sp. nov.*

(Fig. 44.)

Stations 13, 49.

Shell minute, inflated, oblique, produced on the posterior ventral side, glossy, slightly



CYRILLA DALLI.

Fig. 44.

This species, the third and smallest *Cyrilla*, adds a genus to the Australian fauna. It is named for Dr. W. H. Dall, as a slight but grateful acknowledgment of the help which his "Tertiary Fauna of Florida" has been to me in studying this and other forms. My illustration shows the left valve from above and from within.

Many separate valves, and a few coloured and in contact, were taken off Port Kembla in 63-75 fathoms, and off Cape Three Points in 41-50 fathoms.

Family LIMOPSISIDÆ.

LIMOPSIS, *Sassi*.

LIMOPSIS TENISONI, *Ten. Woods*.

- Limopsis tenisoni*, Ten. Woods, Proc. Roy. Soc. Tas. for 1877 (1879), p. 56; *L. cancellata*, Ten. Woods, Proc. Roy. Soc. Tas. for 1876 (1877), p. 156 [not *L. cancellata*, Reeve, nor ? *L. cancellata*, Martens, S. B. Nat. Freunde, 1881, p. 66.]
L. bassi, Smith, Chall. Rep., Zool., xiii., 1885, p. 256, pl. xviii., f. 6.]

Station 49.

Having studied both the type of *L. tenisoni*, in the Tasmanian Museum, and "Challenger" specimens of *L. bassi*, I am in a position to say that these names are synonymous. Tate and May* catalogue this species as *L. multistriata*, Forskal,† but that species, judging from figures, is more symmetrical. It has been identified by McCoy‡ as *L. belcheri*, Adams & Reeve, an identification emphatically denied by Tate.§

The "Thetis" procured this species off Port Kembla in 63-75 fathoms.

LIMOPSIS BRAZIERI, *Angas*.

- Limopsis brazieri*, Angas, Proc. Zool. Soc., 1871, p. 21, pl. 1., f. 34.

Station 49.

Several specimens off Port Kembla in 63-75 fathoms.

LIMOPSIS RUBRICATA, *Tate*.

- Limopsis rubricata*, Tate, Trans. Roy. Soc. S.A., ix., 1887, p. 71, pl. 5, f. 6.

Station 13.

A couple of valves from 41-50 fathoms, off Cape Three Points.

* Tate and May—Proc. Linn. Soc. N.S.W., xxvi., 1901, p. 437.

† Chenu—Man. Conch., ii. p. 177, f. 881, 1859.

‡ McCoy—Ann. Mag. Nat. Hist., (3), xvi., 1865, p. 114.

§ Tate—Trans. Roy. Soc. S.A., xxi., 1897, p. 49.

AUSTROSAREPTA, *Hedley.*AUSTROSAREPTA PICTA, *Hedley.*

Austrosarepta picta, Hedley, Proc. Linn. Soc. N.S.W., xxv., 1899, p. 430, f. 1, 2.

Station 49.

Three single valves from off Port Kembla in 63-75 fathoms.

Family ARCIDÆ.BATHYARCA, *Kobelt.*

BATHYARCA PERVERSIDENS, sp. nov.

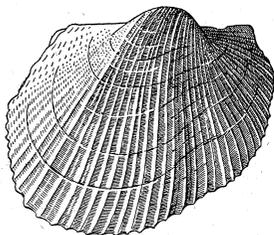
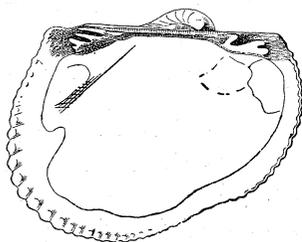
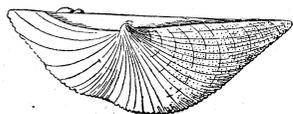
(Fig. 45.)

Stations 13, 49.

Shell small, short, trapezoidal, solid, inflated, slightly inequilateral, rounded anteriorly and posteriorly, slightly sinuate at the byssal gape, a faint depression extending from the gape to the beaks, which are prominent. Sculpture: fine radial riblets, about their own breadth apart, here and there surmounted by short scales, are traversed and broken by concentric growth furrows. Ligamental area narrow. Hinge line straight, narrow and vertically striated for the median third, broadened at either end, anteriorly with two, posteriorly with four irregularly horizontal or oblique striated teeth. Margin crenulated within, except around the byssal gape. Length, 3.25; height, 2.5 mm.

This species is included in the genus *Bathyarca*, named by Kobelt,* and defined by Verrill & Bush.†

Separate valves occurred plentifully off Port Kembla in 63-75 fathoms, and off Cape Three Points in 41-50 fathoms.



BATHYARCA PERVERSIDENS.
Fig. 45.

* Kobelt—Conch. Cab., viii., 2, Arca, 1891, p. 213.

† Verrill & Bush—Proc. U.S. Nat. Mus., xx., 1898, p. 842.

ARCA, *Linneé.*ARCA RETICULATA, *Gmelin.*

Arca reticulata, Gmelin, Syst. Nat., xiii., 6, 1790, p. 3311.

Stations 49, 56.

A few separate valves were taken off Port Kembla in 63-75 fathoms. One adult shell was procured off Botany Bay in 79-80 fathoms.

GLYCYMERIS, *Da Costa.*GLYCYMERIS AUSTRALIS, *Q. & G.*, sp.

Pectunculus australis, Q. & G., Voy. Astrolabe, iii., 1835, p. 469, pl. 77, f. 7-9.

P. holosericus, Reeve, Conch. Icon., i., Pectunculus, 1843, pl. iv., sp. 18.

P. grayanus, Dunker, Proc. Zool. Soc., 1856, p. 357.

Station 52.

This species was taken by Quoy & Gaimard in 14 fathoms off Cape Dromedary, New South Wales. Though so precisely localised, excellently figured and described, it has been ignored by all subsequent authors.

One specimen was taken in the Shoalhaven Bight, 19-20 fathoms.

Family PTERIIDÆ.PHILOBRYA, *Carpenter.*

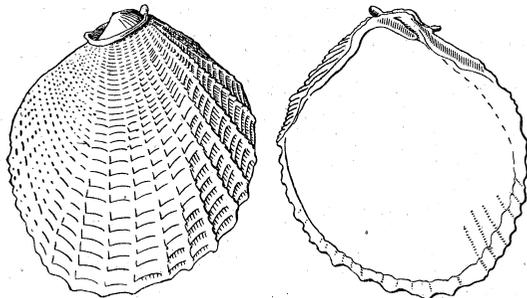
PHILOBRYA PECTINATA, sp. nov.

(Fig. 46.)

Stations 13, 49.

Shell small, thin, rather oblique. Colour white (? bleached). Dorsal margin sloping, posterior and ventral margins rounded, anterior margin sinuate, descending. Prodissoconch of average size. Sculpture about twenty-two sharp, narrow, radiating ribs, crowded posteriorly, apart medially and anteriorly, denticulate the margin, and are intersected by concentric riblets which produce erect scales at the point of contact and enclose nearly square meshes. Within, the margin is narrow, especially anteriorly; the interlocking pits and tubercles upon it are slightly developed, especially anteriorly. In the posterior ventral angle three such

are more prominent, from which ridges and furrows extend upwards into the valve. Chondrophore oblique, submedian.



PHILOBRYA PECTINATA.
Fig. 46.

Byssal notch small. Hinge crenulations well developed both anteriorly and posteriorly. Length, 2; height, 2.5 mm.

