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OF THE

AUSTRALIAN MUSEUM

EDITED BY THE CURATOR.

Vol. IV.

PRINTED BY ORDER OF THE TRUSTEES.

R. ETHERIDGE, JUNR., J.P.,

Curator.

SYDNEY, 1901-1903.

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CONE-LIKE STROBILI ATTACHED TO A *PHYLLOTHECA*-LIKE FOLIAGE.

By R. ETHERIDGE, Junr., Curator.

(Plates i.–ii.)

MANY years have elapsed since the late Professor Sir F. McCoy drew attention to what he considered the inflorescence of *Phyllotheca*,[1] notwithstanding that he misunderstood its nature. Since 1847, the year in which McCoy wrote, Heer and Schmalhausen have both described strobili, believed by them to be the reproductory condition of this interesting and widely distributed Permo-Carboniferous plant. The announcement has lately been made that Professor R. Zeiller has, or is about to publish, additional information afforded by specimens from Asia Minor.

To render the account of the little fossils now under consideration clear, it will be necessary to review the descriptions of the parts referred to by the authors mentioned.

McCoy's infloresence consisted of a "portion of a branch with the joints more approximate than on other parts of the plant, their length being scarcely equal to their diameter; the sheaths are the exact length of the internodes, and fringed on their upper margin with a dense little whorl of (I think two-celled) anthers." To judge by the figure only, I am inclined to say that the inflorescence consisted of a stem giving support to stalked structures bearing sporangiophores, without the intervention of intermediate sterile bracts, thus approximating to the strobilus of *Equisetum*.

Mr. Schmalhausen figured[2] two forms of fructification somewhat different from one another, as those of *Phyllotheca deliquescens*, Göpp. One of these[3] consists of a loose strobilus in the form of a stem bearing clusters of peltate and stalked appendages (sporangiophores), between whorls of sterile leaves or bracts. The other figure[4] differs from the first in so far that sterile bracts alternating with the fruit-bearing organs appear to be absent. On the first

[1] McCoy—Ann. Mag. Nat. Hist., xx., 1847, p. 155.

[2] Schmalhausen—Beiträge Jura-Flora Russlands, 1879, p. 68, pl. ix., figs. 16–17.

[3] *Loc. cit.*, figs. 16, 16*a*.

[4] *Loc. cit.*, fig. 17.

of these illustrations Count Solms-Laubach makes[5] the following remarks: "A striated axis with sheaths thoroughly like those of Phyllotheca, bears on the internodes between the sheaths in a lateral position certain small organs, which are exactly like the sporangiferous peltate disks of our Equiseta." In the words[6] of Seward, "in *Phyllotheca* the sporangiophores appear to have been given off in whorls, which were separated from one another by whorls of sterile bracts, whereas in *Equisetum* there are no sterile appendages associated with the sporangiophores of the strobilus with the exception of the annulus at the base of the cone."

In the case of McCoy's illustration, if the presence of intermediate sterile or normal leaves could be shown to exist, which is certainly not shown on the figure, the correspondence with Schmalhausen's illustration would be very close, the supposed "anthers" being probably equivalent to the sporangiophores. The absence of these organs indicates in McCoy's *Phyllotheca* a much nearer approach to the wholly fertile whorls in the strobilus of *Equisetum*.

In 1880, the late Prof. Oswald Heer figured[7] two cones in contiguity to a *Phyllotheca*-like stem from Siberia, on which Solms-Laubach remarks[8]:—"Heer is not justified in uniting with his Phyllotheca sibirica two spikes of another species . . . merely because they lie beside it on the specimen." It would appear from this that these cones have nothing to do with *Phyllotheca*.

A further instance of inflorescence has been discovered by Prof. R. Zeiller[9] in connection with *Phyllotheca* remains from Asia Minor, but I have not access to his description. The strobili are said to resemble the long and narrow cones of *Annularia*, composed of linear lanceolate sterile bracts and sporangiophores, and therefore in no great degree differing from Schmalhausen's description and figures.

To sum up, and discarding Heer's cones, it may be stated that at least two satisfactory instances of fertile shoots are known in *Phyllotheca*-like plants—that of *P. deliquescens* (Göpp.), Schmalhausen, and *P. ralli*, Zeiller; probably a third—that of the Australian plant figured by McCoy; and possibly even a fourth exists in the form of the *Cingularia*-like foliage, introduced to notice[10] some time ago by myself. It is a very remarkable fact, when we consider the hundreds of *Phyllotheca* fragments that have been

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5 Solms-Laubach—Fossil Botany by Garnsey and Balfour, 1891, p. 181.

6 Seward—Fossil Plants, i., 1898, p. 286.

7 Heer—Flora Foss. Arctica, vi., abth. 1, 1880, pl. i., fig. 5 *b* and *c*.

8 Solms-Laubach—Fossil Botany by Garnsey and Balfour, 1891, p. 181.

9 Seward—Fossil Plants, i., 1898, p. 282.

10 Rec. Geol. Surv. N.S.W., iv., 4, 1895, p. 151.

unearthed in the Upper Coal Measures of New South Wales, and distributed throughout the world since 1828, when Brongniart first named[11] the type *P. australis*, that during this lengthened period, McCoy's example is the only trace of actual fructification recorded in an Australian specimen.

Under these circumstances it naturally affords me great pleasure to describe from the Upper Coal Measures at Newcastle, compact cones attached to a *Phyllotheca*-like stem and foliage, differing entirely in aspect from the loose strobili mentioned by Schmalhausen, Solms-Laubach, and Seward.

There are five well formed cones, varying from seven millimetres to thirty millimetres in length. The associated stems and leaves are to my eye identical with a figure termed by Dr. O. Feistmantel *P. australis*, Brong.,[12] in which the stem and branches are divided into semi-vase like internodes (Plate i., fig. 2; Pl. ii., fig. 4). Similar stem or branch portions are scattered over the surface of the specimens, accompanied by the cones under description, and in one case with one of the smaller cones attached.

In the different stem fragments the internodes are from five to ten millimetres long, and an average pressure diameter of three to four millimetres. Each internode expands somewhat from below upwards; the sheaths are short, but seem to be strong, and give support to at least twenty long linear and delicate uninervate leaves, which do not cling to or embrace the stem, but radiate at a low angle in a very free and open manner, forming, when seen in elevation, gracefully curved outlines (Pl. i., fig. 4; Pl. ii., fig. 5). There are other larger stem fragments on the same pieces of shale, and of which the smaller portions may be the branches.

The state of preservation of the cones does not lend itself to detailed description. They are bi-pyramidal or elongately-pyriform, attached by a narrow short pedicel to the last node of the branch, densely clothed with small linear leaves, which differ very markedly from the ordinary leaves springing from the sheaths in their size and extreme delicacy. The structure of the respective examples is as follows:—

(1.) The smallest cone (Pl. i., fig. 2) is seven millimetres long, slender, elongately-pyriform, and is attached to a portion of a branch. It is clothed with the comparatively long upwardly streaming leaves already described, but no other characters can be made out.

(2.) This cone (Pl. i., fig. 3) is shorter and broader than the first, unequally bi-pyramidal, the lower portion assuming a pedunculate appearance. It is fourteen millimetres long, just double that of the former. Again nothing is visible but the leaf clothing.

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11 Brongniart—Prodrome, 1828, p. 152.

12 Palaeontographica, Sup. Bd. iii., Lief. 3, Heft 2, 1878, pl. vii., fig. 1.

(3.) This (Pl. i., fig. 1) is the largest of the three small cones, and is eighteen millimetres in length. Under the coaly pellicle which practically constitutes the fossil, the shale is impressed with narrow transverse node-like constrictions, from which the leaves spring in upward succession, streaming above the apex of the cone.

(4.) The smallest of the two larger cones (Pl. ii., fig. 2) is twenty-seven millimetres long by thirteen wide (as compressed). Here the nodal lines are very apparent, each giving support to a row of delicate leaves, rather broad at the base, but fine and acicular above. The apical portions are bent outwards at an acute angle, and are visible at the sides of the cone.

(5.) The fifth cone (Pl. ii., fig. 1) only differs from the last slightly in size, otherwise exhibiting precisely the same characters; it is thirty millimetres long, and seventeen broad.

It is unfortunate that neither of these organs is seen in longitudinal section, nor wholly denuded of its bracts. The more intimate structure is therefore inaccessible, and it is impossible to say with certainty whether the verticils of leaves are sterile bracts alternating with fertile organs (sporangiophores) concealed or no. Nor, under these circumstances, can it be surmised whether these strobili agree in their structure with the loose strobilus of *Equisetum* on the one hand, or with the more complex fructification ascribed by authors to *Phyllotheca*.

The loose strobilus figured by Schmalhausen as that of *P. deliquescens*, notwithstanding that the whorls of peltate organs were protected by the alternating cycles of sterile bracts, would hardly prepare one for the appearance of these close cone-like strobili. The former we can picture as longitudinally elongate and narrow bodies, very different in appearance to the present cones. Just at the point this inquiry becomes especially interesting, it has to be abandoned, temporarily it is to be hoped, however. All that can be advanced at present is that, just as one form of *Phyllotheca*-like plant is associated in our Upper Coal Measures with a *Cingularia* foliage; so another, equally *Phyllotheca*-like, produces cone-like strobili, differing in outward appearance, at least, from what one would have anticipated.

As a matter of general resemblance only, attention may be called to the cone of *Macrostachya*, which—allowing for the more elongated form, and the short acicular terminations of the bracts, instead of the long bent over apices in our cones—presents an unmistakable resemblance.

The specimens are from the Upper Coal Measures (Permo-Carboniferous) at Shepherd's Hill, Newcastle, and were collected by Messrs. John Mitchell and C. Hedley.

NOTES ON THE ARCHITECTURE, NESTING-HABITS, AND LIFE-HISTORIES OF AUSTRALIAN ARANEIDÆ, BASED ON SPECIMENS IN THE AUSTRALIAN MUSEUM.

By W. J. Rainbow, F.L.S., Entomologist.

Part I.—THE TERRITELARIÆ.

The Araneæ Theraphosæ include all those Spiders which construct subterranean tubes, some of which are protected by a trap-door or lid. These are divided into three families—Liphistiidæ, Aviculariidæ, and Atypidæ. Of these, the first, consisting of only one genus, *Liphistius*, Schiödte, is peculiar to the islands of Penang and Sumatra. The second, Aviculariidæ, is divided by Simon into seven sub-families, and representatives of it are found in all parts of the world. The third, Atypidæ, although not so numerous as the preceding group, occurs in Europe, America, Africa, Japan, and Malaysia.

The Australian species, as far as at present known, belong solely to the Avicularidæ. Formerly these Spiders were included under the generic name of *Mygale*,[1] Walck. (1802), a term which had, however, two years earlier, been used by Cuvier for a genus of Mammals, belonging to the family Talpidæ, and popularly known as Moles.

Vernacularly these Araneids are known as "Trap-door Spiders," from the fact that many of their dwellings are provided at the entrance with a trap-door. These doors are of two kinds: the *thick*, or "cork-lid" type, and the *thin*, or "wafer" type. Most of these Spiders are terrestrial, but some have quitted the ground in favour of an arboreal existence. The latter are included in the sub-families Miginæ and Diplurinæ, typical genera of which are *Moggridgea*, Camb., of South Africa, and *Macrothele*, Auss., of Spain, Malaysia, and New Zealand. Some species of the latter genus, however, inhabit the fissures of rocks. One species, *Macrothele huttoni*, Camb., together with nests, I collected at Wanganui, New Zealand, some years ago. The nests were small, and built upon the trunks of trees, the silk composing the outer wall being covered with chips of bark and lichen, rendering detection very difficult; the operculum or lid was of the wafer type.

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1 *Myogale* is the modern form of this word.

As far as known, no males construct nests, this branch of industry being apparently peculiar to females. During the periods of mating, both sexes may at times be taken in one nest or burrow; but when living apart, the males usually inhabit small cavities or the fissures of rocks.

Sub-family ACTINOPODINÆ.

This sub-family is represented in Australia by the endemic genus, *Eriodon*, Walck., of which about a dozen species have been described by various authors. These Spiders are very characteristic, and in some instances, the males at least, are brightly coloured.

So far as I know, no observations of the nesting-habits of the Australian species have been recorded. The nest of the South American genus, *Actinopus*, Perty, is a deep, simple, cylindrical tube, perfectly smooth, and lined throughout with silk ; the trap-door is round, and attached to one side with a hinge.

Sub-family MIGINÆ.

In his list of the Araneidæ collected by the Horn Scientific Expedition to Central Australia, Mr. H. R. Hogg, M.A., recorded[2] what he believed to be *Migas paradoxus*, L. Koch. The specimen, collected at Palm Creek, was mutilated, "consisting of a cephalothorax and three pairs of legs." As Mr. Hogg himself does not appear to be altogether certain as to its identity, and as, also, it is a long way from Auckland, New Zealand, to Palm Creek, Central Australia (and there is no other record of its having been found in Australia), we must, until further material is collected, exercise some little reservation in respect to its identity. Mr. Hogg is a very careful and conscientious worker, and his views are, at any rate, entitled to respect.

The Miginæ are a remarkable group of Spiders ; those of the genus *Moggridgea* construct their nests upon the trunks of trees, as already described. *Migas paradoxus*, according to the Rev. O. P. Cambridge,[3] makes a nest about an inch and a half in length, covered with particles of soil and decayed vegetable matter, and protected at the entrance by a thin wafer lid, attached by a weak silken hinge. It is found attached to the roots of fern, enabling the architect to obtain a suitable position without the necessity of excavating. None of the species have the extremities of their falces armed with teeth, these organs having been modified to suit them to their arboreal habits.

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[2] Report Horn Expl. Exp., ii., 1896, Zoology, p. 334.

[3] Proc. Zool. Soc., 1890, p. 624, pl. liii., fig. 3.

Sub-family CTENIZINÆ.

In 1870, the Rev. O. P. Cambridge described and figured a male example from the Swan River, West Australia, for which he proposed the name *Idiops sigillatus*.[4] Simon, however, regards it as belonging to the widely distributed genus *Acanthodon*, Guér., the range of which he defines as : "Syria ; Arabia merid. ; Asia centr. ; India et Burmania ; Africa tropica orient., occid. et austr.; America merid.; Australia";[5] whilst *Idiops*, Perty, occurs in Brazil only.[6] This species is not represented in our collection.

The nests of *Acanthodon* are simple, cylindrical, deep, and lined throughout with silk, the lid is thick and heavy, of the "cork" type, and the edge bevelled, thus allowing it to fit when closed, as in a socket. It is made of several layers of silk and fine earth. The exterior is always of the same colour as its surroundings, and even if necessarry covered with moss ; hence, when closed, it is very difficult to detect. The tenants never leave their dwellings during the daytime, but go forth after dark in quest of prey, which consists of ground roving insects. When at home, the lid is always closed, and as the Spider hangs on to it tenaciously, some force is required to open it from without.

The genus *Aganippe*, Cambr., has so far been found only in Australia. Two species have been described and figured,[7] namely, *A. subtristis*, Cambr., from Adelaide, S.A., and *A. latior*, Cambr., from West Australia.

Arbanitis, L. Koch, occurs in Australia and New Zealand. The type of the genus is *A. longipes*, L. Koch. This was originally described under the generic name of *Pholeuon*, L. Koch,[8] a term applied by Hampe, in 1856, for a genus of Beetles of the family Silphidæ. The New Zealand form was assigned by Cambridge to the genus *Nemesia*,[9] the range of which, according to Simon, is "Regio mediterranea præsertim occid."[10]

No observations have been recorded in connection with the nests made by Spiders of the Australian genus—*Aganippe*, Cambr., but those constructed by species of allied genera are described as being simple, and lined throughout with silk ; the walls are hard, and, in some instances, continued above the surface of the soil ; the orifice is rarely open, but is ordinarily closed with a lid. The latter is always thin, of the "wafer" type, sometimes rigid and

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4 Proc. Zool. Soc., 1870, p. 103, pl. viii., fig. 3.

5 Simon—Hist. Nat. Araignées (2nd edit.), i., 1892, p. 91.

6 Simon—*Loc. cit.*, p. 92.

7 Ann. Mag. Nat. Hist. (4), xix., 1877, pp. 28–29, pl. vi., figs. 3–4.

8 Koch—Arach. Aust., i., 1871, pp. 471 and 491.

9 Trans. N.Z. Inst., viii., 1877, p. 284.

10 Simon—Hist. Nat. Araignées (2nd edit.), i., 1892, p. 112.

sometimes flaccid. The nests of some species are provided with a second, inner lid of a very special nature.

There are in the collection of the Australian Museum some nests from the Tweed River, New South Wales, and from Queensland. In one, from Mirwillumbar, Tweed River, the walls have been carried considerably above the surface, and built so as to incline forward, so that whilst the front elevation measures only three-quarters of an inch, the hinder measures one and a half. The outer walls are covered with a scale moss, determined by my colleague, Mr. T. Whitelegge, as one of the Hepaticæ; the interior is beautifully lined with silk. The lid is thick and heavy, truncate behind, where it is attached by a long hinge; the sides and front are round; it is concave without and convex below, and has its exterior also clothed with the Hepatic moss. Others, from the same district, and from Queensland, agree with the above in every detail, except that the lids were flush with the ground. As no Spiders were sent with the nests, it is impossible to assign them with certainty to any species or genus. They probably belong to the Ctenizinæ.

The Spiders allied to *Arbanitis*, exhibit great diversity in the construction of their terrestrial abodes. In some instances the nest is simple and cylindrical, sometimes branched, and not infrequently complicated. The lid is also variable, being, according to the species, either of the "cork" or "wafer" type, unequal in circumference, rigid or flaccid. In some cases the Spider constructs an interior door of a very different nature to the external one. This occurs where the nest is branched, and is employed to shut off communication with the main chamber. It is attached to the wall by a strong silky tissue, inclining or sloping to one side, and provided at its extremity with a little fringe of silk. It sometimes happens that predatory foes invade these subterranean dwellings; the invader is usually of a powerful and aggressive type, and one with which it would be difficult or dangerous to contend. The second chamber, with its door, affords a safe retreat. Immediately upon the approach of danger, the Spider passes into the supplementary chamber, closes the door, and by placing its body securely against it, resists pressure from without. The intruder, not suspecting the existence of a second chamber, and finding the main one empty, retires. Moggridge spent the declining years of an invalid life at Mentone, in the South of France, studying the habits of these interesting Arachnids.[11]

Gillies has described and figured some New Zealand trap-door nests,[12] and these doubtless belong to this group. In some instances the nests were almost vertical, being nearly straight in outline;

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[11] Moggridge—Harvesting Ants and Trap-door Spiders, London, 1873.

[12] Trans. N.Z. Inst., viii., 1875, p. 222, *et seq.*, pls. vi.-viii.

in others, sinuous; one figure shows the secondary tube, or *cul-de-sac*, directed obliquely upwards, whilst another depicts it directed downwards and outwards. An interesting feature in connection with this group, as also species of the genus *Atypus*, Latr., is the enlarging of a portion of the tube for the reception of the ova-sac or "cocoon." This usually occurs a little below the surface, and here the tube, for a short distance downwards, is enlarged to about twice the diameter of the nest at its aperture. Sometimes the enlargement is only upon one side, but at others it is perfectly round. Gillies found white cocoons with bright golden yellow eggs in some of these enlargements. The cocoons were suspended from the sides by threads of silk, but sufficient space was left to enable the Spider to pass up or down. This observer also noted that in digging out a nest, he accidentally cut through another which he had not observed, and found the Spider in the enlargement "embracing the side of the cocoon." It is well known that the maternal instinct is very strong with Spiders. Many mount guard over their cocoons, and never leave them, even for food, until the young have hatched. Doubtless the one referred to above was so employed when her home was thus rudely broken.

There is one bifurcated nest in our collection from northern New South Wales, but unfortunately unaccompanied by the architect. It is obviously of the Nemesieæ type, and may have been constructed by a species of *Arbanitis*. Both chambers have been plugged with cotton wool, and all the soil removed from the silk. The outer layers are coarse and discoloured by the soil, but the inner lining is beautifully white. Another from the same locality is simple, but somewhat enlarged laterally near the top.

Sub-family BARYCHELINÆ.

This sub-family is represented in Australia by the genera *Idiommata*, Auss., and *Trittame*, L. Koch. Of these, the former also occurs in New Guinea, Pelew Islands, and New Caledonia. *Trittame* contains a single species, *T. gracilis*, L. Koch.

Around Sydney, *Idiommata reticulata*, L. Koch, is somewhat common; it also occurs in Queensland, having been taken at Port Mackay, and again in New Guinea (Mt. Scratchley, at 12,200 ft.)[13]

The nests of these Spiders are deep, simple, and cylindrical, the burrows directed sometimes vertically and sometimes obliquely; the lid is of the "wafer" type, circular, and rigid, and always concolorous with its surroundings, being composed of silk and thin layers of earth. Within, the tube is lined with a thin layer of silk, and discoloured.

No observations have been recorded in respect of *T. gracilis*.

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[13] Proc. Linn. Soc. N.S.W., xxiii., 1898, p. 329.

In the Report of the Horn Exploring Expedition to Central Australia, Mr. H. R. Hogg, gives a list of the Spiders collected, and enumerates amongst others *Idioctis helva*, L. Koch.[14] This species was originally recorded from Ovalau Island, Fiji, so that if there is no mistake in Koch's locality, and Mr. Hogg's determination, its occurrence in two such widely divided areas is, to say the least, remarkable. Moreover, the climate of the two localities is vastly different. Ovalau, from its position, is oppressive, warm, and humid; in the centre of Australia the climate is hot and dry; hence the vegetation in each place must be widely different. Palm Creek, where Mr. Hogg's specimens were collected, is an isolated spot—an oasis in the desert. It is quite true, as Mr. Hogg points out, that "they [the Spiders] present a general analogy to those from the coastal districts of New South Wales and Queensland, exhibiting here and there interesting variations in what are clearly co-ordinate types."[15] Still, that would hardly appear sufficient to account for the occurrence of *I. helva*.

Mr. Hogg's note reads:—"In seven female specimens, the third pair of legs is longer in proportion, the lips are shorter and the body larger than in those described by Koch.[16]

The type of *I. helva* was in the Museum Godeffroy, so that the recorder was guided solely by Koch's description and figures.[17] Had he had the privilege of comparing his specimens with the type, he might have observed further differences which would have influenced his determination.

The nest of *I. helva* is figured by Koch.[18] It is an exceedingly interesting structure, consisting of a short downward tube whence two branches extend; one of these is horizontal, and rather more than twice the length of the entrance tube; the other is much longer, directed downwards and curved under; the lid is nearly circular.

Sub-family AVICULARIINÆ.

This sub-family is represented in Australia by two genera, *Ischnocolus*, Auss., and *Phlogius*, E. Simon.[19] The former occurs in the Mediterranean region—Spain, Sicily, Barbary, Cyprus, and Syria; Ethiopian region—East India, Nicobar Islands; Malaysia—Java, Sumatra, Borneo, Phillipine Islands; Australia; Central America; the Antilles: South America—Colombia, Brazil, and Uruguay. *Phlogius* is distributed over S.E. Asia—Burma,

14 Report Horn Expl. Expd., ii., 1896, pp. 312 and 335.

15 *Loc. cit.*, p. 309.

16 *Loc. cit.*, p. 335.

17 Koch—Arach. Aust., i., 1871, p. 484, pl. xxxvii., figs. 3, 3*a*, 3*b*.

18 Koch—*Loc. cit.*, pl. xxxvii., fig. 3*c*.

19 Simon—Hist. Nat. Araignées (2nd edit.), 1892, p. 136.

Siam, Cochin China; Malaysia—Sumatra, Borneo, the Mollucas; New Guinea; North, Eastern, and Central Australia.[20]

The Aviculariinæ rarely excavate a tube, but avail themselves of the natural cavities in the soil or trunks of trees; these they line with a thick mantle of silk, which is light and transparent, and without a tubiform retreat, and no lid protects the entrance. Their eggs, which are numerous, and not agglutinated, are enveloped in a cocoon of white, flaccid silk. Some species carry their cocoons with their falces wherever they go, and never relinquish them until the young are hatched out.

Phlogius crassipes, L. Koch, is a large tunnel-boring species. It is known, popularly, by the white settlers as the "Barking Spider," owing to the peculiar stridulating noise which it makes. The sound produced, however, is more of a whistling nature, hence it would be more appropriately termed the "Whistling Spider." Professor Baldwin Spencer investigated sounds supposed to emanate from Spiders at Alice Springs, and came to the conclusion that the noises ascribed to them were evidently made by birds—probably quails. The latter frequent the very parts—grassy flats amongst the hills—where the sounds are heard and the Spiders live; and they are most abundant just after rainfalls, when also the sound is heard most frequently. Not only this, but they actually produce a noise which is apparently identical with that attributed to the Spider. The time spent in observing the animals was not, however, altogether thrown away, as one day, whilst teasing a large female (which had been kept in a tin box for ten days), with a piece of straw, it raised its body and, rubbing its palpi against the mandibles, made a distinctly audible whistling noise.[21] The stridulating organs, responsible for the noise referred to, are fully described and figured by the narrator.[22]

The burrow of *Phlogius* is made in hard ground; it is deep, and, as noted by Professor Spencer in his account of *P. crassipes*, is directed downwards in a slanting direction to the depth of a foot and a half, or even more, when it ends in a more or less spherical space of about two inches in diameter. As previously stated, no lid is made. The Spiders occupy these burrows during the daytime, but quit them at night, when they emerge in quest of prey, which usually consists of large beetles. At the bottom of the burrows there is invariably an accumulation of *débris* consisting of the remains of beetles upon which the spiders have fed. The species occurs in Queensland, Northern New South Wales, and Central Australia. A nest, measuring six inches in length, made by a young specimen, is in the Australian Museum. It was taken in Queensland.

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20 Simon—*Loc. cit.*, p. 146.

21 Report Horn Expl. Exp., ii., 1896, Zoology, p. 413.

22 Spencer—*Loc. cit.*, p. 414, pl. xxviii.

Sub-family DIPLURINÆ.

Four genera of this sub-family occur in Australia, namely :—*Brachythele*, Auss. (= *Aname*, L. Koch), *Hapalothele*, Lenz. (= *Ixalus*, L. Koch), *Atrax*, Cambr., and *Hadronyche*, L. Koch.

The first of these has a wide range. Simon[23] quotes it from the Eastern Mediterranean region—Greece, Cyprus, Asia Minor ; Central Asia ; South Africa ; Madagascar ; Australia and Tasmania ; North, West, and South America. *Hapalothele* occurs in Madagascar ; Central America ; South America—Bolivia and Brazil.[24]

These Spiders do not make terrestrial galleries, but, on the contrary, owing to their sedentary habits construct rather large, sheet-like webs, which are light, dense, and transparent, much after the style of the Agelenidæ. Hence they differ in many essential points from the majority of those of the preceding sub-families ; the apical extremities of the falces, for instance, being devoid of teeth. Other distinctions are also apparent, but as these have been fully defined by Simon,[25] there is no need to repeat them here.

In conclusion, I would suggest that in future our friends, when sending specimens to the Museum, should forward both architect and nest. Such a donation would be of far greater value than if the Spider or nest alone were sent. Where a nest is known to exist, the tenant may be captured with it, if (before it has a chance to escape) a little cotton-wool is inserted, and the lid closed down. Then, by digging well and deeply round it, the whole may be secured. If this be then placed in a suitable box, and well packed, so as to prevent the soil breaking away, it may be carried safely.

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23 Simon—Hist. Nat. Araignées, (2nd edit.), i., 1892, p. 180.

24 Simon—*Loc. cit.*, p. 180.

25 Simon—Hist. Nat. Araignées (2nd edit.), 1892.

CTENOSTREON PECTINIFORMIS, SCHLOTHEIM, AN AUSTRALIAN FOSSIL.

By R. Etheridge, Junr., Curator.

(Plate iii.)

In 1870, the late Mr. Charles Moore, of Bath, England, recorded[1] as a West Australian Oolitic species, *Lima proboscidea*, Sby., but he neither described nor figured the shell. Less than three years previously, the late Rev. W. B. Clarke did the same from information supplied him by Mr. Moore.[2] As it is important that all species common to the stratified deposits of this Continent and other parts of the world should be accurately figured, quite as much as those purely endemic, for the information of Australian students of Geology, I take the opportunity in the present instance of effecting this through examples of this shell having passed into the possession of the Trustees.

The species was known to the older writers under two names—*Lima pectiniformis*, described by Von Schlotheim in 1820, and *Lima proboscidea*, by J. Sowerby in 1821, the latter therefore becomes a synonym of the former.[3] It also forms the second described species of Eichwald's genus *Ctenostreon*.[4]

Eichwald very carefully and lucidly explains that *Ctenostreon* unites the characters of the genera *Ostrea*, *Pecten*, *Lima*, and *Spondylus*. The more or less inflated shell is lamellar, as in *Ostrea* and *Lima*, more or less irregular in growth as in both the genera just mentioned, but the costæ are more uniform than those of the Oyster. The valves are nearly equal, as in *Lima*, with large auricles as in *Pecten*, and the costæ are furnished with fistulose spines similar to those of *Spondylus*. The shell was not self-attached as in *Ostrea*, but like that of *Pecten* fixed by a byssus.

The principal synonomy of the species is as follows :—

[1] Quart. Journ. Geol. Soc., xxvi., 1870, pp. 231 and 232.

[2] Quart. Journ. Geol. Soc., xxiii., 1867, p. 8.

[3] Bronn—Index Pal., Nomen., 1848, p. 647.

[4] Eichwald—Lethæa Rossica, ii., 1868, p. 455.

CTENOSTREON PECTINIFORMIS, *Schlotheim*, sp.

(Plate iii.)

Ostracites pectiniformis, Schlotheim, Petrefactenkunde, i., 1820, p. 231.

Lima proboscidea, J. Sby., Min. Con. Gt. Brit., iii., 1821, p. 115, pl. cclxiv.

,, *proboscidea*, Goldfuss, Petrefacta Germaniæ, ii., 1836, p. 88, pl. ciii, fig. 2.

,, *pectiniformis*, Bronn., Index Pal., Nomen., 1848, p. 647.

,, *pectiniformis*, Bronn., Lethæa Geognostica, 3rd edit., ii., Theil 4, 1851, p. 214, pl. xix., figs. 9 and 10, 10*a* and *b (for full synonomy)*.

,, *pectiniformis*, Morris & Lycett, Moll. Gt. Oolite (Pal. Soc.), pt. 2, 1853, p. 26, pl. vi., fig. 9.

,, *proboscidea*, Clarke, Quart. Journ. Geol. Soc., xxiii., 1867, p. 8.

Ctenostreon proboscideum, Eichwald, Lethæa Rossica, ii., 1., 1868, p. 457.

Lima proboscidea, Moore, Quart. Journ. Geol. Soc., xxvi., 1870, pp. 231 and 232.