This species is nearest related to *P. tatei*, Hedley,* from which it is immediately distinguished by the sloping posterior dorsal margin and narrower contour. By the kindness of Mr. J. Dennant I am enabled to compare the novelty with *P. bernardi*, Tate,† which is longer, narrower, more inflated, and has the interior margin broader and more tuberculated than the recent species. The dimensions of *P. bernardi* were not stated in the original description, so this opportunity is taken to note that the co-type from Shelford is 1.9 mm. in length and 2.8 in height.

Several valves from 41-50 fathoms off Cape Three Points, and from 63.75 fathoms off Port Kembla.

PHILOBRYA TATEI, Hedley.

Philobrya tatei, Hedley, Rec. Aust. Mus., iv., 1901, p. 24, f. 6.

Stations 13, 49.

Numerous separate valves were taken with the preceding species.

PHILOBRYA CREMATULIFERA, Tate, sp.

Myrina crenatulifera, Tate, Trans. Roy. Soc. S.A., xv., 1892, p. 131, pl. i., f. 11, 11a.

Stations 13, 49.

One valve was taken at each locality, neither of which showed the characteristic colour of southern specimens.

* Hedley—Rec. Aust. Mus., iv., 1901, p. 24, f. 6.

† Tate—Trans. Roy. Soc. S.A., xxii., 1898, p. 88, pl. iv., f. 10.

Family TRIGONIIDÆ.

TRIGONIA, *Bruguiere*.

TRIGONIA MARGARITACEA, *Lamarck*,

Var. ACUTICOSTATA, *McCoy*.

Trigonia acuticostata, McCoy, Geol. Mag., iii, 1866, pp. 481-2, f. 1.

Trigonia lamarckii, var. *reticulata*, Ten. Woods, Proc. Linn. Soc. N.S.W., ii, 1878, p. 125.

(Figs. 47, 48.)

Stations 13, 49.

The classification of the recent *Trigonia* is a subject of dispute. Several species have been proposed, but no two writers have agreed on their value. A preliminary examination led von Willemoes Suhm to recognise four species.* His notes are probably embodied by Smith.† The references given by the latter writer are not exhaustive, and if his valuation be adopted certain references should, I think, be transferred to the credit of other species.

Tapparone Canefri, who gave the matter considerable attention,‡ concludes that *T. lamarckii*, Gray, is a mere variety of *T. margaritacea*, Lamk.

The study Lycett bestowed on this genus gives especial weight to his opinion. Though he confused the nomenclature of the recent species, his meaning can be recovered from the context. He considered that only two recent species, *T. margaritacea*, Lamk., and the bizarre *T. strangei*, Ad., are valid.§

Having collected *Trigonia* at points of this coast thousands of miles apart, and after careful study of the ample collection in the Australian Museum, I endorse Lycett's opinion.

In size, shape, colour and sculpture *Trigonia* is quite inconstant; it matches *Lima* in the variation of the radial ribs and of the warts or spines upon them. In deeper water the shell becomes more spinose, a character upon which McCoy founded his *T. acuticostata*. Tenison Woods bestowed another name upon this form, apparently because his specimens were recent and McCoy's

* Willemoes Suhm—Chall. Rep., Narr., i, 1885, p. 462.

† Smith—Chall. Rep., Zool., xiii., 1885, pp. 224-5.

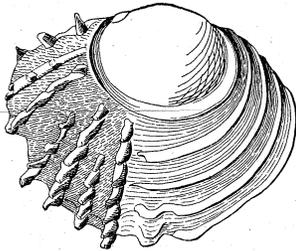
‡ Tapparone Canefri—Mem. Acad. Sci. Torino, xxviii., 1876, p. 241.

§ Lycett—Monogr. Brit. Fossil Trigoniæ, Palæont. Soc., xxxiii., pt. 5, 1879, p. 232.

were fossil. Subsequent to his description of the species McCoy recognised *T. acuticostata* as living in Bass Straits.*

The series before me well illustrates the early stages of growth. I had remarked on the discrepant sculpture these exhibit, when my friend, Mr. T. S. Hall, informed me that he had simultaneously discovered this interesting feature. He has since published† an excellent account of this, showing how the ornament of Mesozoic ancestors persists in the young of recent *Trigonia*.

A young shell, 1.15 mm. long and 1.05 mm. high, is here shown



TRIGONIA MARGARITACEA.

Fig. 47.

The prodorsal part of the valve is smooth and inflated with a broad up-turned rim. On the posterior half of the valve are seven radiating spinose ridges, alternately older and younger, two spines corresponding in age to one of anterior concentric lamella, the interstices of the radii, but not of the lamellæ, are finely granulate. At every second lamella a fresh radius arises, and thus retreating step by step the lamellæ shrink till at the tenth they disappear. I find that the brephic stage here described of var. *reticulata* is precisely similar to that of typical *T. margaritacea* and of its other varieties, viz., *nobilis*, Ad., *dubia*, Sowb., *lamarckii*, Gray, and *uniophora*, Gray; also to that of *T. strangei*. All these forms also possess a small chondrophore immediately posterior to the umbo, of which I find no note in literature.

At its inception the hinge appears to consist of a cardinal and a lateral in the right valve, each fitting into its respective sockets



LEFT VALVE.

RIGHT VALVE.

BREPHIC STAGE OF HINGE IN TRIGONIA.

Fig. 48.

in the left. With growth (three stages shown in fig. 47) both cardinal and lateral add cog upon cog, advance and unite to form the adult complex. Corresponding modifications occur in

* Crosse—Journ. de Conch., xxiv., 1876, p. 396.

† Hall—Proc. Roy. Soc. Vic., xiv., 1901, pp. 17-21, text fig.

the left valve. This history disproves the suggestion* that the *Trigonia* hinge is a contraction of an originally taxodont dentition.

Numerous separate valves occurred off Port Kembla in 63-75 fathoms, and off Cape Three Points in 41-50 fathoms.

Family PECTINIDÆ.

PECTEN, *Mueller.*

PECTEN MEDIUS, *Lamarck.*

Pecten medius, Lamarck, Anim. s. vert., vi., 1, 1819, p. 163.

Pecten laticostatus, Gray in Yate, Account of New Zealand, 1835, p. 310 [not *P. laticostatus*, Lamk., Anim. s. vert., vi., 1819, p. 179].

Pecten fuscus (Klein), Sowerby, Thes. Conch., i., 1842, p. 47, pl. xvi., f. 118, 119.

Pecten bifidus, Menke, Spm. Moll. Nov. Holl., 1843, p. 35; *Id.*, Philippi, Abb. Besch., i., 1844, p. 202, pl. ii., f. 6 [not *P. bifidus* (Munster), Goldfuss, Petr. Germ., 1826, p. 65, pl. xcvii., f. 10].

Pecten fumatus, Reeve, Conch. Icon., 1852, pl. vii., f. 32; *Id.*, Smith, Chall. Rep., Zool., xiii., 1885, p. 307.

Pecten novæ-zelandiæ, Reeve, *op. cit.*, pl. vii., f. 36.

Pecten modestus, Reeve, *op. cit.*, pl. xi., f. 41.

Pecten filosus, Reeve, *op. cit.*, f. 42.

Pecten meridionalis, Tate, Proc. Roy. Soc. Tas. for 1886 (1887), p. 115.

? *Pecten concavum*, Perry, Conchology, 1811, pl. iv., f. 1.