,, *proboscidea*, Eth. fil., Cat. Austr. Foss., 1878, p. 109.

Obs.—There are two right valves in our Collection, the largest is four and a half inches across both diameters, and the other is but slightly less, four inches by four and a half. The specimen figured (Pl. iii.) is the better of the two, and from it the following facts are chiefly gained :—

The valve is suborbicular, decidedly inequilateral, only moderately convex, and with a short cardinal margin, but not shorter in proportion than that figured by Morris and Lycett from the Great Oolite of Minchinhampton. The anterior auricle is practically undeveloped, and the anterior margin oblique to the cardinal margin. The posterior auricle is triangular and comparatively small, separated from the body of the valve by a well marked groove; the posterior end as it approaches the margin is somewhat flattened. The posterior margin is oblique, but not emarginate. There are nine well developed costæ and an indication of a short tenth, sharp and ridge-like, rising into nodose, fistulous projections, or short tubes, at the intersections of the costæ by the concentric lamellæ, which vary much in their distance apart in the two specimens—wide apart in one, moderately close in the other. The fistulous spines project beyond the ventral margin, which is regularly rounded. The intercostal spaces are wide and concave in the centre of the valve, becoming flatter towards the lateral margins, and the concentric lamellæ continue longitudinally across the posterior auricle, but the latter is destitute of costæ.

Internally there is a well marked and broad area, traversed by delicate cartilage grooves, and divided medianally by a wide chondrophore, which, slightly canted to the posterior, projects below the lower margin of the area. The former is subconcentrically grooved, but the grooves are coarser than those on the area proper. The margins, anterior and posterior, as far as the transverse median line of the valve are lamellar scobinate. Beneath the somewhat projecting ventral end of the chondrophore, and a little anterior to the latter, is a shallow hepatic fossa. The adductor impression is moderately large, longitudinally oval, and impressed on its posterior side, so that in casts of the interior, a semi-oval ridge would be left.

There appears to be a large amount of variability in the number of costæ decorating the exterior of *Ctenostreon pectiniformis*. Goldfuss figures a wide shell with fourteen highly fistulous costæ; Bronn a medium sized mollusc with eleven, and an abnormal, long, narrow individual with equal pectinoid auricles, possessing six costæ. The shell figured by Morris and Lycett has ten costæ; and, as previously stated, the West Australian specimen now under description exhibits nine normal and well developed ribs. An example from Olschingen, in our Collection, possesses eight costæ, and another from Neuhausen twelve.

A similar variability exists in the form of the valves, and the extent to which the auricles are developed. In the present example, and in one from an unknown German locality, the anterior auricle is entirely wanting; in a second individual from the latter place there is a slight anterior auricle; whilst in the shell so beautifully illustrated by Goldfuss, and in Morris and Lycett's Great Oolite specimen both auricles are well grown.

The chondrophore varies in longitudinal diameter, but its posterior obliquity seems to be fairly constant in all that have come under my notice. The chondrophore of the recent *Malleus malleus*, Linn., is precisely similar to that of the present shell, both as to form, direction, and extension below the cardinal area. That of *Meleagrina margaritifera* is on the same plan, but much more transversely drawn out.

The adductor impression is also a variable feature, longitudinally oval or round, and in two out of three valves now before me, deepest on the posterior side.

The hepatic fossa, although constant in all the specimens examined, is neither large nor deep. I use this name to distinguish the pit so generally found penetrating the umbonal cavity of both valves, or only the right valves of aviculoid shells. Amongst living forms it is practically reduced to nothing in *Melina cumingi*, and other species of that genus; absent in *Pinna*; present in both valves of *Pteria prasei*, Dunker; visible in the right valve of *Pteria morio*, Leach, and in both valves of *Pteria cumingi*, Reeve. The fossa is not developed in *Meleagrina margaritifera*, Linn.; but to some extent in the right valve, at least, of *M. citrina*, Dunker. It is not to be found either in *Malleus* or *Ostrea*.

Closely allied to *C. pectiniformis* externally, is *Lima substriata* (Munster) Goldfuss,[5] and not unlike our shell either. *Lima tuberculata*, Terquem,[6] also possesses a general resemblance.

Loc.—Hills on the Cue Railway, thirteen and a quarter miles north-east of Geraldton, Western Australia (presented by Mr. A. Gibb-Maitland, Government Geologist of Western Australia); and Geraldton District[7] (presented by Miss Fitzgerald).

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5 Goldfuss—Petrefacta Germaniæ, ii., 1836, pl. ciii, figs. 1, 1*a* and *b*.

6 Dumortier—Études Pal. Dépots Jurassiques Bassin Rhone, i., 1864, p. 56, pl. viii., figs. 3–5.

7 Precise locality unknown.

THE DESTRUCTION OF NATIVE BIRDS IN NEW SOUTH WALES.

By ALFRED J. NORTH, C.M.Z.S., Ornithologist.

DURING a visit to the head-waters of two of the North-Coast rivers, I ascertained that an incredible number of the beautifully plumaged males of the Rifle-bird and Regent Bower-bird were destroyed throughout the year, a large export trade being done in the skins of these species, chiefly for the purposes of adornment and decoration of ladies' hats and dresses.

The wanton destruction of a more modestly plumaged, but equally attractive species, has been brought prominently under the notice of the public through an article entitled "The destruction of Lyre-birds," in the columns of a newspaper,[1] in which the writer records that a man, carrying a number of Lyre-birds' tails, or rather portions of tails, had called on him the previous day, asking if he would purchase one. Inquiries made elicited the fact that the man had collected about two hundred and fifty of them on the Paterson River, New South Wales, during the open season, and a lot more the previous one. The pertinent question is asked, "Why should any one be allowed to shoot these beautiful birds?"

The three species of Lyre-bird comprising the genus *Menura*, all of which are found in New South Wales, are possessors of the richest and most varied notes of any bird in Australia, and as mocking-birds are unequalled in the world. The tails referred to above, which I saw being offered for sale in George and Pitt-streets, Sydney, on the same day all belonged to the oldest described species of the genus, *Menura superba*, and were those of the male birds only. As the Lyre-bird builds in the early winter months, and the single egg laid by it in a season is usually deposited in July, it is evident that many of these birds were shot while paired, for the close season does not commence until the 1st of August. All species of the Lyre-bird, the Rifle-bird, and the Regent Bower-bird, should be accorded absolute protection throughout the year. "The Bird Protection Act of 1893," is a very useful piece of legislation, but its clauses are, unfortunately, as a rule, more honoured in the breach than in the observance.

[1] *Sydney Daily Telegraph*, 29th August, 1900.

Country residents, or persons who shoot birds for a livelihood, are not more culpable in this respect than are the dwellers in large cities. I refer more particularly to youthful gunners, who go to the outlying suburbs on Saturday afternoons, and further afield on holidays throughout the year, and shoot at every bird they come across. Many of the birds killed are of inestimable value to the orchardist, horticulturist, and agriculturist, ridding his trees or land of many injurious insect pests, without fee or reward. In the breeding season, too, many birds are killed while incubating their eggs or engaged in family cares, leaving either their eggs to rot in the nest, or young ones to perish miserably from starvation. To a less extent, indiscriminate egg-collecting by boys, is responsible for many birds either seeking safer nesting-sites, or being driven away from the environment of the cities and suburbs, or their numbers decreased. In ninety-nine cases out of a hundred, it is due to thoughtlessness and not want of heart, and the mischief wrought should be pointed out to them and discouraged by their elders.

In the United States of America, this is done by many teachers in the public schools, who encourage the children regularly to learn the names of the birds around them, and point out the folly of destroying what may in after life be beneficial to their pursuits, and a source of pleasure to them. Bird-day there is also an annual institution, like Arbour-day.

While on the subject, and ere it is too late, I wish to place on record the many other agencies at work at the present time, that are tending to rapidly drive away, diminish, or ultimately exterminate many species of our native birds in New South Wales.

It is inevitable that by the steady growth of cities and their suburbs throughout the State, and the consequent clearing and burning of scrub lands, and drainage of swamps, many birds are either destroyed or driven away from their former haunts. This is only a natural sequence. Take the metropolis as an instance. The Emu no longer roams shrough the scrub between Botany Bay and Sydney Harbour, as in Governor Phillip's time, and as I have pointed out elsewhere,[2] many species once common in the neighbourhood of Sydney within the memory of present residents, now no longer frequent the County of Cumberland. On the 1st August, 1895, between Botany and La Perouse, I found many nests of the New Holland Honey-eater, containing eggs or young ones. Numbers of men who had previously been engaged in felling the scrub, were, at the time of my visit, occupied in setting light to it in different places and burning it off. A strong north wind was blowing at the time, and the fire quickly spread to the

[2] North—Austr. Assoc. Adv. Sci., Handbk. (Sydney Meeting), 1898, p. 69.

heath and standing scrub, consequently destroying many hundreds of nests containing eggs or young.

Many native birds are driven from their usual haunts by the introduction and acclimatization of both foreign birds and mammals. Owing to the ample cover around Sydney, the former evil will not be so apparent for many years as it is at present in Melbourne, which is virtually denuded of its indigenous trees for miles around. In the immediate neighbourhood of the latter city, hardly a single native bird is to be seen. During a fortnight's stay, in March, 1899, in a northern suburb five miles from the city, and surrounded on two sides with open paddocks, I observed three species—the House Swallow, the Black-backed Magpie, and the Australian Pipit or "Ground Lark." Some of the missing ones were represented by the ubiquituous Sparrow, the Indian Myna, and the Starling. A couple of miles' walk through paddocks, either way from the station of a southern marine suburb, ten miles from town, revealed an additional three species of native birds—the White-fronted Ephthianura, the White-plumed Honey-eater, and the Yellow-rumped Thornbill. Now from experience I know that in both of these, and many other of the Melbourne suburbs, the native birds were at one time fairly well represented, for they were my early hunting-grounds, and what has happened to Melbourne will, in time to come, happen to Sydney and its immediate neighbourhood. At Ashfield, near Sydney, I have seen colonies of the Fairy Martin ousted out of their nests and driven away by the usurping Sparrows; and in the same neighbourhood and around Five Dock and Canterbury, the Starlings are rapidly increasing, and both of these acclimatized birds far outnumber any species of native birds in these suburbs. The Goldfinch, Greenfinch, and Indian Myna, although increasing, are not perceptibly numerous at present, and the Skylarks which frequent the Centennial Park, and the open heath-lands of Randwick and Botany, have not apparently interfered with the breeding of terrestrial species.

It is, however, the importation of foreign mammals that has directly and indirectly caused the destruction of a vast number of our Australian birds, and this loss is still going on day by day. Hundreds of thousands of pounds have been expended in trying to eradicate the Rabbit from the western half of New South Wales. This has been partly accomplished by the erection of rabbit-proof fences, and the laying of poisoned baits. For the latter, phosphorized oats is chiefly used, with the result that in addition to the Rabbits, thousands of granivorous birds perish annually, chiefly the ground and grass-frequenting species of Pigeons, Parakeets, Finches, and Quail. To cope with the Rabbits, domestic cats were also turned loose in the central and south-western divisions of the State, with the result that after

Rabbits had been eradicated or had disappeared, the felines—now become wild and of increased size—turned their attention to the ground and low-bush frequenting birds, destroying large numbers of many species, and causing the total extinction of others where they were once common.

Poisoned baits laid for Wedge-tailed Eagles, Ravens, and Crows, are also frequently taken by Magpies and other useful species.

The Fox, that acclimatised curse in Victoria, and which is rapidly extending over the southern portions of New South Wales, in addition to robbing poultry-yards, is rapidly diminishing the numbers of one of the most interesting species of the Victorian avi-fauna. Mr. G. A. Keartland informs me that in the lair of one of these animals in the Dandenong Ranges, the remains of upwards of thirty tails of Queen Victoria's Lyre-bird were found, mostly those of females, the birds being presumably captured while sitting on their nests.

By the newspapers, I also observe that "great ravages have been made by Foxes among the young lambs in the Corowa District of New South Wales this season."[3]

Tens of thousands of birds, principally Finches and Parakeets, used to be trapped annually on the western plains of New South Wales, but their numbers are now sadly diminished. To give an instance: the pretty little "Budgerigar," or Warbling Grass Parakeet, used to be sent to Melbourne and Sydney many years ago in thousands, but seldom now any great number of these birds is to be seen in dealer's shops. In 1839, in the early days of settlement of the State, Gould records that on arrival at Breeza, to the north of the Liverpool Plains, he found himself surrounded by numbers of these birds, breeding in the hollow spouts, and that since his return to England in 1840, he had more than once seen two thousand at a time in a small room at a dealer's in Wapping. I have several times passed over the Liverpool Plains, and through Breeza in the breeding-season, without hearing so much as the twitter of one of these birds, and during the last decade it is rarely one meets with them in New South Wales in any considerable number. I do not wish to infer that all these birds have been exterminated by trappers or by poisoned grain, only that a vast number has been captured and destroyed, and they are not found in their old haunts, where they were once abundant.

Periods of long-continued drought, from which the western district of the State has suffered for years past, is an important factor in the disappearance of many granivorous species, for without an abundant rainfall, the various plants and grasses, on the

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[3] *Sydney Daily Telegraph,* 10th September, 1900.

seeds of which these birds subsist, do not exist. From Byrock to Bourke, during very hot summers, it is not an uncommon thing for large numbers of birds to die with the excessive heat. As both the Finches and Parakeets are prolific breeders, with the return of good seasons it is to be hoped they will appear again in their old haunts as numerous as ever.

I do not fear as much for a diminished Avifauna inland as near the coast and in the vicinity of large centres of population. Of those birds frequenting our coastal brushes and contiguous mountain ranges, the Lyre-bird, if successful, rears only one young bird in a season; the Rifle-bird and Regent Bower-bird, usually two each, at the most three, in a season. The adult males of all three of these species, having a commercial value, apart from their value as natural history specimens, are in the future liable to be utterly exterminated, unless stringent measures are taken for their absolute protection. Large areas of still unalienated virgin brush lands and mountain-range should be perpetually reserved in the haunts of these beautiful birds, and the entire flora and fauna of these reserves kept sacred and zealously guarded against all would-be destroyers.

Briefly summed up the facts are these:—Partly through nature's laws, and partly through ignorance, carelessness, and design, the destruction of bird-life has been for years past, and is still going on almost unrestricted. Through nature's laws, by the growth of cities and suburbs, the felling and burning of brush and forest lands in the country districts, and bush fires; by the ignorance of boys and youths not knowing the damage they are doing in shooting birds throughout the year; through carelessness on the part of persons introducing foreign mammals and birds into Australia, and ignorant whether their introduction will prove beneficial or harmful; by design in the wilful trapping and shooting of birds in the close season.

Where preventible, is this annual loss of bird-life to continue? If so, ere another century is passed, the sweet melody of birds may no longer be heard by the future dweller near city, hill, or plain, and Australia become what was so falsely reported of her in the early days of settlement, a songless land—a land of silence

SOME NEW OR UNFIGURED AUSTRALIAN SHELLS.

By CHARLES HEDLEY, Conchologist.

SEVERAL collectors have contributed from the vicinity of the Jenolan Caves a well-marked race of *Thersites gulosa*. Mr. J. E. Wiburd found it among the playthings and decorations of a bower of the Satin Bower-bird, *Ptilinorhynchus violaceus*, Vieillot. An account of this, by Mr. A. J. North, has been published by Dr. R. B. Sharpe.[1]

It may be named and defined as follows :—

THERSITES GULOSA, *Gould*, *var.* DEPRESSA, *n. var.*

In texture, colour, and sculpture, normal; but distinguished by greatly depressed spire and consequently wider umbilicus and flatter base. The ordinary faint keel is much exaggerated in the variety. Height, 10 mm.; maj. diam., 22 mm.; min diam., 20 mm.