? *Pecten excavatus*, Anton, Verzeich., x., 1839, p. 19; *Id.*, Philippi, Abbild. Besch., i., 1844, p. 201, pl. ii., f. 1.

Station 55.

This nomenclature for the common Australian Scallop has not been previously recognised. The inquiry into its right to usage turns on two points—whether the Australian species is identical with that from New Zealand, and what is the proper name for the latter.

* Fischer—Journ. de Conch., xxxii., 1884, p. 117.

Angas, who had collected the species in both countries, writes that the South Australian *Pecten* "is without doubt the *P. latincostatus* of Gray from New Zealand."* Tenison Woods remarks that the Tasmanian and New Zealand forms can only be parted by those who consider geographic isolation a specific character.† Hutton agrees in uniting the New Zealand species to the Australian.‡

On the other hand, Tate, after mature consideration, ranked the Australian species apart from that of New Zealand.§ This view had by inference the support of Sowerby, Reeve and Smith.

The variations in colour and contour of the Australasian Scallop described by Tate are not, in my opinion, sufficient or persistent enough for specific rank. The Australian and New Zealand shells are, therefore, to be united under one name.

Lamarck gave no locality for his *Pecten medius* when he described it. It has escaped the notice of all conchological writers that Deshayes (who doubtless wrote in view of Lamarck's type) has redescribed *Pecten medius*, and added, "Elle vient des mers de la Nouvelle Zélande, où elle paroît aussi commune que le *Pecten maximus* sur nos côtes."||

Lamarck had ample collections of the common and conspicuous shells from New Zealand, Tasmania and Southern Australia. That our Scallop had apparently escaped his notice was an anomaly which suggested the present inquiry.

Because Lamarck referred interrogatively to the figure of a shell from the Red Sea, he has been misunderstood as having described Red Sea material. It is beyond the limits of this article to discuss whether the species from the Red Sea and the West Indies, generally known as *P. medius*, is or is not that species. However, that the New Zealand species, and hence the Australian, is the real *Pecten medius*, Lamarck, is certain.

In 11-15 fathoms off the Crookhaven River.

AMUSIUM, *Schumacher*.

AMUSIUM THETIDIS, sp. nov.

(Fig. 49.)

Station 49.

Valve small, thin, white, translucent, compressed, equilateral, externally glossy and concentrically grooved by reverse imbricating sculpture, the internal lyræ visible through the shell. The anterior auricle well developed, without ctenolium. Hinge line long, slightly concave, umbo projecting. Within are ten slender

* Angas—Proc. Zool. Soc., 1865, p. 656.

† Ten. Woods—Proc. Roy. Soc. Tasm. for 1877 (1878), p. 56.

‡ Hutton—Proc. Linn. Soc. N.S.W., ix., 1884 (1885), p. 532.

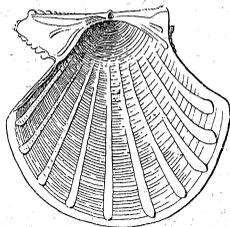
§ Tate—Proc. Roy. Soc. Tasm. for 1886 (1887), p. 115.

|| Deshayes—Encycl. Meth., Vers., iii., 1832, p. 715.

raised radiating lyræ, knobbed at the ventral margin and vanishing towards the umbo. A pair of auricular crura occur on either side of the hinge. The hinge plate and ventral margin are roughened by fine vermiculate scratches. Chondrophore minute, triangular, the depth of the hinge plate. Length, 6; breadth, 6 mm.

This seems to represent the *A. lucidum*, Jeffreys, of Northern Seas.

One perfect right valve and several fragments were taken off Port Kembla in 63-75 fathoms.



AMUSIUM THETIDIS.
Fig. 49.

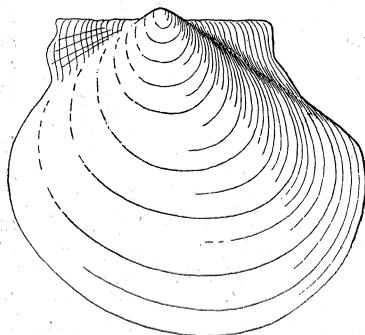
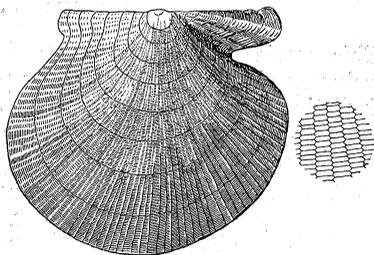
CYCLOPECTEN, Verrill.

CYCLOPECTEN FAVUS, sp. nov.

(Fig. 50.)

Stations 13, 49.

Valves dissimilar in shape, size and sculpture. The left larger and more convex, thin, opaque white in the centre, transparent at the periphery, smooth, except for a few delicate concentric growth lines. Hinge line straight, about two-thirds of the length of the valve; auricles nearly equal, latticed by radiating and concentric threads. Umbo projecting, with a callus crest. Ventral margin rounded, produced posteriorly. Hinge plate narrow, finely wrinkled. Chondrophore small, projecting into the cavity of the valve.



CYCLOPECTEN FLAVUS.
Fig. 50.

Right valve smaller, overlapped ventrally by its fellow, less oblique, pale yellow, opaque. Umbo not projecting, auricles unequal, the anterior narrow and produced. Beneath it a byssal notch, but no pectinated teeth. Sculptured by concentric growth lines and

superficially by numerous fine, irregular, radiating threads, connected by close-set transverse bars which include narrow hexagonal spaces. This structure is seen to peel off in places, and is, therefore, probably epidermal, and perhaps corresponds to the pustules of the Atlantic species.

Left valve, length, 3.2 mm. ; height, 2.7 mm.

Right valve, length, 2.6 mm. ; height, 2.5 mm.

The species is referred to Verrill's genus *Cyclopecten*,* one member of which, *C. murrayi*, Smith,† has already been reported from Australia.

This and the next are readily distinguishable from co-generic forms by their obliquity and the honeycomb structure of the right valve.

A couple of perfect shells and numerous separate valves were taken off Port Kembla in 63-75 fathoms, and off Cape Three Points in 41-50 fathoms. The Museum contains specimens which Mrs. Helena Forde collected on the beach at Pambula, N.S.W.

CYCLOPECTEN OBLIQUUS, sp. nov.

(Fig. 51.)

Stations 13, 49.

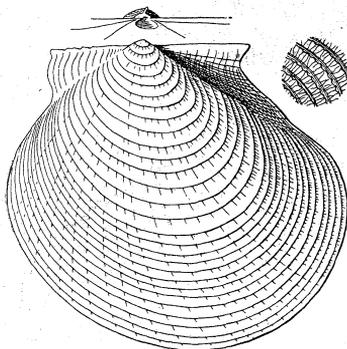
This species is slightly larger than the preceding, which it closely resembles. Without a lens the right valve of *C. obliquus* is indistinguishable from that of *C. favus*; my drawing would stand equally well for either. Under high magnification, and by transmitted light, the hexagonal spaces in *C. obliquus*, but not in

C. favus, appear to be stippled. From this cause, by reflected light, the valve of *C. favus* is glossy, that of *C. obliquus* dull.

The left valve (fig. 50) is easily distinguished by its elevated concentric lamellæ, about 35 in number. Between the lamellæ are irregular veins.

The valve figured is 4.6 mm. in length and 4.2 mm. in breadth.