NATICA SUBCOSTATA, *Tenison Woods.*

(Fig. 1).

Ten. Woods, Proc. Linn. Soc. N.S.W., ii., 1878, p. 263.

The accompanying drawing has been made from the type in the Australian Museum. Since it was prepared, Messrs. Pritchard and Gatliff have published illustrations and an improved description of the species from Victorian material.[2]

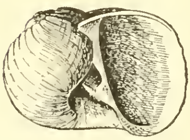

Fig. 1.

TRICHOTROPIS TORCULARIS, *Tenison Woods.*

(Fig. 2).

Cingulina torcularis, Ten. Woods, Proc. Linn Soc. N.S.W, ii., 1878, p. 263; *Rissoa torcularis*, Tate, Proc. Roy. Soc. S.A., xxiii., 1899, p. 234.

As this species has not heretofore been figured, I have prepared the accompanying illustration from the type, now in this Museum. It seems to me that T. Woods erred in his choice of the genus and that the species would find a more natural place in *Trichotropis*. The shell is 3½ mm. in length.

Fig. 2.

1 Sharpe—Monograph Paradisidæ and Ptilonorhynchidæ, ii., 1891-8. Article on *P. violaceus*.

2 Pritchard and Gatliff—Proc. Roy. Soc. Vic., xiii., 1, 1900, p. 132, pl. xx., figs. 1, 2, 3.

Drillia tricarinata, *Tenison Woods.*

(Fig. 3).

D. tricarinata, Ten. Woods, Proc. Linn. Soc. N.S.W., ii., 1878, p. 265.

A figure from the type, now in the Australian Museum, is here presented. The original is 6 mm. long.

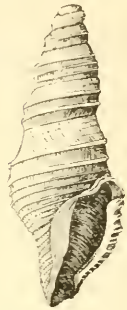

Fig. 3.

Mangelia desalesii, *Tenison Woods.*

(Fig. 4).

Ten. Woods, Proc. Roy. Soc. Tas., 1876 (1877), p. 138.

Great difficulty attends the identification of the unfigured species of T. Woods. To aid future determination of *M. desalesii*, a figure has been prepared from material in this Museum.

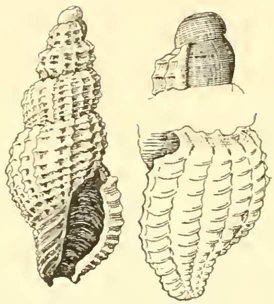

Fig. 4.

Carditella delta, *Tate & May.*

(Figs. 5*a*, *b*).

Tate & May, Proc. Roy. Soc. S.A., 1900, p. 102.

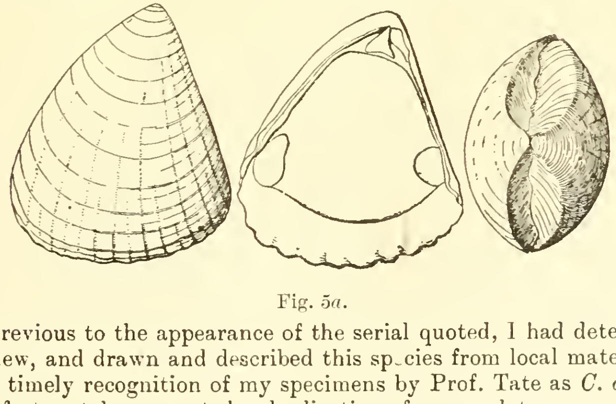

Fig. 5*a*.

Previous to the appearance of the serial quoted, I had detected as new, and drawn and described this species from local material. The timely recognition of my specimens by Prof. Tate as *C. delta* has fortunately prevented reduplication of nomenclature.

The Museum collection includes eight examples, dredged in 1884, off Ball's Head, Sydney Harbour; and two dredged in 1880 by a Museum expedition in charge of Mr. (now Prof.) W. A. Haswell, at Broughton Islands, north of Port Stephens, New South Wales, in thirty-five fathoms. The latter are catalogued in the Annual Report of the Australian Museum for 1881, p. 22, as "No. 109, Cardium sp.?"

Southern examples appear to exceed those from New South Wales. The individual from Sydney, figured herewith, being 1·95 mm. in

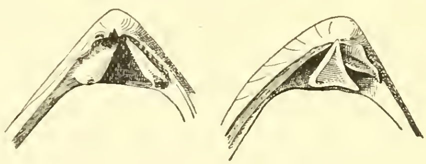

Fig. 5*b*.

height, 1·6 mm. in length, and 1·05 mm in breadth of conjoined valves. Since the description of *C. delta* does not touch on the hinge, I would point out that the umbo of the left valve is slightly cleft for the reception of the large, projecting, and upcurved cardinal tooth of the right valve. In this feature, the sinuous dorsal margin and the clasping of the valves there is a strong resemblance to *Corbula*.

When instituting *Carditella*,[3] Smith expressed no opinion on its systematic position, but apparently treated it as one of the Carditidæ. Bernard[4] has placed the genus in his new family Condylocardiidæ.

PHILOBRYA TATEI, *n. sp.*

(Fig. 6).

Valve subquadrate, rather inflated, thin. Colour uniform pale brown. Epidermis abundant, dense, membranous, projecting far beyond the margin of the valve, puckered into about seventeen radiating bristly crests. Prodissoconch of moderate size, rather flat, with thickened margin. Externally the valve has fine radiating riblets, corresponding to the epidermal crests and terminating in a small sharp point on the margin. Numerous low broad bars run continuously from riblet to riblet, appearing in each intercostal space like the rungs of a ladder. Within, the

3 Smith—Proc. Zool. Soc., 1881, p. 42.

4 Bernard—Journ. de Conch., xliv., 1896 (1897), p. 170.

valve has a broadened margin, which, except for a space on the anterior side, is occupied by alternate pits and bosses, to the number of about twenty-five. These evidently serve to interlock the valves, and have no relation to the external riblets. Ligament

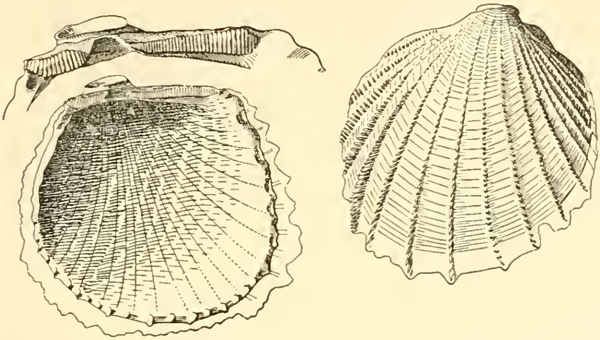

Fig. 6.

short, submedian. Anterior hinge crenulations long and well developed. Muscular scars indistinguishable. Height, 2·15 mm.; length, 2·1 mm.

Habitat.—Two complete specimens, apparently taken alive, were obtained in November, 1880, in thirty-five fathoms, off Broughton Islands, Port Stephens. They are enumerated as "No. 116, *Arca ? sp. nov.*" in the Annual Report of the Australian Museum for 1881, p. 22. There are also three specimens in the Museum, labelled "Port Jackson."

This species is easily distinguished as being less inequilateral than any member of the genus yet found. In agreement with comparative symmetry are the shorter ligament and better balanced hinge. It may be appropriately called by the name of one to whom we owe all our knowledge of the Australian *Philobrya*.[5]

PERIPLOMA MICANS, *n. sp.*

(Fig. 7).

Shell broadly ovate, rostrate, inequivalve, not thin but very brittle. Inside nacreous with a brilliant silvery lustre; where the thin surface layer has flaked off, the nacre is visible outside. Beak fissured. Colour ochreous. Sculpture—there are a few low, broad concentric undulations, which are imprinted on the interior. The rostrum is defined by a narrow, shallow, but sharply impressed

[5] Tate—Trans. Roy. Soc. S.A , xxv., pt. ii., 1898, p. 86.

strip descending from the umbo. The thin epidermis is puckered into raised threads, coarser posteriorly, which sometimes follow and sometimes obliquely cross the main sculpture. Where unworn

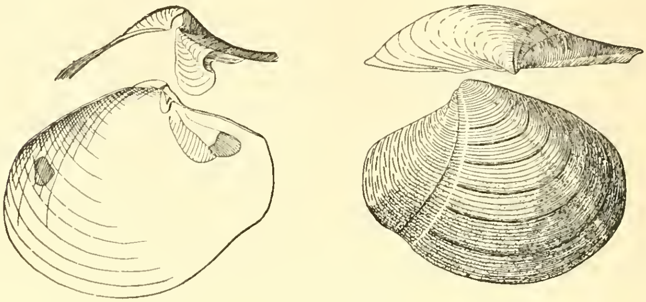

Fig. 7.

the surface seems minutely granular. The chondrophore is small, shallow, and directed downwards. Length, 15·5 mm.; height 11·2 mm.

The species is based on a single, rather worn, right valve, labelled by Mr. J. Brazier "five miles east of Sydney Heads, seventy-five fathoms." The depth should, I think, be forty-five fathoms. From that locality Mr. Brazier received a quantity of shells, including *Cassis thomsoni*,[6] on June 3rd, 1874, when a party of Sydney naturalists was entertained on board "H.M.S. Challenger." I suppose that the specimen I describe was then obtained.

Sarepta ? tellinaeformis, *n. sp.*

(Fig. 8).

Shell equilateral, oval, tumid, thin and translucent; ventral margin more rounded than the dorsal, posterior end more produced than the anterior. Substance at first sight dull and porcellanous, but on close examination showing occasional pearly lustre. Umbo prominent, neither lunule nor area. Colour dull white. No radiating sculpture, but closely, evenly, and entirely covered with fine concentric hair lines. Ventral margin smooth. Hinge plate slightly arched, interrupted by a broad, shallow, projecting, oblique chondrophore. On the shorter, anterior portion, are about fifteen, and on the posterior about eighteen small teeth; the proximal lamellate, the distal forked Above the margin, below the umbo, and communicating with the chondrophore is a small hemispherical ligament pit. Muscular scars faint, pallial line entire. Length, 9·5 mm.; height, 7·5 mm.

[6] Brazier—Proc. Linn. Soc. N.S.W., i., 1875, p. 9.

Habitat.—With *Periploma micans* and other shells, this was labelled in Mr. J. Brazier's writing "seventy-five fathoms, five miles east of Sydney Heads."

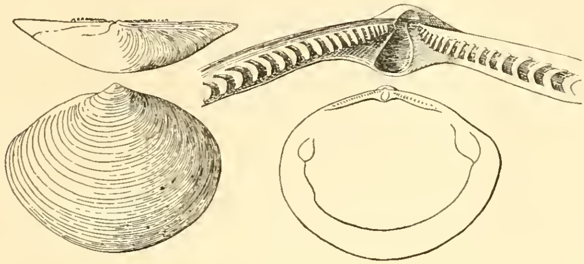

Fig. 8.

Three separate valves represent the species.

The novelty seems to resemble *Sarepta speciosa*, A. Adams,[7] more than *S. abyssicola*, Smith.[8] Neither illustration show the hinge structure clearly enough to enable me to draw a detailed comparison.

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7 Crosse—Journ. de Conch., xvi., 1868, p. 41, pl. iv., fig. 1.

8 Smith—Chall. Rep., Zool., xvi., 1885, p. 243, pl. xx., fig. 6.

STUDIES IN AUSTRALIAN SHARKS, WITH DIAGNOSIS OF A NEW FAMILY.

By Edgar R. Waite, F.L.S., Zoologist.

(Plate iv.)

HEMISCYLLIUM MODESTUM, *Günther*.

Chiloscyllium modestum, Günther, Proc. Zool. Soc., 1871, p. 654, pl. liv.

(Plate iv., fig. 1; and Fig. 9).

On the 7th September last, the Trustees received from Mr. E. C. Haviland seven fœtal Sharks, removed from one female. The parent was not forwarded with the young, but Mr. Haviland has since supplied the following particulars:—During a holiday, spent at Port Macquarie, New South Wales, he caught three 'dog-fishes' off the rocks on the ocean side; they were taken with a line among rocks and sea-weed in about five fathoms, and he understood that the species was common in the locality.

One of them, on being opened, was found to contain the seven young ones sent to the Museum; these, when placed into a rock-pool, swam about quite freely until a boy, despatched for a bottle, returned.

I am able to identify these young Sharks with *Hemiscyllium modestum*, Günth., and find that, in common with many of the Selachii, they possess a more ornamental colouration than the adults.

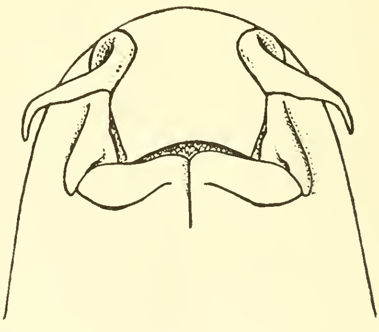

Fig. 9.

Günther's type, described under the name *Chiloscyllium modestum*[1] was a dried skin, his figure, therefore, though recognisable, is not wholly satisfactory; this applies more especially to the under side of the head, which is correctly represented in the accompanying diagram (Fig. 9).

[1] Günther—Proc. Zool. Soc., 1871, p. 654, pl. liv.

The head is wide, and strongly depressed with an even curved profile from above the pectoral fin. The eyes are small and oval, about one-third larger than the spiracle, which is situated about its own diameter behind and below the eye; it has a complete thickened margin. The length of the snout is five-sixths the interorbital space or rather less than the width of the nasal flap. The nostrils are nearer the end of the snout than the mouth, each is bounded externally by a raised semi-circular flap and the inner margin is produced into a falcate cirrus having a broad base; when depressed it reaches to, or nearly to, the end of the upper labial fold; this fold is triangular in shape, extending from the nasal opening to the external angle of the mouth, where it is widest. The lower labial fold is also large, but does not reach the symphysis, indicated by a deep sinus.

The teeth in both jaws are similar and tricuspid, the median cusp being comparatively large; there are about four rows of teeth in function.

The four anterior gill-openings are oblique, the fifth less so, larger and closer; the last three are above the pectoral.

The posterior insertion of the first dorsal fin is midway between the end of the snout and that of the tail. The second dorsal is similar in character and extent, and is separated by a space little more than half its base; the angles are not produced. The pectoral is inserted midway between the end of the snout and the origin of the ventral; the latter arises generally, but not wholly, in advance of the first dorsal. The anal is well developed, and has a long base which originates behind the posterior insertion of the second dorsal; it is subcontinuous with the caudal.

The caudal is continued in the line of axis of the body; its lower lobe is long and deep, rendering the fin deeper than any part of the tail, that is, behind the ventrals.

A depressed lateral line begins on each side, above the spiracle, and passes along the upper portion of the side to the caudal. Above it and nearer to it than to the median line is a series of pores, arranged rather irregularly two or three deep. A single line of pores passes backwards and upwards from the spiracle and becomes lost in an irregular series above the gill-slits.

Colours.—The general colour of the body above and on the sides is a coffee-brown, with or without markings; the fins are greyer. The under part of the head and anterior parts of the body are yellow, the rest of the body brown, though much lighter than above, while the tail is uniformly brown throughout.