Numerous separate valves and a perfect specimen occurred off Cape Three Points in 41-50 fathoms, and off Port Kembla in 63-75 fathoms.



CYCLOPECTEN OBLIQUUS.

Fig. 51.

* Verrill—Trans. Connect. Acad., x., 1899, p. 70.

† Smith—Chall. Rep., Zool., xiii., 1885, p. 303, pl. xxii., f. 1.

CHLAMYS, *Bolten*.CHLAMYS ASPERRIMUS, *Lamarck*, sp.

Pecten asperrimus, Lamarck, Anim. s. vert., vi., i., 1819, p. 174 ;
Delessert, Recueil., 1841, pl. xv., f. 1a-b.

Stations 49, 55.

Menke mis-identified* this as *Pecten rubidus*, Martyn, a name now included in the synonymy of the Arctic *P. islandicus*, Müller.

In 11-15 fathoms off the Crookhaven River, and off Port Kembla in 63-75 fathoms.

CHLAMYS TEGULA, *Wood*, sp.

Ostrea tegula (Mawe), Wood, Index Test., 1828, p. 206, Suppl.,
pl. ii. *Ostrea*, f. 3 ; *Pecten tegula*, Sowerby, Thes. Conch., i.,
1842, p. 68, pl. xiv., f. 90.

Station 55.

In 11-15 fathoms off the Crookhaven River.

CHLAMYS FENESTRATA, *Hedley*.

Chlamys fenestrata, Hedley, Proc. Linn. Soc. N.S.W., xxv.,
1900, p. 730, pl. xlvi., f. 17-19.

? *Pecten polymorphoides*, Zittel, Reise Novara, Geol., i., 1864,
p. 51, pl. xi., f. 3.

Stations 13, 49, 52.

A few broken valves occurred off Port Kembla in 63-75 fathoms, and off Cape Three Points in 41-50 fathoms. From 19-20 fathoms in the Shoalhaven Bight a large specimen was secured, which measured 37 mm. in height and length, and was more oblique than younger shells. In this stage of growth it differs much from the type described, and acquires a close resemblance to the fossil *P. polymorphoides*, Zittel. In view of the geologic importance of the determination, I requested the Curator, Mr. R. Etheridge, Junr., to examine the two shells. Guided by the

* Menke—Spm. Moll. N. Holl., 1843, p. 36.

material on hand, we agree that the minute sculpture of the recent species divides it from the fossil, but in view of the variability of each we regard it as probable that a larger series might bridge the gap.

Mr. Etheridge has kindly drawn up the following detailed comparison:—

"The outline and auricles, cardinal margins, chondrophore, latilaminæ and adductor impressions in each valve are the same in both fossil and recent forms

Right valves.—The fasciculate primary costæ in both are six in number and rounded. In the recent form the fasciculi are flat, entire and depressed, and are differentiated from one another by faint grooves. In the fossil shell the fasciculi are sharp, each distinctly separated from its neighbours and bifurcate.

The intercostal spaces in the recent shell are traversed by simple secondary narrow costæ. In the fossil these second costæ are similar to the fasciculi of the primaries, and are more numerous than the secondaries of the recent form.

The sculpture of the recent shell consists of almost microscopic, remarkably close, concentric, scobinate frills on the intercostal spaces, reduced to ordinary linear sculpture on the primary costæ. In the fossil the whole of the fasciculi are sub-echinate, and on the anterior end echinate, whilst the intercostal spaces exhibit concentric frills only.

Left valves.—Primary costæ are 6, prominent, of indefinite fascicules, except on the anterior and posterior ends, and are of less width than the intercostal spaces. In the fossil they *may* be 6 and depressed, but the component fascicules sharp.

The intercostal spaces in the recent form bear secondary costæ, which are obliterated by upstanding concentric frills passing equally and uniformly across them and the primary costæ. The fossil appears to have possessed the same sculpture."

From 19-20 fathoms in the Shoalhaven Bight.

DIMYA, *Roualt.*

DIMYA CORRUGATA, sp. nov.

(Fig. 52.)

Station 49.

Shell irregularly trapezoidal, higher than long, obliquely posteriorly produced, both valves shallow, the left or free valve the flatter. In the shade the surface is dull grey, but in reflected light it has a brilliant silvery sheen. Sculpture: close fine concentric growth lines in the early stages are distorted by

the foreign body to which the apex is fixed, radial crenulations early appear, increase by interstitial riblets, and corrugate the margin. Interior with a marginal shelf reached by variable radiating ribs, which are not related to the external sculpture, the ventral distant, the dorsal smaller and closer, sometimes in pairs. Hinge line straight and short, beneath its centre is set the small deep triangular chondrophore. Umbo projecting in the left valve. Height, 12; length, 10 mm.

My material consists of fragments and odd, mostly left, valves. All known *Dimya* are Tertiary fossils except *D. argentea*, Dall,* dredged alive in the West Indies. From that the Australian shell differs by coarser sculpture and fewer internal radii. Two Australian Eocene *Dimya* were published by the late Prof. Tate. *D. dissimilis*,† which has wrinkled hinge areas like *Dimyodon*, and *D. sigillata*‡, apparently from the examples before me, smoother, smaller, and more globose than the recent species.

The interior of the left and the exterior of the right valve are here figured.

Off Port Kembla, 63-75 fathoms.

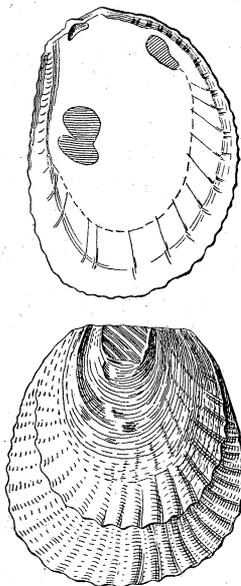
L I M A, *Bruguère*.

L I M A L I M A, *Linn.*, var. MULTICOSTATA, *Sowerby*.

Lima multicostata, Sowerby, *Thes. Conch.*, i, 1843, p. 85, pl. xxii., f. 38.

Stations 48, 49.

Several living specimens from 63-75 fathoms off Port Kembla and off Wollongong in 55-56 fathoms.



DIMYA CORRUGATA.

Fig. 52.

* Dall—*Bull. Mus. Comp. Zool.*, xii., 1885-6, p. 228.

† Tate—*Trans. Roy. Soc. S.A.*, vii., 1885, p. 100, pl. iii., f. 9a-c.

‡ Tate—*Op. cit.*, pl. viii., f. 18a-b.

LIMA ANGULATA, *Sowerby*.

Lima angulata, Sowerby, Thes. Conch., i., 1843, p. 86, pl. xxii.,
f. 39, 40.

Stations 13, 49.

A few small valves from off Cape Three Points in 41-50 fathoms, and off Port Kembla in 63-75 fathoms.

LIMA BULLATA, *Born*, sp.

Ostrea bullata, Born, Mus. Caes. Vindob., 1780, p. 110, pl. vi.,
f. 8.

Stations 13, 49.

A valve from off Cape Three Points in 41-50 fathoms, and off Port Kembla in 63-75 fathoms.

Family MYTILIDÆ.

ARCOPERNA, *Conrad*.ARCOPERNA RECENS, *Tate*.

Arcoperna recens, Tate, Proc. Malac. Soc., ii., 1897, p. 181, 3 text
figures.

Stations 13, 49.

A few fragments of this occurred off Port Kembla in 63-75 fathoms, and off Cape Three Points in 41-50 fathoms.