The young Sharks sent by Mr. Haviland are greyer in colour than the adults, and have eleven well defined darker cross bands which do not, however, reach the ventral surface. The first is across the occiput; the second and third in advance of, and the fourth and fifth at the base of the first dorsal; the sixth and seventh at the base of the second dorsal, the eighth above the anal, and the remainder on the caudal fin. The bands, ground colour, and fins are alike ornamented with scattered white spots, some of which have a dark ring around them. All the examples have the yolk-sac attached, its position and character being represented in the accompanying illustration (Pl. iv., fig. 1).

These coloured cross-bands, and even the spots, sometimes persist to adult life, in fact, I believe, if sought for, traces of the bands at any rate could be found in the majority of fresh examples. Specimens showing such markings, were described by Macleay under the name *Chiloscyllium furvum.*[2] This author gives Port Jackson as a habitat, but I do not think the species has been taken within the harbour; it is only found on the coast in rocky situations and is never caught excepting with hook and line. It is taken by fishermen when angling for Groper *(Achærodus)*, the bait being either a Shore Crab *(Grapsus variegatus*, Fabricius), or the Ascidian locally known as Cungeboy *(Cynthia præputialis*, Stimpson).

Hemiscyllium modestum is commonly used for demonstration purposes in the Biological Department at the Sydney University, hence it is made one of the types in Parker and Haswell's Text-book of Zoology. The authors have used Macleay's name, rendering *Chiloscyllium furvum* as *C. fuscum.*[3] With regard to the shell gland mentioned (and figured) as a slight swelling, Prof. Haswell replies to me as follows:—"I do not think that the presence of a functional shell-gland necessarily implies oviparity; a good many of the viviparous forms develop a shell, though it is thin and is soon thrown off."

Being a source of small revenue to the fishermen, they are in the habit of placing their captures in rock-pools, whence they cannot escape. The Sharks have been thus kept alive for several days, and fed upon fishes entrails and other food thrown to them. As ascertained by opening the stomachs of individuals caught, the food in a natural state is rather varied. I have found portions of Crabs and small Fishes *(Lophonectes ?)*. Of two examples in the Sydney University, examined by the kindness of Mr. J. P. Hill, F.L.S., one had swallowed a Sepia, the other an Anemone *(Actinozoon)* and two Macrurus Crustaceans which Mr. Whitelegge believes to be *Galathea*.

Though appearing in literature as the Dusky Dog-fish or Brown Cat Shark, it is universally known to the fishermen as Blind Shark, this, though of course a misnomer, is applied on account of the comparatively small eyes and the habit of the Shark in

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2 Macleay—Proc. Linn. Soc. N.S.W., vii., 1882, p. 364.

3 Parker and Haswell—Text-book of Zoology, ii., 1897, p. 135.

retracting them and closing the eyelids when it is removed from the water.

It was originally described from Queensland, but does not appear to have been since noticed there. On our coast, in addition to the metropolitan area, it is now known to be common at Port Macquarie, and is doubtless numerous in suitable situations all along the coast; so far we have not received it from localities south of Botany Bay.

The fœtus figured, of natural size, measures 162 mm. in length.

The following are the principal dimensions of an adult specimen, a male, obtained at Lillipilli, near Maroubra Bay, on 3rd March, 1901:—

	mm.
Total length	620
Length of head to 1st gill-slit	83
" " 5th "	118
Width of head	90
Snout to eye, front margin	40
Diameter of eye	12
Snout to spiracle	52
Diameter of spiracle	10
Snout to mouth	30
Width of mouth	48
Length of cirrus	24
Circumference of body (behind pectorals)	233
Height of body	60
Length of snout to vent	270
Snout to 1st dorsal fin	270
Length of 1st dorsal fin (base)	58
" " front margin ...	86
" " posterior margin ...	53
Snout to 2nd dorsal fin	368
Length of 2nd dorsal fin (base)	49
" " front margin ...	80
" " posterior margin ...	47
Intradorsal space	40
Snout to pectoral fin	110
Length of pectoral fin	85
Width of pectoral fin	65
Snout to ventral fin	240
Length of ventral fin	90
Width of base, ventral fin	55
" margin, ventral fin	68
Snout to anal fin	420
Length of anal fin	57
" base, anal fin	40
" caudal fin	160
Height of caudal fin	48
Length of basal lobe	120

One of the characters of the Scylliorhinidæ, to which family *Hemiscyllium* has been assigned, is that afforded by the method of reproduction. Like members of the Rajidæ, these Sharks are oviparous, laying angular chitinous egg-cases.

Hemiscyllium has been shown to produce its young alive, that is, to be ovoviviparous, and for a similar habit members of the Rhinobatidæ have been separated as a family distinct from Rajidæ.

To maintain uniformity in classification, it is necessary to associate *Hemiscyllium* and *Chiloscyllium* to form a new family, which may be thus characterised :—

Family HEMISCYLLIIDÆ.

Two dorsal fins, similar, without spines, the first wholly, or in part behind the ventrals. Anal fin present, behind the second dorsal and more or less continuous with the caudal. Caudal fin moderate or long with a basal lobe, the tail not keeled, not bent upwards. Spiracles present; no nicitating membrane; gill-openings small, the posterior ones above the root of the pectoral. Mouth moderate, with several rows of small teeth with or without lateral cusps. Nostrils near the snout, confluent with the mouth, provided with cirri.

Young produced alive.

The Hemiscylliidæ thus differ from the Scylliorhinidæ mainly by having the anal fin behind the second dorsal, and in being ovoviviparous.

The following families now constitute the Scyllioidea :—

Scylliorhinidæ............oviparous.
Ginglymostomidæ ......
Hemiscylliidæ............ovoviviparous.
Orectolobidæ ....ovoviviparous.
Pseudotriakidæ ....

ORECTOLOBUS BARBATUS, *Gmelin.*

Squalus barbatus, Gmel., Syst. Nat., i., 1788, p. 1493.

When writing the foregoing article on *Hemiscyllium*, it occurred to me that although I was under the impression that the Wobbegong *(Orectolobus barbatus)* produced living young, I had nowhere seen the habit published. In order to place the matter beyond doubt, I enlisted the kind services of Mr. J. A. Brodie, Chief Inspector of Fisheries, who at once responding, sent to me Inspector William H. Newton, in charge of the Port Hacking District. This officer assured me that the Wobbegong bears its young alive, and that in November last he removed twenty-three young ones from a single female. Some of these, when placed in water, swam about quite vigorously, and were evidently within a few days of being born. Others were thrown on to the beach, and though this took place in the morning, at night they were found to be still alive.

In response to a circular forwarded by Mr. Brodie to all his officers, I have had numerous reports, all agreeing as to the ovo-viviparous habit of the Wobbegong.

In the letter above mentioned, Prof. Haswell also writes:—"I was much interested to hear of your discovery with regard to *Hemiscyllium;* it constitutes another link between it and *Crossorhinus*, to which, rather than to the Scyllidæ, some of the features of the skull, etc , seem to connect it. It has been known to me for a good many years that *Crossorhinus* is viviparous, but I do not know that the fact has been published. Other viviparous forms in our local fauna are: *Urolophus*, *Trygon*, *Myliobatis*, *Hypnos*, *Trygonorhina*, *Rhinobatus*, *Pristiophorus*."

Squalus megalops, *Macleay*.

Acanthias megalops, Macl., Proc. Linn. Soc. N.S.W., vi., 1881 (1882), p. 367.

(Plate iv., fig. 2).

By purchase, the Trustees recently obtained two examples of this species. They were caught by a fisherman on August 24th, 1900, at Neverfail, between Port Jackson and Broken Bay, in sixty fathoms. Both are females in full breeding condition. They measure respectively 565 mm. and 515 mm. in total length, and the smaller example, in addition to five or six large eggs, contained a young one almost ready for birth. It is this fœtus which I have figured on the accompanying plate, of which more below.

Looking first to the adults, the validity of the species claims some attention. It is one of three recorded from Australian waters, the other two being *S. acanthias*, Linn., widely distributed in the Atlantic and identified by McCoy in Victoria, and *S. blainvillii*, Risso, recorded by Günther and Ogilby from Australia. Günther mentions that *Acanthias blainvillii* is scarcely distinct from *A. vulgaris*[4] *(S. acanthias)*, while Ogilby considers that "eventually it is probable that the three will have to be joined together under a common name."[5]

The differences between *S. acanthias* and *S. megalops* are certainly not many, but the most noticeable one, namely, the

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[4] Günther—Brit. Mus , Cat. Fishes, viii., 1870, p. 419.

[5] Ogilby—Proc. Linn. Soc. N.S.W., (2), iii., 1888, p. 1096, and iv., 1889, p. 1 5.

position of the ventral fin is so striking and so constant that I feel compelled to regard the two as distinct, and Mr. Ogilby since tells me that he now holds the same view.

In *S. megalops* the ventral fin occupies a much more forward position, the centre of its fleshy base being exactly midway between the end of the snout and the termination of the upper caudal lobe, while the anterior insertion of this fin is below the middle of the space between the origin of the two dorsals. An examination of any specimen of *S. acanthias*, shows a much more posterior situation of the ventral.

Very many of the examples which I knew so well on the Yorkshire coast under the name "Sea-dog," exhibited white spots; in the young they were generally to be traced. These features are recorded by Day, Yarrell, Couch, and other writers on British Fishes. I have not seen a spotted example of *S. megalops*, and the fœtal specimens above referred to show no trace of such. The point of each dorsal spine in this species is covered by a little knob, a feature referred to in *S. acanthias* by Mr. Robert Ball as follows:—

"Mr. Ball brought under notice of the Academy, as an unobserved fact, a beautiful provision in the fœtus of the Spined Dog-fish *(Acanthias vulgaris)*, by which the mother is protected from being lacerated by the spines of the young before birth. He exhibited two perfectly developed young, which he had taken from the mother on the 30th November last; in these the spines were each covered at the point with a small knob of cartilage, fastened by straps of the same material, passing down one on each of the three sides of each spine, in such a manner as evidently to become easily detached at birth, thus allowing the little animal to commence life effectively armed. He mentioned that the female in question contained a large number of eggs, in various states of development, in addition to the two fully-formed young."[6]

The drawing of the fœtal Shark, reproduced by Richardson,[7] evidently represents *Squalus acanthias*, and not *S. megalops*, as indicated not only by the posterior position of the ventral fin but also by the presence of the white spots. On comparing this figure with my illustration, the difference in the comparative size of the eyes is very striking, much more than in the adults, though it was this peculiarity which induced Macleay to bestow upon his species the name *megalops*.

The example figured, of the natural size, measures 162 mm. in length.

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6 Ball—Proc. Roy. Irish Acad., iii., 1847, p. 230.

7 Richardson—Voy. Ereb. and Terr., Fish, 1846, p. 44, pl. xxviii., figs. 1 and 2 (*errore* fig. 5 in text).

Addendum to Hemiscyllium.

On March 11th, we received from a fisherman at Lillipilli two adult females of *Hemiscyllium modestum.* The larger measures 660 mm. in length, and contained eight young ones in an early stage of growth. All are of about equal size. In one examined the length is 74 mm, the diameter of the egg-sac 34 mm., and the length of the peduncle 16 mm. The dark bands are clearly indicated, those on the head being most conspicuous. A short rather faint band connects the eyes; this is not apparent in the larger examples previously described. The succeeding band, namely that across the occiput, is convex in front, while the next one is very markedly concave.

The most interesting feature of these fœtal examples is the external gills. They are in five clusters, one proceeding from each gill-slit; each cluster consists of about a dozen filaments; these are scarlet in colour, and 18·5 mm. in length.

Branchial filaments also pass from the spiracle; this has been shown to be a modified visceral cleft, and in early embryos indistinguishable from the other clefts.[8]

In the smaller female the ovary was apparently unimpregnated. The only substance found in the stomach was a coralline seaweed *(Corallina)* represented by several pieces.

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[8] Balfour—Embryology, ii., 1881, pp. 50-1.

ADDITIONS TO THE FISH-FAUNA OF LORD HOWE ISLAND, No. 2.

By EDGAR R. WAITE, F.L.S., Zoologist.

(Plates v. – viii.)

THE present contribution to the Fish-fauna of Lord Howe Island is the result of an examination of two collections obtained in 1900. The first, made by Mr. W. S. Thompson, a resident on the island, to whom the Trustees owe other courtesies, consists of but half-a-dozen species. One of these, however, is an interesting new Labroid. The second collection is the result of gatherings by our friend Mr. Frank Farnell, Honorary Visiting Magistrate to the island. It is more extensive, and, though not yielding novelties, enables me to add six species to the known fauna, and to specificallly recognise an undetermined record, namely, *Scarus pyrrhostethus*, Richardson. I have also added two species obtained in 1894, but not previously recorded.

The new records are as follows; species unrepresented on the New South Wales mainland being denoted by an asterisk (*):—

Anguilla reinhardtii, Steindachner.
**Hyporhamphus sp.*
**Upeneus pleurostigma*, Bennett.
Nomeus gronovii, Gmelin.
**Thalassoma umbrostigma*, Rüppell.
**Iniistius cacatua*, sp. nov.
**Chætodon tricinctus*, sp. nov.
Sillago ciliata, Cuvier and Valenciennes.
Antennarius commersonii, Lacépède.

The following species are figured for the first time:—

Upeneus pleurostigma, Bennett.
Apogon norfolcensis, Ogilby.
Iniistius cacatua.
Chætodon tricinctus.
Monacanthus howensis, Ogilby.

ANGUILLA REINHARDTII, *Steindachner.*

Of the two common fresh-water eels of New South Wales, *Anguilla australis*, Rich., and *A. reinhardtii*, Steind., the former has been recorded from Lord Howe Island. I am now able to include *A. reinhardtii*, an example having been forwarded by Mr. Farnell to the Fishery Commissioners, and by them presented to the Museum.

HYPORHAMPHUS, *sp.*

For the present I leave a small *Hyporhampus* undetermined. It differs markedly from *H. intermedius*, Cantor, and *H. regularis*, Günther, of the mainland, the former of which has been recorded from the island. Both these species are referable to the genus *Hyporhamphus*, distinguishable from *Hemirhamphus* by the anterior position of the ventral fin.

UPENEUS PLEUROSTIGMA, *Bennett.*

(Plate v.)

This species was originally described by Bennett[1] in 1831, and in 1859 Günther[2] placed it as doubtfully synonymous with the later described *Upeneus brandesii* of Bleeker.[3] In 1873–5, however, he confirmed his suspicions, as indicated by unreservedly placing the last-named as a synonym of Bennett's species.[4]

The next step is not quite so clear to me. The Mullidæ are contained in the last part of Bleeker's unfinished "Atlas." Of this part (Vol. ix) we possess the plates, but not the text (of which I understand eighty pages were issued).

Bleeker publishes a figure under the name *Parupeneus pleurostigma*, Blkr.,[5] having apparently accepted Günther's ruling as to the specific identity of *U. pleurostigma* with *U. brandesii*, but in changing the generic name added, as was his custom, his own to the species. Since then the matter does not appeared to have been referred to. A comparison of this figure with the descriptions of *U. pleurostigma* by Bennett and Günther shows that the two cannot possibly be reconciled.

By the kind services of Mr. Farnell, the Trustees have received from Lord Howe Island a very fine example which I unhesitatingly pronounce to be *U. pleurostigma*, Bennett. With the material at my command, and having neither of the descriptions of Bleeker, I am disposed to regard his illustration as of *U. brandesii*, which is really a good and very distinct species.

U. pleurostigma has not therefore been illustrated, and I have pleasure in publishing the accompanying figure of the Lord Howe Island example (Plate v.) This specimen exhibits the following characters :—

D. viii., i. 8. A. ii. 6. V. i. 5. P. 16. C. 7 + 8. L. lat. 31. L. tr. 2 + 6.

Length of head 3·0, of caudal fin to end of central rays 8·9, height of body 3 5 in the length (caudal excluded). The eye is

1 Bennett—Proc. Zool. Soc., i., 1830-1, p. 59.

2 Günther—Brit. Mus. Cat , Fish., i., 1859, p. 407.

3 Bleeker—Nat. Tyds. Ned. Ind., 1851, p. 236 (not seen by me).

4 Günther—Fische der Sudsee, ii., 1873-5, p. 58.

5 Bleeker—Atlas Ichth., ix., pl. cccxciii. (iii.), fig. 3.

situated in the hinder half of the head, in the whole length of which its diameter is contained 5·5 times. The snout is noticeably produced, its length being slightly more than half that of the head; the posterior nostril is a vertical slit, close to the anterior margin of the eye; the anterior one is a small round pore, rather nearer to the end of the snout than the eye; the interorbital space, which is rather flat above, but declivous above the eyes, is one-fourth the length of the head. The length of the maxilla is twice, and its greatest width equal to, the diameter of the eye; the lips are very fleshy.

The barbels are thick for their proximal third, are contained 1·6 times in the length of the head, and extend barely to the angle of the preopercle. Opercle with a rather strong flat spine. Gill-rakers slender, sixteen on the lower limb of the first arch; the longest equal to half the diameter of the eye. The small conical teeth are arranged in a single series in each jaw; the palatines and vomer are edentulous.

The upper edge of the snout is straight; the profile is rounded from above the eye to the first dorsal spine, which marks the highest point of the body.

The first dorsal spine is very short, the third and fourth are equal and longest, one-half the length of the head. The second dorsal fin is little more than half the height of the first; it has a somewhat more forward position than the anal. The first anal spine is very small, and being applied closely to the second, may easily be overlooked. The pectoral is equal to the ventral in length, or 1·4 in that of the head; the spine of the latter fin is very broad, and the first ray reaches two-thirds of the distance of its origin from that of the first anal spine. Caudal deeply forked; the lobes equal, pointed, five-eighths the length of the head; the least height of the peduncle 3·4 in the same.

Scales large, those on the anterior part of the snout not distinct, between these and those of the cheek is a naked space. Cheek scales very irregular, with more or less jagged margins. The anterior scales of the lateral line with branched tubules, those of the posterior scales simple; three series of scales between the dorsal fins; a long pointed scale in the axilla.

Colours.—General colour red, the upper part of the snout brown, with a darker streak occupying the naked space between the eye and the mouth. Some bright red spots on the area between the eye and the first dorsal. On the lateral line, below the intradorsal space, is a deep black blotch, occupying four or five scales and the corresponding portions of the row above and below; beneath the second dorsal is a faint pink blotch, embracing the 15 – 18 scales of the lateral line, and the adjoining scales of the row above. The second dorsal fin is set in a large median black blotch, which extends its whole length and includes the first row of scales on each side. The basal half of the fin is likewise black, its upper portion marked with dark longitudinal lines. The other fins are without markings, but the upper caudal rays are black, and a few rays below these have towards their free margin black spots; the lower lobe of the caudal is also, but much more narrowly edged with black.

Length of specimen, 275 mm.

This species is known from Mauritius and Zanzibar in the Indian Ocean; Apamana (Gilbert Islands), Tahiti (Society Islands), and now Lord Howe Island, in the Pacific.

Not having the original description of *U. brandesii*, I can only contrast our fish with Bleeker's figure, which, as above suggested, probably represents that species. The most important points of difference appear to be as follows:—In *U. pleurostigma* the snout is much longer, due to the backward position of the eye, which lies wholly in the posterior half of the head; in *U. brandesii* the eye is but little out of centre. The barbels in Bennett's species do not reach beyond the angle of the preopercle; in Bleeker's they extend far beyond it. In colouration both species agree in having a black blotch on the lateral line, followed by a light one, but the former is very much larger in *U. pleurostigma*. This latter species has also the black mark at the base of the second dorsal fin, and the basal half of the fin itself black, also black marks on the caudal, none of which occur in *U. brandesii*.

NOMEUS GRONOVII, *Gmelin.*

Included in Mr. Farnell's collection is an example of this widely distributed pelagic form. In 1894, I first recorded it from the coast of New South Wales;[6] since this time I have had several examples from Maroubra Bay, and have myself seen it there. It is not infrequently left in the rock-pools after the tide has receded. It swims very leisurely, and seems to be incapable of making the sudden darts so common with most fishes; when moving gently in the water, the dark-coloured ventral fins are extended, and the long tail with its slender peduncle, wriggled from side to side. This action, in conjunction with the narrow elongate body, so greatly resembles the movements of a Lizard in water that on first seeing the fish, my colleague, Mr. T. Whitelegge, thought it was a Skink that had fallen into the rock-pool. He tells me that, on a second occasion, he was similarly deceived.

It is noticed that *Nomeus* is only found on our coast when the Portuguese Men-of-war are driven ashore, and this is quite in accord with the known habit of the fish in swimming beneath the *Physalia*. These latter are slow moving organisms, dependent on wind and wave for conveyance, hence any associate would need but the slightest power of locomotion in order to keep the pace

6 Waite—Proc. Linn. Soc. N.S.W., (2), ix., 1894, p. 219.

and direction of its companion. Goode and Bean write[7]:—"The large fan-shaped ventrals are used as support in resting on the bottom, and in swimming they are generally closed in their groove unless the fish is moving leisurely, when they may be partly expanded." If the ventrals are fully operative only when the fish is resting on the bottom they can, considering the truly pelagic habit, be of little service. In the Sargossa sea, where the species abounds, a resting-place would be afforded by the weed, but elsewhere, the coasts excepted, no support would be encountered. As the ventral fin of *Nomeus* by its large size is perhaps the most striking character of the fish, it must have a more important function than an adaptation to a condition in which it would, by the remotest chance, find itself.

That the fish should extend its fins when on the bottom of a rock-pool can only be regarded as an unnatural attitude, such as a caged animal might assume, the fish not previously having encountered bar to its downward progress.

The relationship which exists between *Nomeus* and *Physalia* is a very curious one, and invites speculation as to the advantage of the association. A similar partnership is known between Fishes and Medusæ. The benefit must primarily be with the fish, for it is a voluntary agent, whereas the *Physalia* has no power of locomotion. If the fish secures safety from its enemies by entering the area embraced by the deadly tentacles of the *Physalia*, which attain a length of ten to twelve feet, it must be immune to their influence; a remarkable condition considering that, as I have previously recorded, small fish have often been seen in their stomachs and entangled in their tentacles.[8]

Garman[9] seems to consider that there is no such immunity:—"On several occasions Physaliæ have been taken with partially digested Nomei in their grasp, which would indicate that the little fishes were sometimes preyed upon by the 'men-of-war.'"

It has yet to be shown that the partially digested Nomei were not ejected by other fishes before entering the grasp [tentacles] of the *Physalia*, digestion being performed by the stomach and not by the tentacles.

Goode and Bean, in the work already quoted, inform us that ten individuals were taken in a dip-net, from the deck of the "Albatross," off the Florida coast, all swimming under one Portuguese Man-of-war.

It is probable that, in addition to protection, the fish derives its food from association with the *Physalia* much as does the Remora in accompanying a Shark. The *Physalia* doubtless

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7 Goode and Bean—U.S. Nat. Mus., Bull. Oceanic Ichth., 1895, p. 220.

8 Waite—Aust. Mus. Mem., iv., 1, Fishes, 1899, p. 15.

9 Garman—Bull. Lab. Nat. Sci. Iowa, 1896, p. 81.

paralyses many more animals than it can consume—the residue falling to the lot of the fishes, which, as already noted, may be present to the number of ten.

Apogon norfolcensis, *Ogilby.*

Apogon norfolcensis, Ogil., Proc. Linn. Soc. N.S.W. (2), ii., 1887, p. 990.

(Plate vi.)

The specimen figured, of the natural size, is the largest of five examples received from Mr. Farnell per the Fishery Commissioners.

Thalassoma umbrostigma, *Rüppell.*

Julis umbrostigma, Rüppell, Neue Wirbelt. Fische, 1837, p. 11, taf. 3, fig. 2.

This species, of which we have received an example 122 mm. in length, has not been previously recorded from Australian waters. The nearest published locality to Lord Howe Island is Aneiteum, in the New Hebrides, whence there is an example in the British Museum. Should the published colour illustrations of the species be accurate, it must vary considerably; our example is generally green, which is also the hue of the longitudinal markings on the dorsal and anal fins. The dark body markings are more nearly represented by the figure of Eydoux and Souleyet,[10] than by that of Bleeker.[11]

Iniistius cacatua, *sp. nov.*

(Plate vii.)

All the fishes sent to the Trustees from Lord Howe Island by Mr. W. S. Thompson in August last, have, with one exception, been already recorded.

This fish, a labroid, belongs to the Novacula group, and to the restricted genus *Iniistius*, Gill, which differs from *Xyrichthys* only by having the two anterior dorsal spines produced and entirely separated from the other portion. The following species seem to enter the genus:—*Xyrichthys pavo*, Cuv. & Val. (the type); *Iniistius mundicorpus*, Gill; *Novacula tetrazona*, Bleek.; *Xyrichthys dea*, Schleg.; and *Novacula aneitensis*, Günth. The two latter, however, scarcely satisfy the definition of the genus.

Novacula kallosoma, Bleek., has features which also ally it with *Iniistius;* indeed, if the various divisions are worthy of name, they are scarcely entitled to more than sub-generic rank, while, as Jordan remarks,[12] "It is not unlikely that it will be found necessary to unite *Iniistius*, *Hemipteronotus*, *Xyrichthys*, and *Xyrula* into one genus, as Günther has done. In this case the name to be used is *Hemipteronotus*, not *Novacula* nor *Xyrichthys*."

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10 Eydoux and Souleyet—Voy. Bonite, Poiss., pl. vi., fig. 2.

11 Bleeker—Atlas Ichth., taf. xxxiv., fig. 2.

12 Jordan—Report U.S. Comm. Fish, 1887 (1891) p. 662.

For reasons stated below, I regard the Lord Howe Island example as the type of a new species. It may be characterised as follows:—

D. ii. vii. 12. A. iii. 12. P. 10. V. i. 5. C. 11 + 4. L. lat. 21 + 6. L. tr. 3 + 10.

Length of head 2·9, height of body 2·4 in the total length (caudal excluded). The eye is 5·6, the pectoral 1·4, and the central caudal rays 2·57 in the length of the head. The height of the head, which is trenchant above, is equal to its length, and its anterior profile very steep. Jaws equal, each with a pair of canines anteriorly, followed by a single series of rather spaced conical teeth to the number of 9 – 10. The eye is set high on the head, leaving the cheek deep. The body is deep and compressed, the height of the caudal pedicel slightly more than its length behind the last dorsal ray, or 2·2 in the length of the head.

The first two dorsal spines are widely and entirely separated from the remainder of the fin; the anterior spine, which measures 1·5 in the length of the head, arises on the occiput slightly behind the eye; the second spine is two-thirds the length of the first; the third spine is one-third the length of the first, and the fin gradually increases in height, the last ray being rather more than half the length of the first spine, and reaching the base of the caudal rays.

The first anal spine stands beneath the twelfth scale of the lateral line, and is little more than half the length of the third, which equals the third dorsal. The fin terminates a little posterior to the end of the dorsal.

The pectoral is 1·4 in the length of the head; its upper ray is broad and strong. The ventral is somewhat shorter, but its first ray, which is produced beyond the others, attains the length of the pectoral; its spine is weak, equal to the ninth dorsal in length. The caudal is rounded posteriorly.

Scales.—The head is naked with the exception of two or three rudimentary scales at the hinder margin of the orbit. The lateral line is placed on the third row of scales below the dorsal fin, is interrupted on the twenty-first scale, but continued three rows lower, along six scales in the median line of the caudal pedicel.

Colours.—After immersion in spirits for two or three weeks the general ground tint is a dirty cream There is a dark bluish line down the centre of the forehead and on the preopercle from below the eye, running obliquely backwards and downwards, a dark grey mark, relieved by light blue lines, which in part become broken up into dots. The hinder part of the opercle is similarly tinted and ornamented. Three dark vertical bands encircle the body, the first from the spinous dorsal to behind the origin of the ventral, the second from the anterior dorsal rays to the corresponding part of the anal, and the third connecting the posterior part of these fins. These bands are as wide as, or slightly wider than the interspaces, embracing from three to five scales. There is also a dark band at the base of the caudal rays ; this is connected with the last body band by a less indistinct median streak. Each scale has a broad, slightly darker margin, immediately within which is a vertical line of light blue. This line is much broader on the scales, covered by and above the pectoral, and on the ground colour posterior to this fin is a large sulphur-yellow blotch. Beneath the sixth and seventh dorsal spines, on the row above the lateral line, two scales have the margin quite black, and the light blue lines within are very broad ; they thus form a conspicuous feature. The first dorsal, or occipital fin is of bluish grey colour, its membrane diagonally crossed by dark green lines, and its filamentous portion black. The dorsal proper is greenish, with darker margin, and a blue submarginal band ; below this is another darker broken band, which gives off irregular diagonal lines to the base of the fin. The anal is reddish at the base, greenish towards its free edge ; it has a dark margin and blue intramarginal band, within which are a number of blue spots. The first ray of the pectoral is light, followed by a dusky streak, which suffuses the posterior margin of the fin, leaving the lower base pale. The ventral is bluish-grey, has a dusky margin, and the produced portion of the first ray black. The caudal is greenish, and the markings are similar to those of the anal, a broad dark margin and some blue spots within ; the upper and lower rays are also blue.

Total length 320 mm.

The intestines contained small shells, including a *Trochus*, pieces of coral rock, and bladders of a seaweed *(Sargassum)*.

A consideration of all the characters leads me to regard this specimen as allied to, but distinct from, the fish obtained on the coast of California, and described by Gill as *Iniistius mundicorpus*.[13] Not having the original description, my comparison is made with the account published by Jordan and Evermann,[14] from which it will be seen that some differences occur in the relative proportions, particularly of the pectoral fin. The American examples taken at Cape San Lucas (at the entrance to the Gulf of California) and the adjoining coast of Mexico, do not exceed eight inches in length, whereas ours measures nearly thirteen inches.

In deciding to regard this fish as distinct from *I. mundicorpus*, I have also been influenced by a consideration of geographical conditions. Unlike the surface or deep-sea fishes, which have

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13 Gill—Proc. Acad. Nat. Sci. Phil., 1862, p. 145.

14 Jordan & Evermann—U.S. Nat. Mus., Bull. 47, 1896, p. 1620.

wide distribution, members of the Labridæ usually inhabit rocky shores, and are frequently very local. An exception is when a species occurs in an island studded area, for by numerous short journeys it may stray from shore to shore, and so spread itself over an extensive ocean. We can so explain the wide distribution of many coast fishes in Polynesia.

Between the eastern fringe of this island-area and the western coasts of America is a great expanse of open sea; it does not possess an island which a shore fish might use as a stepping-stone to the land beyond. We should thus expect to find—and experience teaches us this is so—that few but the pelagic and bathybic forms traverse this unbroken oceanic area.

Another bar to the shore-fishes, and to a certain extent the pelagic forms also, is the Antarctic drift of cold water, named Humbolt's current, which flows northward along the American coast.

The Novacula Labroids are subject to considerable variation in colour, and the sexes of the same species may be of quite different colouration. Thus, while the males of *I. mundicorpus* are strikingly ornamented, the females, first described, are quite plain.