MODIOLARIA, *Loven*.MODIOLARIA BARBATA, *Reeve*, sp.

Lithodomus barbatus, Reeve, Conch. Icon., x., 1858, pl. v., f. 27,
and *L. laniger*, f. 30; *Modiolaria barbata*, Angas, Proc. Zool.
Soc., 1867, p. 911, pl. 44, f. 12.

Station 28.

A few specimens were obtained off the Manning River in 22 fathoms.

MODIOLA, *Lamarck*.MODIOLA ARBORESCENS, *Chemnitz*, sp.

Mytilus arborescens, Chemnitz, Conch. Cab., xi., 1795, p. 251, pl. 198, f. 2016-17; *Id.*, Reeve, Conch. Icon., x., 1857, Modiola, pl. vi., sp. 30.

Stations 4, 13, 49.

This world-wide species occurred off Barranjoey in 55-84 fathoms, off Cape Three Points in 41-50 fathoms, and off Port Kembla in 63-75 fathoms.

MODIOLA ALBICOSTA, *Lamarck*.

Modiola albicosta, Lamarck, Anim. s. vert., vi., 1819, pt. 1, p. 111; *Id.*, Delessert, Recueil de Coq., 1841, pl. 13, f. 8a-b.

Station 54.

Accepting the usual interpretation of the species, this Tasmanian shell is, by Delessert's figure, associated with Lamarck's name. Yet it appears to me as probable that Lamarck applied the name *M. albicosta* to the tropical *M. philippinarum*, Hanley, while he regarded* the Tasmanian shell as a variety of *M. tulipa*.

The following record appears to be the northernmost locality for this species: Jervis Bay, 10-11 fathoms.

MODIOLA AUSTRALIS, *Gray*.

Modiola australis, Gray, King's Survey Intertrop. Coasts Austr., ii., 1827, app. p. 477; *Id.*, Reeve, Conch. Icon., x., Modiola, 1857, pl. v., f. 21.

Station 55.

Gray's brief account is as applicable to *M. albicosta*. Reeve's figure fixes the identity of the species.

Dredged off the Crookhaven River in 11-15 fathoms.

Family MYOCHAMIDÆ.MYODORA, *Gray*.MYODORA BREVIS, *Stutchbury*, sp.

Anatina brevis, Stutchbury, Zool. Journ., v., 1829, p. 99, pl. xliii., f. 1, 2.

Station 49.

One immature valve from 63-75 fathoms off Port Kembla.

* *Fide* Dashayes—Anim. sans vert., vii., 1836, p. 19, footnote.

Family CUSPIDARIIDÆ.CUSPIDARIA BRAZIERI, *Smith*, sp.

Nœera brazieri, *Smith*, *Chall. Rep.*, *Zool.*, xiii., 1885, p. 51, pl. ix., f. 3.

Stations 13, 49.

A few valves from 41-50 fathoms off Cape Three Points, and from 63-75 fathoms off Port Kembla.

CUSPIDARIA LATESULCATA, *Ten. Woods*, sp.

Nœera latesulcata, *Ten. Woods*, *Proc. Linn. Soc. N.S.W.*, ii., 1877 (1878), p. 123 [not *Nœera (Rhinomya) latesulcata*, *Tate*, *Trans. Roy. Soc. S.A.*, ix., 1886 (1887), p. 178, pl. xix., f. 7].

Leda, sp. nov., *Cox*, *Proc. Linn. Soc. N.S.W.*, ii., 1877 (1878), p. 122.

Cuspidaria latesulcata, *Hedley*, *Proc. Linn. Soc. N.S.W.*, xxvi., 1901, p. 20, pl. ii., ff. 11-13.

Station 49.

Since *Tenison Woods* preoccupied the name chosen by *Prof. Tate* for a Tertiary species, to avoid confusion I now propose for the latter the name of *Cuspidaria tatei*.

A broken valve comes from off Port Kembla in 63-75 fathoms.

Family CRASSATELLITIDÆ.CRASSATELLITES, *Kruger*.

CRASSATELLITES SECURIFORME, sp. nov.

(Fig. 53.)

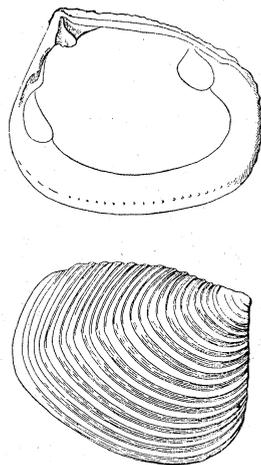
Stations 13, 49.

Shell small, rather flattened, solid, produced, trapezoidal, very inequilateral. Colour yellow-ochre. Sculpture: about eighteen stout, reversely imbricating, concentric ridges traverse the valve,

and are parted by furrows of equal width. Both ridges and furrows are over-run by minute and close concentric threads. Beaks acute and smooth. Inner ventral margin finely denticulate. Length, 6·5; height, 5 mm.

There is a group (? *Crassatina**) of small, compressed, ridge sculptured *Crassatellites*, distributed in Australian waters by pairs, one species long, the other short. In Queensland there are *C. torresi*, Smith, and *C. rhomboides*, Smith; in S. Australia, *C. micra*, Verco, *C. producta*, Verco; in New South Wales, *C. securiforme*, Hedley, and *C. scabrilirata*, Hedley. Thanks to the kindness of Dr. J. C. Verco, who forwarded examples of his species, I am enabled to make the following comparisons. In many respects the new species is intermediate between *C. producta*† and *C. micra*; ‡ from the former it differs by being shorter in proportion to height,

by the ridges being smaller, closer and more numerous, and by the secondary microscopic sculpture being much finer; from *C. micra* it differs by being longer and flatter and by having the interior ventral margin denticulated.§



CRASSATELLITES SECURIFORME.

Fig. 53.

It has been pointed out by Dr. W. H. Dall|| that *Crassatella*, Lamarck, 1799, having for type *C. cygnea*, Spengler, is a synonym of *Mactra*. Hence it must be abandoned in favour of *Crassatellites*, Kruger, 1823.¶

A few separate valves were obtained from off Port Kembla in 63-75 fathoms, and off Cape Three Points in 41-50 fathoms.

* Weinkauff—Conch. Cab., x., Abth. Ia, Crassatella, p. 1, 1881.

† Verco—Trans. Roy. Soc. S.A., xix., 1895, p. 92, pl. i., f. 2.

‡ *Id.*, *op. cit.*, p. 93, pl. i., f. 3.

§ *C. aurora*, Ad. & Ang. (Proc. Zool. Soc., 1863, p. 426, pl. xxxvii., f. 15), from Bass Straits, is a species as yet unrecognised by local workers. I venture to suggest that *C. carnea*, Tate, is probably a synonym of this.

|| Dall—Trans. Wagner Free Inst., iii., iv., 1898, p. 874.

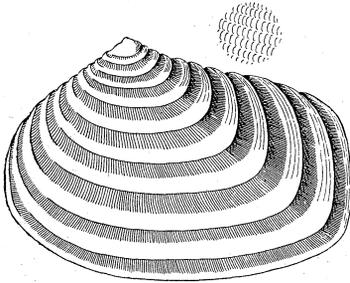
¶ Kruger—Gesch. Urw., ii., 1823, p. 466.

CRASSATELLITES SCABRILIRATA, sp. nov.

(Fig. 54.)

Station 13.

Shell small, rather thin and flattened, rhomboidal, very inequilateral, the posterior side twice the length of the anterior.



CRASSATELLITES SCABRILIRATA.

Fig. 54.

Colour dull pale yellow. Sculpture about ten low, broad, downwardly curved lamellæ, which are radiately transversed by rows of microscopic scales. Lunule and dorsal area elongate and narrow. Umbo acute. Inner ventral margin smooth. Length, 6.7; height, 4.8 mm.

Its peculiar microscopic sculpture distinguishes this from all southern forms, but connects it with *C. rhomboides*, Smith, a species originally described from Torres Straits, but which I have taken in 15 fathoms off Palm Islands. *C. scabrilirata* is not so abruptly truncated anteriorly, nor so flattened, and has fewer and broader concentric ribs than *C. rhomboides*.

One half-grown valve was taken off Cape Three Points in 41-50 fathoms. I have drawn the figure and description from better material taken off Port Stephens by a Museum dredging excursion.

CUNA, gen. nov.

A genus of the *Crassatellitidae*. Shell very small, equilateral or slightly rostrate, higher than long, with lunule and impressed dorsal area, beaks erect, prodissoconch marked, valves sometimes clasping. Sculpture radiate or concentric, or both. Inner ventral margin usually denticulate. Hinge plate broad and flat; in the left valve two well developed cardinals; in the right a rudimentary cardinal and a massive, projecting, flat-topped and triangular cardinal. Laterals produced, sometimes transversely striated, a posterior and anterior in each valve. Ligament partly internal, protruding in a notch below the beaks.

Type *Cuna concentrica*, Hedley.

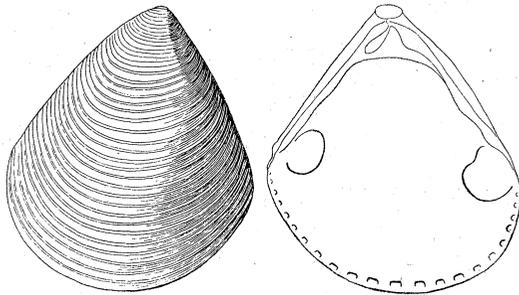
This genus, which embraces *Kellia atkinsoni*, Ten. Woods, *Carditella delta*, Tate and May, &c., has hitherto been confounded with *Carditella*, the hinge structure of which is of a different plan. The erect beak and the fissure above the chondrophore readily distinguish *Cuna* from *Carditella*. The late Prof. Tate told me that species like his *C. delta* occurred fossil in the Australian Tertiary.

CUNA CONCENTRICA, sp. nov.

(Fig. 55.)

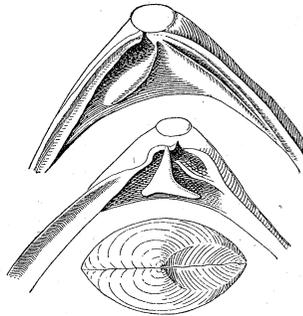
Station 49.

Shell subtrigonal, equilateral, very short, rather flat, glossy,



white. Without radial sculpture, but with about forty concentric ribs of width equal to their interstices. Dorsal margins nearly straight, ventral margin rounded, inner ventral margin set with about twenty square interlocking knobs. Height, 2. mm. ; length, 1.85 mm.

Numerous separate and a few conjoined valves from off Port Kembla in 63-75 fathoms.



CUNA CONCENTRICA.
Fig. 55.

CUNA ATKINSONI, *Ten. Woods*, sp.

Kellia atkinsoni, Ten. Woods, Proc. Roy. Soc. Tas. for 1876 (1877), p. 158; *Carditella atkinsoni*, Tate and May, Proc. Linn. Soc. N.S.W., xxvi., 1901, p. 435, pl. xxvii. f. 107.

Station 49.

Three odd valves from off Port Kembla in 63-75 fathoms.

CUNA DELTA, *Tate & May*, sp.

Carditella delta, Tate & May, Trans. Roy. Soc. S.A., xxiv., 1900, p. 102; *Id.*, Proc. Linn. Soc. N.S.W., xxvi., 1901, p. 434, pl. xxvii., f. 100, 101; *Id.*, Hedley, Rec. Aust. Mus., iv., 1901, p. 23, f. 5.

Station 13.

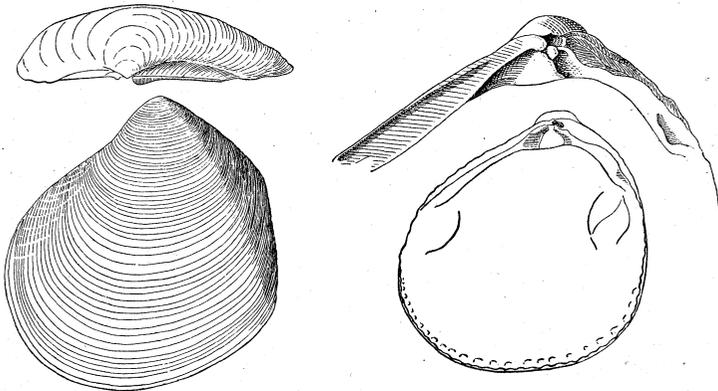
A few immature and separate valves from off Cape Three Points in 41-50 fathoms.

CUNA PARTICULA, sp. nov.

(Fig. 56.)

Stations 13, 49.

Shell small, shallow, oblique, very inequilateral, especially in the younger stage. Colour pale yellow. Anterior margin abruptly



CUNA PARTICULA.

Fig. 56.

truncated. Sculpture: numerous fine, close, concentric threads, becoming coarser and more distant towards the ventral margin. A few opaque radial lines appear in transmitted light, but do not affect the sculpture. Inner ventral margin crenulated by about 16 small interlocking tubercles. Chondrophore less deeply sunk than in the preceding species. Above the cardinal of the left valve are two small semidetached round tubercles. Height, 2 mm.; length, 2.3 mm.

Abundant in 63-75 fathoms off Port Kembla, and in 41-50 fathoms off Cape Three Points.

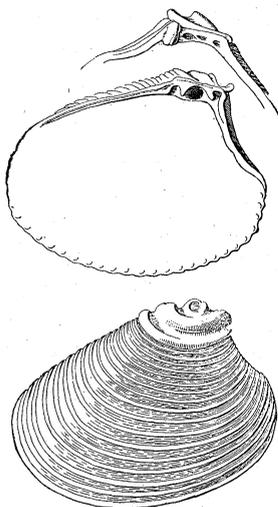
Family CONDYLOCARDIIDÆ.CONDYLOCARDIA, *Bernard*.

CONDYLOCARDIA PROJECTA, sp. nov.

(Fig. 57.)

Stations 13, 49.

Shell extremely small, cream coloured, moderately inflated, ovate cuneate, very inequilateral, the anterior side four times as long as the posterior. Dorsal margin straight, anterior end tapering; ventral margin rounded, posterior end rapidly descending, hollow above, projecting below. Prodissoconch very large, consisting of a medially cleft protuberance, arising from a thick lipped basin, contained in a second basin. Dorsal area lanceolate, hollow, smooth, bounded by a crest whereon terminates the concentric sculpture. Sculpture: there are about sixteen narrow, elevated, curled, reversely imbricating ridges, crowded above, wider spaced below, without trace of radials. Hinge margin long and straight, a line of primitive crenulations above, chondrophore medial well immersed; in the right valve a feeble anterior and posterior cardinal; in the left a single massive posterior cardinal; in each valve an anterior lateral. Muscular impressions invisible. Inner ventral margin with about twenty-five interlocking rounded tubercles. Height, 1 mm.; length, 1.2 mm.