The only specimen we possess of *I. cacatua* has been partially gutted. I am, therefore, unable to determine the sex.

SCARUS PYRRHOSTETHUS, *Richardson.*

Pseudoscarus, sp., Ogilby, Aust. Mus. Mem., ii., 1889, p. 22.

A specimen, 350 mm. in length, is identified by Mr. Whitelegge with the large example (26 inches) taken by the Museum party and recorded as *Pseudoscarus sp.* This fish was not preserved.

Notwithstanding the difficulty and consequent uncertainty of satisfactorily determining members of the Scarinæ, I have no doubt that our example is correctly referred to *Scarus pyrrhostethus*, Rich.

Of *Pseudoscarus* Jordan and Evermann write[15]:—"This genus differs from *Scarus*, as here understood, chiefly in the deep green or blue colour of its highly modified jaws and teeth." This feature, if unsupported by other characters, seems rather slight for generic distinction and presupposes that the teeth are naturally coloured, and not stained by some particular coral or seaweed upon which the fish may habitually feed. The teeth of the Port Jackson Shark *(Heterodontus philippi*, Lacépède), are usually of a purplish hue, due to the habit of feeding upon the Echinoderm *(Centrostephanus rodgersi*, Agassiz), the handling of whose spines at once stains the fingers their characteristic colour. If admitted, it necessitates the removal of *S. pyrrostethus* from *Pseudoscarus*, where it was placed by Bleeker.

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15 Jordan and Evermann—*Loc. cit.*, p. 1655.

CHÆTODON TRICINCTUS, *sp. nov.*

(Fig. 12).

D. xii. 20. A. iii. 17. V. i. 5. P. 16. C. 17. L. lat. 40. L. tr. 14 + 26.

Length of head 3·1, height of body 1·25 in the length (caudal excluded). Diameter of eye 2·8, and length of snout 4·5 in that of the head. Interocular space very slightly convex, equal to the diameter of the eye. Preopercle denticulated. Body short, deep, and strongly compressed. Dorsal fin high, the spines very strong, the sixth the longest, it equals the head in length. The anterior rays are longer than the hinder spines, and the longest ray is a little shorter than the longest spine. The first anal spine is weaker, but longer than the first dorsal; the second is the longest and strongest, equal to the third dorsal or 4·5 in the length of the

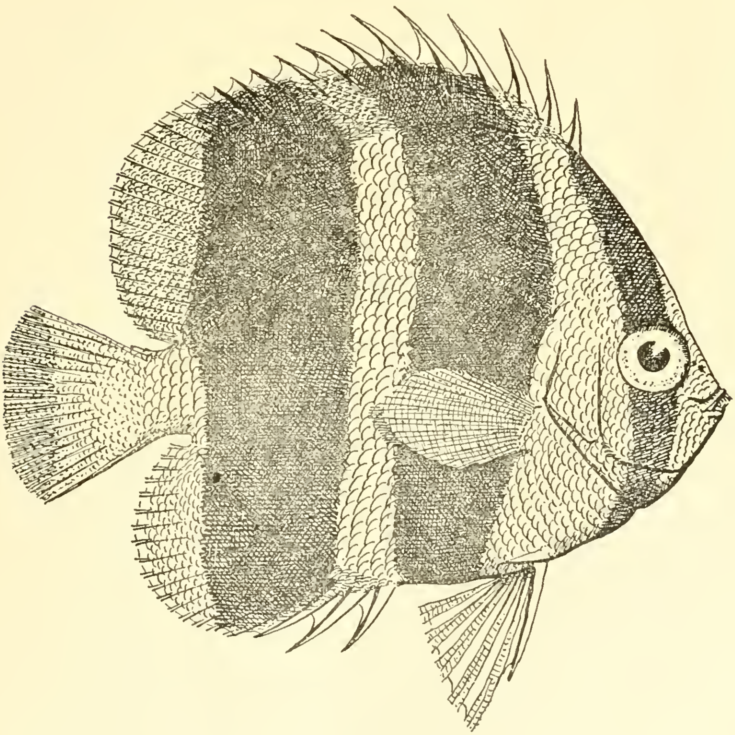

Fig. 12.

head; the rays are similar to, but lower than those of the dorsal. The ventral spine is as long as, but weaker than the second anal; the rays reach to the base of this spine; the pectoral is of the same length. The caudal is rounded and is a trifle shorter than the head. The lateral line forms an even curve from the opercle to the end of the dorsal, where it terminates at the juncture of the fin with the caudal peduncle. The scales of the upper part of the body do not form an angle with those of the lower part.

Colours.—The ground colour is yellowish in spirits, vertically and entirely crossed by three broad black bands; the first (the ocular) embraces the base of the first dorsal spine, passes through the eye, and obliquely backwards on to the chest. The second is twice the breadth of the first; it arises from the 4 – 8 spines, and with a forward sweep attains the lower profile between the ventral and anal fins, being narrower below than above. The third band is equal in breadth to the second, and is of uniform width; it commences on the tenth spine, and leaving a band of the ground colour, an eye-diameter wide, reaches the base of the third anal spine. The caudal has a faint terminal band, convex anteriorly; the paired fins are without markings.

Length of specimen 97 mm.

This *Chætodon* was obtained by Mr. T. R. Icely, formerly Visiting Magistrate, in August, 1894. I was unable to find it for inclusion in my first "Additions to the Fish-fauna of Lord Howe Island,"[16] but having since recovered it, furnish the above description for the present contribution.

Other three Chætodontoids have been recorded from the island, these are:—*Chætodon strigatus*, Cuv. & Val.; *C. aphrodite*, Ogil.; and *Chelmo truncatus*, Kner.

MONACANTHUS HOWENSIS, *Ogilby.*

(Plate viii.)

To the present time this species was known from a single specimen, the type. I am pleased, therefore, to be in a position to record a second occurrence. The original example, which I now have before me, measures 200 mm. in length; the recent specimen is smaller, being 177 mm in length. Its colour is well preserved in formaline; this enables me to correct and supplement the original description, and to give a reliable figure of the species.

The general colour of the body is bluish-grey, with rather small white spots disposed regularly all over, the upper surface of the snout excepted (these spots are probably pale blue in life). The lower half of the body, behind the pectoral fin, has black spots also, equal in size to the white ones, but more irregularly spaced.

16 Waite—Aust. Mus. Rec., iii., 7, 1900, p. 193.

The lips are white, with black margins. The dorsal and anal fins are colourless, each with three dark marks at its base; the anterior is the broadest, the posterior the narrowest; these respectively pass on to the body, and tend to form bands, but are soon lost; complete bands would possibly be traceable in young examples.

The membrane of the caudal is black; the rays are grey, crossed by two curved grey bands of which the posterior is the narrower.

SILLAGO CILIATA, *Cuvier & Valenciennes.*

The examples received are young, and differ from any specimen I have seen on the mainland in having faint oblique markings above the longitudinal yellow line. These marks recall *S. maculata*, Quoy and Gaim., but the general features, and in particular the smaller number of anal rays, and fewer scales on the lateral line, unquestionably point to *S. ciliata*.

This is the first *Sillago* recorded from the island.

ANTENNARIUS COMMERSONII, *Lacépède.*

The example now recorded was received from the island in August, 1894, in company with the *Chætodon* above described, but for similar reasons a notice of its occurrence has been delayed. Günther has lavishly illustrated this species, and shown how extremely it varies in colouration and pattern.[17]

Our specimen, which is a very fine one, measuring 260 mm. in length, is to be at once identified with Bleeker's *A. moluccensis*, and with one or two trifling exceptions, might have been the one from which his drawing was made.[18]

This is the second member of the genus recorded from Lord Howe Island, Ogilby having identified *A. coccineus*, Lesson and Garnot, therefrom.

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[17] Günther—Fische der Südsee, v., 1876, p. 163, pl. c.-cvi.

[18] Bleeker—Atlas Ichth., v., 1865, p. 17, pl. cxcvi., fig. 2.

DESCRIPTION OF A NEW HERMIT CRAB *(CALCINUS IMPERIALIS)*, FROM LORD HOWE ISLAND.

By Thomas Whitelegge, Zoologist.

(Plate ix.)

This fine handsome species is fairly common at Lord Howe Island. It is generally found at or about low tide line, inhabiting the shells of *Turbo imperialis*, Gmelin. Numerous examples were obtained during the visit of Mr. R. Etheridge, Junr., Mr. J. A. Thorpe, and the writer, in 1887. These specimens appeared in the report on "Lord Howe Island: Its Zoology and Physical Characters,"[1] under the name of *Calcinus elegans*, Milne-Edwards, the error arising from a comparison with a wrongly named example in the collection. Since 1887 many specimens have been received from the same region, and about three years ago I obtained a living specimen at Maroubra Bay, near Sydney. During the visit of the "Thetis" to Lord Howe Island in March, 1898, Messrs. Etheridge and Waite secured six examples, two of which are selected for illustration and description.

Owing to the difficulty of adequately representing Crustacea by means of drawings, it was determined to reproduce the *Calcinus* by the collotype process. I took the photographs, and avoided shadows by mounting the crabs on a sheet of clear glass, placing a piece of opal glass some distance behind it. A little adjustment of the two sheets to the source of light threw the reflected shadows quite out of the field.

The reproduction and printing by Messrs. Morgan and Kidd, of London, leave nothing to be desired.

Calcinus imperialis, *sp. nov.*

(Pl. ix., figs. 1 – 2*d*.)

Anterior region of carapace strongly calcified, convex, smooth and closely punctate, with a few scattered setæ arising from shallow pits. There is a well marked Y shaped impression, the base of which reaches to the cervical groove, and the apices are bounded on each side by a short oblong depression. The front has a slightly thickened border, which extends on each side of the well-defined rostral process to a point between the insertion

[1] Austr. Mus. Mem., ii., 1889, p. 36.

of the eyestalks and the outer antennæ. Externally the front slopes away to subacute angles, and the sides have an angular ridge which extends about half way towards the cervical groove.

Posterior region of carapace membraneous, with six longitudinal depressed lines; the central pair is rather wide apart, and gradually converges, becoming deeper and wider posteriorly; the other two pairs are closer together, and are situated midway between the median line and the margin, posteriorly they diverge and terminate at the densely hairy hinder border. At the sides anteriorly there are several faint transverse linear depressions.

Ocular peduncles stoutish at the base and slightly thicker at their apices than in the middle. In length they are equal to the anterior region of the carapace. Eyes black, with a slight descending lobe on the external aspect. Ocular scales thrice as long as broad at the base, terminating in a small distinct spine, and with one or two minute ones on the external apical border.

Peduncles of the internal antennæ a little shorter than the eyestalks ; the latter are about one-third longer than the peduncles of the outer antennæ.

The external antennæ bear a few stiff setæ near the base ; the first joint almost reaches to the external angle of the front ; the second joint is short, stout, and bears two spines on the superior distal angles, the outer of which is large and bispinose at the tip ; the penultimate joint is about equal to the second ; there is a small spinule on its superior distal end. The ultimate joint is nearly equal to the three preceding combined. The antennal acicle reaches to, or slightly exceeds the extremity of the third joint ; it is armed on its inner border with four or five spines, and is bi- or trispinose at the apex.

Flagellum twice as long as the peduncle.

The ischium joint of the left chelipede of the male is laterally compressed, and bears a bead-like lobe on its lower edge, near the distal end, in half grown examples this lobe is scarcely indicated. Merus joint trigonous as broad as long ; the external and internal surfaces are convex, smooth, glossy, and very distinctly punctate ; the lower distal margin is deeply excavated, and adapted to the shape of the carpus, upper border acute, smooth to within a short distance of the distal end, which bears a few spiniform granules. A well defined transverse, subdistal groove extends from a point posterior to the articulation with the carpus on the external surface, and is continued on the inner surface to the junction with the ischium. Lower border short acute, with one or two spinules about the middle.

Carpal joint broader distally than the length of the upper border ; lower distal margin transversely produced into a thin plate, so that the base of the hand, when the chelipede is bent down, is almost in contact with the merus.

Superior surface and the upper border exhibits three or four irregularly disposed spinose tubercles, internal surface and inner distal margin smooth; outer distal margin with eight or ten spines.

Hand compressed, about one third longer than deep, upper border crested and bearing four or five spines, lower border thin, curved, and denticulated throughout its length, the proximal denticles being larger than the distal. Inner surface of palm convex, centrally smooth, slightly punctate and scaly above; with a large drop-like tubercle near the lower border posteriorly, and a series of small tubercles extending towards the lower finger. Outer superior aspect of palm longitudinally concave, rugose and slightly setose, with three or four tubercles; central region, lower surface and both fingers covered with closely arranged circular granules. There is a deep broadish pit at the base of each finger, and another immediately behind the interdigital space; the lower proximal portion of the palm also exhibits a depression in which the granules are arranged in transverse ridges.

Inner edge of lower finger excavated, armed with five or six unequal denticles, and a broad white cusp at the extremity.

Upper finger with a granulose crest superiorly, and a strong longitudinal ridge on the external surface; inner edge with a broad, acute apical cusp, and three denticles of which the proximal is the largest.

The right chelipede differs from the left in its smaller size, higher crest on the hand; and in the pits, on the palm and fingers being less marked.

Merus joint of first ambulatory leg strongly compressed about twice as long as deep, with thin almost acute upper and lower borders; a small white spinule is present near the external distal angle. Carpus two-thirds the length of the merus, outer surface angular, inner convex, lower and upper borders somewhat rounded; the superior surface carries two spinules, one projects from the distal margin, and the other is situated on the inner aspect, about its own length from the median line and also from the margin.

Propodus subcylindrical, a little shorter than the merus; there is a small spinule on the inner distal margin. Dactylus tapering, slightly compressed, about equal to the carpus in length, with three or four horny spinules on the lower border, and a stout black spine at the extremity. Second ambulatory leg with all joints more or less compressed, and shorter than those of the first. The carpus lacks the prominent angle, and is proportionately much deeper than that of the first leg. The dactyli have each five horny spinules on the lower border; on the left they are reduced to mere rudiments. Lower borders of ambulatory legs with numerous tufted setæ; on the sixth and seventh joints of the second pair the setæ are closely arranged in two rows. The penultimate segment of the abdomen bears a ⊤ shaped impression; the telson is symmetrical, about one third wider than long, with a broad emargination, and a superior distal linear groove about 0·5 mm. in length.

The colour is as follows, taken from the living specimen obtained at Maroubra Bay, and supplemented from the figured examples:—

Anterior region of carapace olive, spotted and margined anteriorly with azure blue. Ocular peduncles and external maxillipedes olive green. Inner antennæ greenish-yellow. External antennæ chrome yellow. Granulation on chelipedes French gray, the spines purplish-blue. Hand brownish-olive, upper finger with two deep red spots, one on each side near the base. The ambulatory legs have the carpal joints dark brown; the propodal joints have an olive-green band at the base, a dark brown central band, and the distal extremity is yellowish-white. Dactylus white with a central dark-brown band.

Total length of body of larger example 65 mm.

OCCASIONAL NOTES.

I.—APERTURE OF *CONULARIA*.

In 1873 I called attention[1] to the inflection of the distal end of the shell in *Conularia*, whereby the four faces of the pyramid are uniformly inflected and bent down, but do not meet in the centre of the truncated end. A quadrangular opening is then left, with the four corners forming re-entering grooves, which join the angles formed by the union of the conical sides of the shell.

In a collection of fossils recently acquired by the Trustees is a small example of *C. lævigata*, Morris, from the Lower Marine Series of Ravensfield, New South Wales, in which there is an indication of a similar inturning of the distal margins, but not as perfectly preserved as in the Scotch fossil just referred to.