CONDYLOCARDIA PROJECTA.

Fig. 57.

This species is smaller than any Australian bivalve yet described. It represents a genus new to Australian seas. As framed by its author,* *Condylocardia* contains two species from Stewart Island, New Zealand, two from St. Paul's in the Indian Ocean, and a French Tertiary fossil.

A few odd valves were taken by the "Thetis" off Port Kembla in 63-75 fathoms, and off Cape Three Points in 41-50 fathoms. My figures and description are derived from better

* Bernard—Journ. de Conch., xliv., 1896 (1897), p. 169-206.

material taken previously by a Museum dredging excursion at Watson's Bay.

CONDYLOCARDIA PECTINATA, *Tate & May*, sp.

Carditella pectinata, Tate & May, Trans. Roy. Soc. S.A., xxiv., 1900, p. 103; *Id.*, Linn. Soc. N.S.W., xxvi., 1901, p. 435, pl. xxvii, ff. 96-97.

Station 49.

A few immature valves from 63-75 fathoms off Port Kembla. The species also occurs in Sydney Harbour.

Family CARDITIDÆ.

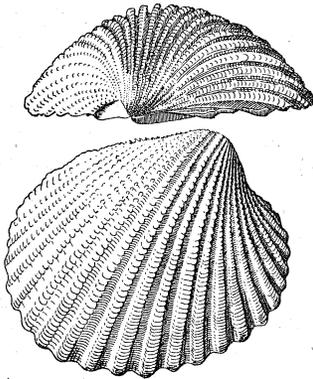
CARDITA, *Bruguière*.

CARDITA CAVATICA, sp. nov.

(Fig. 58.)

Station 49.

Shell inflated, ovate-oblong in the largest specimen, inclining to a square outline when young, very inequilateral, posterior side thrice as long as the anterior. Colour dull cream, sparsely irregularly spotted with chocolate. Sculpture: numerous close, narrow, erect, radiating ribs, 26 in number on the type specimen. These radii are surmounted by scales, about 70 to a rib, which ventrally are low, broad and crowded, while dorsally they gradually become narrow, erect and distant hollow spines. The deep interstices are about the breadth of the radii, and sculptured by concentric threads in broken lengths. Lunule short, cordate and deeply impressed.



CARDITA CAVATICA.

Fig. 58.

Inner ventral margin double, developing an interlocking tubercle beneath each furrow of the external sculpture. Length, 17; height, 14; depth of single valve, 6 mm.

Probably this is the *Cardita*, sp., noted in the Challenger Report as from Port Jackson.* By its remarkable sculpture it

* Smith—Chall. Rep., Zool., xiii., 1885, p. 213.

is allied to a small group of Tertiary *Cardita*, typified by *C. gracilicosta*, T. Woods,* from which it differs by smaller size and greater length in proportion to height.

Numerous separate valves from off Port Kembla in 63-75 fathoms.

CARDITELLA, *Smith*.

CARDITELLA ANGASI, *Smith*.

Carditella angasi, Smith, Chall. Rep., Zool., xiii., 1885, p. 217, pl. xv., f. 9, 9a.

Stations 13, 49.

Some specimens, mostly young, from 63-75 fathoms off Port Kembla, and in 41-50 fathoms off Cape Three Points.

Family LUCINIDÆ.

LUCINA, *Bruguière*.

LUCINA BRAZIERI, *Sowerby*, sp.

Tellina brazieri, Sowerby, Proc. Zool. Soc., 1883, p. 31, pl. vii., f. 2 [not *Tellina brazieri*, Sowerby, Conch. Icon., xvii., Tellina, pl. lv., f. 323, 1869.]

? *Lucina fabula*, Reeve, Conch. Icon., vi., Lucina, pl. xi., sp. 69, 1850.

Station 49.

An author's co-type of the second *Tellina brazieri*, Sowerby, received from Mr. J. Brazier, enables me to unravel the vexed synonymy of this species. In the first place, it is a *Lucina*, not a *Tellina*; in the second place, Prof. Tate, to whom I showed the specimen, regarded it as *L. fabula*, Reeve. Prof. Tate is responsible for the introduction of *L. fabula* into Australian lists.† Unless Sowerby's drawing of *L. fabula* is very bad, which is likely enough, the two species, *L. fabula* and *L. brazieri*, are distinct. Further, the existence of *L. fabula* in Australia requires to be proved.

Mr. Brazier suggests to me that this is probably the species listed by Angas‡ as *Semele scabra*, Hanley, which is not otherwise known here.

A few separate valves were taken by the "Thetis" off Port Kembla in 63-75 fathoms.

* Tate—Trans. Roy. Soc. S.A., vii., 1884 (1885), p. 152.

† Tate—Trans. Roy. Soc. S.A., ix., 1887, p. 96.

‡ Angas—Proc. Zool. Soc., 1877, p. 191.

Family CRYPTODONTIDÆ.

AXINUS, *Sowerby*.

AXINUS FLEXUOSUS, *Montagu*, sp.

Tellina flexuosa, Mont., Test. Brit., 1803, p. 72; *Cryptodon flexuosus*, Brazier, Proc. Linn. Soc. N.S.W., (2), ix., 1894 (1895), p. 725.

Stations 13, 49.

A few separate valves at each locality from off Port Kembla in 63-75 fathoms and off Cape Three Points in 41-50 fathoms.

Family LEPTONIDÆ.

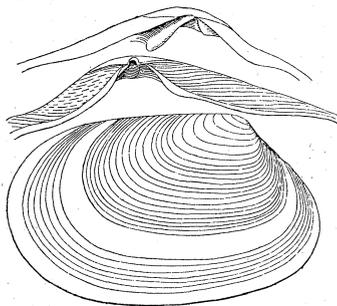
ROCHEFORTIA, *Velain*.

ROCHEFORTIA LACTEA, sp. nov.

(Fig. 59.)

Stations 13, 49.

Shell small, thin, translucent, oblong, moderately inflated, very inequilateral, the anterior being three times the length of the posterior side. Colour milk-white, with translucent zones. Dorsal margin straight, anterior end rounded, ventral margin arcuate, dorsal margin steeply descending, then rounded. Sculpture: fine regular incremental lines. Hinge of right valve with a long strong anterior and a small weak posterior cardinal; left valve notched above the chondrophore. Beaks inconspicuous. Length, 3; height, 1.9 mm.



ROCHEFORTIA LACTEA.
Fig. 59.

Numerous separate valves from off Port Kembla in 63-75 fathoms, and off Cape Three Points in 41-50 fathoms.

ERYCINA, *Lamarck*.

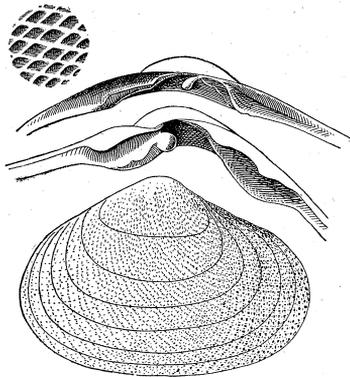
ERYCINA ACUPUNCTA, sp. nov.

(Fig. 60.)

Stations 13, 49.

Shell small, inflated, oblong; dorsal margins straight, ends rounded; ventral margin straight; beaks not prominent; rather solid; milk-white, with translucent zones; the anterior side slightly exceeding the posterior. The whole of the external surface is covered like a thimble with fine punctures, arranged in curved oblique lines of the pattern called "engine turned." In each valve a cardinal, and anterior and posterior lateral. Height, 1.25; length, 2.1 mm.

A few separate valves from off Cape Three Points in 41-50 fathoms, and off Port Kembla in 63-75 fathoms.



ERYCINA ACUPUNCTA.

Fig. 60.

CYAMIUM, *Philippi*.CYAMIUM MACTROIDES, *Tate & May*.

Cyamium mactroides. Tate & May, Trans. Roy. Soc. S.A., xxiv., 1900, p. 102; *Id.*, Proc. Linn. Soc. N.S.W., xxvi., 1901, pl. xxvii., f. 103.

Station 49.

A few separate valves from off Port Kembla in 63-75 fathoms.

LASÆA, *Leach*.LASÆA SCALARIS, *Philippi*, sp.

Poronia scalaris, Philippi, Zeit. f. Malak., iv., 1847, p. 72; *Id.*, Angas, Proc. Zool. Soc., 1867, p. 926.

P. parreyssi, Philippi, *op. cit.*, p. 73.

P. purpurata, Philippi, *op. cit.*, p. 73.

P. rugosa, Recluz., Journ. de Conch., iv., 1853, p. 50, pl. ii., f. 4, 5.

P. australis, Souverbie, Journ. de Conch., xi., 1863, p. 287, pl. xii., f. 8; *Id.*, Angas, Proc. Zool. Soc., 1867, p. 926.

Kellia balaustina, Gould, Proc. Bost. Soc. Nat. Hist., viii., 1861, p. 34.

Stations 13, 14.

A few odd valves from off Port Kembla in 63-75 fathoms, and off Cape Three Points in 41-50 fathoms, which were probably swept down from shallow water.

Family CARDIIDÆ.

CARDIUM, *Linne.*

CARDIUM STRIATULUM, *Sowerby*, var. THETIDIS, *Hedley*, var. nov.

Cardium striatum, *Sowerby*, Proc. Zool. Soc., 1840, p. 105; *Id.*, Conch. Illust., 1841, *Cardium*, sp. 9, f. 16 (not 45).

Stations 13, 49.

A considerable series taken by the "Thetis" appears specifically inseparable from *C. striatum*. Compared with specimens from New Zealand ours are very diminutive, being only 12.5 mm. in length and 11.5 mm. in height; in proportion to their bulk they are more thin and delicate, the concentric sculpture is fainter, and the angle limiting the posterior prickly area is less pronounced.

Sowerby quotes Conch. Ill., f. 45, for his species. It seems to me to represent the allied *C. pulchellum*, *Gray*.

From off Port Kembla in 63-75 fathoms, and off Cape Three Points in 41-50 fathoms.

Family VENERIDÆ.

CHIONE, *Megerle.*

CHIONE PLACIDA, *Philippi*, sp.

Venus placida, *Philippi*, Abbild. Beschr., i., 1844, p. 128, pl. ii., f. 2.

V. roborata, *Hanley*, Proc. Zool. Soc., 1844 (1845), p. 161.

Station 49.

This species is usually quoted by *Hanley's* name, which, however, is subsequent to that proposed by *Philippi*. The fascicule

of the Abbildungen containing *V. placida*, is dated April, 1844. That of the Zoological Society's Proceedings containing Hanley's name was issued in February, 1845. It is true that Hanley quotes for his shell "Ind. test. sup., t. 16, f. 25," but at the time he wrote that figure was still unpublished. Hanley afterwards stated* that this plate 16 was issued at the end of 1844.

Numerous specimens from off Port Kembla in 63-75 fathoms, and from off Cape Three Points in 41-50 fathoms.

CHIONE GALLINULA, *Lamarck*, sp.

Venus gallinula, Lamarck, Anim. s. vert., v., 1818, p. 592; *Id.*, Delessert, Recueil, 1841, pl. x., f. 1.

Venus cœlata, Menke, Spec. Moll. Nov. Holl., 1845, p. 43; *Id.*, Philippi, Abbild. Beschr., ii., 1846, p. 106, pl. v., f. 3.

Station 49.

A few young shells from 63-75 fathoms off Port Kembla.

CHIONE STRIATISSIMA, *Sowerby*, sp.

Erycina cardioides, Lamarck, Anim. s. vert., v., 1818, p. 486; *Id.*, Delessert, Recueil, 1841, pl. iv., f. *7a-b-c* [not *Venus cardioides*, Lamk., *op. cit.*, p. 590.]

Venus striatissima, Sowerby, Thes. Conch., ii., 1853, p. 718 pl. 157, ff. 103-5.

Station 56.

One valve was taken in 79-80 fathoms off Botany Bay.

MERETRIX, *Lamarck*.

MERETRIX PLANATELLA, *Lamarck*, sp.

Cytherea planatella, Lamarck, Anim. s. vert., v., 1818, p. 565;

Id., Philippi, Abbild. Beschr., i., 1845, p. 199, pl. iii., f. 6.

Cytherea diemenensis, Hanley, Proc. Zool. Soc., 1844, p. 110.

Station 49.

With this species Tate & May have united *M. disrupta*, Sowerby, which I regard as a distinct species.

From off Port Kembla in 63-75 fathoms.

* Hanley—Recent Shells, 1856, Preface, p. v.

Family PETRICOLIDÆ.CHORISTODON, *Jonas*.CHORISTODON RUBIGINOSUM, *Adams & Angas*, sp.*Narano rubiginosa*, Ad. & Ang., Proc. Zool. Soc., 1863, p. 425,
pl. 37, f. 17.

Station 56.

One broken valve occurred in 79-80 fathoms off Botany Bay.

Family TELLINIDÆ.TELLINA, *Linne*.TELLINA TENUILIRATA, *Sowerby*.*Tellina tenuilirata*, Sowerby, Conch. Icon., Tellina, 1867, pl. xxxix.,
f. 219.

Stations 13, 49.

A few separate valves from off Port Kembla in 63-75 fathoms,
and off Cape Three Points in 41-50 fathoms.*Family* SAXICAVIDÆ.SAXICAVA, *Fleuriau de Bellevue*.SAXICAVA ARCTICA, *Linne*, sp.*Mya arctica*, Linn., Syst. Nat., x., 1767, p. 1113.

Stations 13, 49.

A few small valves from off Port Kembla in 63-75 fathoms and
off Cape Three Points in 41-50 fathoms.

[These corrections were printed 5 September 1914 in Part 18 of Memoir IV at p.[xiii], they relate to other Parts of Australian Museum Memoir IV as follows:
"Page 245" refers to p. 245 in Part 3. Whitelegge. Crustacea. Part II. Isopoda. Part I
"Page 305" refers to p. 305 in Part 5. Hedley. Mollusca. Part I. Brachiopoda and Pelecypoda
"Page 441" refers to p. 441 in Part 8. Leighton Kesteven. The anatomy of Megalatractus
"Page 480" refers to p. 480 in Part 9. Whitelegge. Sponges. Part I (note that Plate xlv is printed in Part 10)—Sub-Editor, April 2009]

CORRECTIONS.

Page 245—Under the right hand figure *for 20f, read 23f.*

Page 305—Under the bottom figure, *for flavus read favus.*

Page 441, line 16—*for pericardial, read nephridial.*

Page 480—*DENDORYX PUMICEA—after Plate xlv., fig. 15, read and Plate xlv., fig. 24.*