Another instance is figured by Mr. R. M. Johnston. A very fine *Conularia* is termed by him *C. tasmanica*,[2] from the Bridgewater Limestones of the Lower Marine Series of the Tasmanian Permo-Carboniferores, in which the terminal sides are also to some extent inturned.

A further exemplification of this distal inturning is shown in a specimen of *C. undulata*, Conrad, from the *Conularia*-beds of Bolivia, by Dr. A. Ulrich.[3] In this case there is an absence of the bilateral symmetry observed in the distal end of the Scotch and New South Wales examples. Three of the inturned faces meet at the centre, but the fourth not so. The two faces of the longer diameter of the shell are equal, but those of the shorter diameter are not equal to the former, nor to one another.

R. ETHERIDGE, Junr.

[1] Etheridge—Geol. Mag., 1873, x., (1), p. 295.

[2] Johnston—Syst. Acc. Geol. Tas., 1888, pl. xx., fig. 1.

[3] Ulrich—Steinmann's Beiträge Geol. Pal. Südamerika, 1892, i., p. 32, pl. iii., fig. 6*a*, 6*b*.

II.—FISHES.

Bascanichthys pinguis, *Günther.*

We have received from Mr. C. Chute, an Ophichthyian Eel taken at Rose Bay, on the southern shores of Port Jackson. It is of the genus *Bascanichthys*, Jordan and Davis, and without doubt identical with *Ophichthys pinguis*, Günther.[1] On mentioning this to Mr. J. D. Ogilby, he suggested that his *Bascanichthys hemizona*,[2] might also be the same species : together we made the necessary comparison, and found it to be so. Mr. Chute's specimen is therefore the second record for Port Jackson. The species will be known as *Bascanichthys pinguis*, Günther, the type of which was described from the Solomon Islands.

Monacanthus mosaicus, *Ramsay & Ogilby.*

In November last, Mr. J. A. Boyd, of Eden, Twofold Bay, wrote:—"I send you two dried Leatherjackets caught in the lake here. Neither I, nor a couple of other old fishermen, have seen anything like them before." These, I find, to be *M. mosaicus*, which has its distribution thus extended considerably southward, attaining almost the limits of the State. It was previously known only from Port Jackson, and off Wati Moli whence an example was trawled by the "Thetis" Expedition.

Mr. Boyd's remarks support the conclusion that it is a rare species on our coast; and in reply to my queries he further writes:—"Lake Curato, like most of the coastal lagoons, is sometimes closed and at others open to the sea. For the last nine months it has been open, but the mouth is getting very shallow. The fish seems rare here, for though I have made many hauls, I got but one in the seine, the other was taken in a meshing net."

Prototroctes maræna, *Günther.*

Of this species, known from Tasmania and Southern Victoria, we have an example taken in New South Wales. It was obtained for us in the Snowy River, near Mount Kosciusko, by our generous donor Mr. A. M. N. Rose.

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1 Günther—Cruise 'Curacoa,' 1873, p. 430, pl. xxxv.

2 Ogilby—Proc. Linn. Soc. N.S.W., xxii., 1897, p. 248.

Hemitautoga centiquadra, *Commerson*, MS.

Labrus centiquadrus, Lacép., Poiss., iii., p. 493.

This species is represented in the collection by two examples taken some years ago in Port Jackson and registered as *Julis, sp.* It may be more familar under the name *Platyglossus hortulanus*, used by Günther,[3] but why *hortulanus* should be chosen in preference to *centiquadra* is not clear. The latter name occurs in Lacépède's work, on page 493, where it is accompanied by a description; the former on page 518 (not 516, as rendered by Bleeker, Günther, and Day), without description.

This species ranges from the Indian Ocean, through Malaysia to the Pacific, and though not previously recognised from Australia, will doubtless also be found on the northern coasts.

Lethrinus opercularis, *Cuvier and Valenciennes.*

An example taken in Port Jackson introduces this species to the fauna of the State. It has been recorded from Lord Howe Island.

EDGAR R. WAITE.

[3] Günther—Brit. Mus, Cat. Fish., iv., 1862, p. 147.

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RECORDS

OF THE

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FEB 1902

REPORT ON SPONGES FROM THE COASTAL BEACHES OF NEW SOUTH WALES.

By Thomas Whitelegge, Zoologist.

Introductory Note.

[In August of last year (1900), the Trustees received from the Fishery Commissioners a very large donation of Sponges from the coast of New South Wales. The collection was made by the various Inspectors of Fisheries stationed on the sea-board, and the object in view was to ascertain the number suitable for commercial purposes, or that might be rendered suitable by cultivation.

After Mr. Whitelegge had made a preliminary examination, I became so convinced of the high importance of the suggested investigation, that I recommended he should discontinue the work on which he was at the time engaged—the description of the Crustacea of the "Thetis" Trawling Expedition, in itself a highly important piece of work—and solely confine his attention, for the time being, to the elaboration of the Sponges in question; this was at once approved of.

Throughout his labours I was kept well informed of the difficulties Mr. Whitelegge encountered, and on several occasions have consulted with him on intricate and debatable points. To arrive at anything like a satisfactory result, no other method than that adopted by him would have been successful. At the inception of the undertaking neither of us for a moment foresaw the amount of labour or trouble that the investigation would entail, through the unsatisfactory nature of previous researches on the Sponges of New South Wales.—R.E., Jnr.]

The collection consists of about six hundred and thirty specimens; of these forty belonged to the commercial class, representing about twelve species and varieties, seven of which may be regarded as having an economic value.

In Dr. von Lendenfeld's Monograph of the Horny Sponges,[1] there are sixty-one species and varieties enumerated under the genera *Euspongia* and *Hippospongia*, both of which furnish the sponges of commerce. Of the sixty-one forms, thirty-five are recorded as occurring in Australasian waters, and seventeen of these are recorded for New South Wales; the remainder are chiefly confined

[1] Lendenfeld—Mon. Horny Sponges, 1889.

to North and West Australia. Of the thirty-five forms mentioned, six are identical with the bath sponges usually sold in Sydney; three of which are stated to occur on the New South Wales coast. These are as follows:—*Euspongia discus*, D. & M.; *E. zimocca*, Schulze; and *Hippospongia equina*, var. *elastica*, Lendenfeld. To these may be added *Euspongia illawarra*, sp. nov.; *E. irregularis*, var. *areolata*, var. nov.; *E. irregularis*, var *silicata*, Lendenfeld; *E. irregularis*, var *dura*, Lendenfeld; and *Hippospongia mollissima*, Lendenfeld. These eight forms are all represented in the collection except *E. zimocca*, Schulze; the first three can be purchased at any dealer's store in Sydney, and the remaining five are fairly common on the coast. Of the latter, from an economic point of view, *Euspongia illawarra* is the most important, being quite equal, if not superior, to many of the kinds used for domestic purposes. The texture is soft, elastic, tough, and durable, and the main fibres are entirely free from foreign bodies, such as sand grains and spicule fragments, which are invariably present in fibres of the imported bath sponges. In Dr. Lendenfeld's tabular lists enumerating the contents of the main fibres, only four out of a total of sixty-one forms are given as being free from foreign bodies, but these are not noted as being of economic value:—

Euspongia irregularis, var. *areolata*, var. nov.—This is moderately tough, soft, and highly elastic, but it is very irregular in habit, and only a small proportion of the specimens could be utilized for domestic use.

E. irregularis, var. *silicata*, Lendenfeld.—This variety is very tough, rather hard, and strongly elastic; but, notwithstanding its hardness, it would be highly valuable for the washing of vehicles and for use in the stable.

E. irregularis var. *dura*, Lendenfeld.—This form is usually very hard, but many of the larger flabellate examples are fairly soft, very tough, and they would be suitable for many purposes, the texture being very even, close, and fine.

Hippospongia mollissima, Lendenfeld.—This species is about equal or slightly superior to *H. equina*, var. *elastica*, in value, being somewhat closer and finer in texture.

It is thus evident that at least eight species and varieties, which are valuable commercially, occur on our coast; and if systematic investigation were instituted, no doubt many other forms of equal or superior value would be discovered. It must be remembered that the Sponges herein dealt with were obtained on the various beaches along the coast, specimens that had been washed ashore during heavy gales, and in many cases water-worn or dried with a considerable proportion of the animal matter remaining around their fibres, which has the effect of rendering them hard and very often incompressible.

It will be seen from the preceding remarks that there are certain commercial sponges in our coastal waters, and that others are procurable from North and West Australia; possibly a supply might also be obtained from the various Pacific islands.

In prospecting for useful sponges, many preliminary details would have to be carefully attended to: such as ascertaining the best localities for obtaining them, the habit, size, and colour, and the depth and situations in which they occur. If a favourable sponge ground were located, it would be necessary to select a series of living examples, some for preservation in the flesh, and others to be macerated and made into skeletons, so that any given species or variety could be easily recognised in either condition, by comparison with well prepared specimens.

When a thorough knowledge of the habitat and characteristics of any useful sponge is acquired, means might be taken to ensure its increase both in size and in number of the individuals. This could be accomplished by the judicious weeding of the ground, and removing all organisims which might enter into competition with the sponge for food, or interfere with its growth in any way; while at the same time such weeded spaces would afford opportunities for young sponges to settle down under favorable conditions, provided the weeding process did not actually diminish the number of organisms which contribute to the nutrition of the sponge: the latter phase of the question can only be decided by practical experiments.

Young specimens, attached to small stones or other objects, might be transplanted to positions that would favour rapid growth, either on the spot, or to remote localities, if proper means were taken to protect the sponge against injury in transit. The transplanting of living sponges has been successfully accomplished in various parts of the world, and the possibility of cultivating them artifically and profitably fairly proved. The results of these cultural experiments have been published, and the following is a brief summary of the contents of some of the reports on the subject:—

According to Mr. E. J. Allen,[2] Filippo Cavolina pointed out in the year 1785 that sponges could be transplanted from their original place of attachment, and that they were "capable of fixing themselves and continuing their growth."

In 1862, Prof. Oscar Schmidt called attention to the fact "that if a perfectly fresh sponge is cut into suitable pieces, and if these pieces, properly protected, are again placed in the sea, they will grow and finally develop into complete sponges.

2 Allen—"Report on the Sponge Fishery of Florida, and the Artificial Culture of Sponges," Journ. Mar. Biol. Assoc. United Kingdom, (n.s), iv., 1896, pp. 188-194.

In 1863, experiments in sponge culture were commenced at the island of Lesina, in the Adriatic Sea, under the direction of G. Buccich. The results were fairly successful, but the experiment was discontinued in 1872, owing to the opposition manifested by the sponge fishermen. Dr. Emil von Marenzeller published a detailed report on these experiments[3] from notes made by the director. Since the latter date, many experiments have been made, both in Europe and America, of which the American culturists appear to have been the most successful.

The results of experiments in Florida are summarised by Mr. E. J. Allen[4]:—"The first trials were made at Key West, by the agent of Messrs. McKessan and Robbins," of which the following brief report was prepared: "The sponges were all raised from cuttings; the localities in which they were planted were not the most favourable for sponge development, and their growth was therefore less rapid and perfect than might otherwise have been the case. They were fastened to the bottom, in a depth of two and a half feet of water, by means of wires and sticks running through them. The four specimens sent to Washington were allowed to remain down about six months before they were removed. Fully four months elapsed before they recovered from the injury done in the cutting, and the actual growth exhibited was for about two months only. The original height of the cuttings was about two and a half inches. One was placed in a cove or bight, where there was little or no current, and its increase in size was very slight. The other specimens were placed in tide-ways, and have grown to from four to six times their former bulk. Two hundred and sixteen specimens in all were planted at the same date, and at the last accounts those that remained were doing finely."

The Florida experiments indicate a more rapid growth of the cuttings than those conducted at Lesina. In the latter locality the planted cuttings increased to about twice or thrice their original size during twelve months' growth; whilst at the former place the increase was from four to six times in six months, the actual growth taking place in two months. G. Buccich, who directed the Lesina operations, estimated that it would take from five to seven years for sponge cuttings to grow to a marketable size.

Mr. G. Bidder,[5] in summarising the Florida experiments, calculates that two and a half-inch cuttings would attain a marketable size in six months. Mr. T. Lee[6] reports that the

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[3] Marenzeller—Ver. K. K. Geol. Bot. Ges. Wien., xxxvii., 1879, pp. 687 - 694.

[4] Allen—*Loc. cit.*, p. 193.

[5] Bidder—"Notes on Projects for the Improvement of the Sponge Fisheries," Journ. Mar. Biol. Assoc. United Kingdom, (n.s.), iv., 1896, App., p. 201.

[6] Lee—U.S. Fish. Commission Report, 1886, p. 664.

Nassau fishermen say that the young sponges reach marketable size in three months after attachment. Mr. E. Lamiral[7] states that exhausted fisheries are regenerated in three years.

From the foregoing authorities it is evident that the rate of growth is subject to great variation, and no doubt this is due to local conditions, such as temperature, food supply, and the situation in which the cuttings were planted.

Mr. E. J. Allen, in a supplement to his paper already quoted,[8] published a letter, giving the results of Mr. R. M. Monroe's experiments in sponge culture. This is a very excellent report, and is worth reprinting, as it contains a full account of the methods adopted, and the results obtained.

Mr. Monroe, in his letter to the United States Fish and Fisheries Commissioners, states that he commenced work in November, 1889, "at Biscayne Bay, a place admirably adapted to such experimenting, far more so than any other place on the coast, having a greater range of bottom from the oozy marls of the inner lagoons to the hard coral reef, waters of all degrees of density, from the Gulf Stream to fresh, and currents to suit. Being already well provided with a vessel, boats, sponge-hooks, and water glasses, the question of suitable material for attaching to and sinking the cuttings to the bottom, gave some trouble, although apparently a simple problem. Saplings of white wood, which were plentiful, fairly proof against worms, and heavy enough to retain their place in tide-ways, were finally chosen. They were about twelve feet in length, with a cross-piece at one end to prevent rolling over. The cuttings were fastened to them by various contrivances, wedged into holes with pegs, wires around the pole, etc.; but the quickest, if possibly not the best, as it afterwards turned out, was short pieces of brass-wire, doubled and driven into the pole with a peculiar grooved punch, which could be done rapidly. At other stages of the experiment, I used bamboo stakes, long double lines of twisted wire, connected by cross pieces of white wood, with the cuttings inserted between the strands, also flat pieces of coral rock with drilled holes and wooden wedges. Galvanized iron in any form did not answer, especially wire, as it quickly corroded. Most of the first plantings were lost by its use; and I am inclined to condemn brass-wire on account of the possible poisonous effects of the salts formed on it, although some of the best results were obtained when it was used. Having prepared the sinkers, and hooked up sufficient sponge for several days' work, placing them in nets hung from the side of the schooner, the process was as follows:—Taking the poles or other sinker material in a small boat, two kedge anchors, a small long line, and the sponge in buckets in which the

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7 Lamiral—Bull. Soc. d'Acclim., viii., 1861 - 1863, p. 329.

8 Allen—Journ. Mar. Biol. Assoc. United Kingdom, iv., (n.s.), 1896, p. 289.

water was changed every few minutes. (In this connection, it has been generally understood that exposure to air and sun for even a few minutes was fatal to a sponge, and at first I was very careful in this respect; subsequently I found that several hours of such exposure did not hurt them to any extent; stagnant water, however, will kill them in a very short time). A cutting-board, and knife, the latter very thin and re-sharpened often, owing to the calcareous matter imbedded in the sponge. Having reached the locality which was at first selected by the natural sponge growth already on it, the two kedges are let go at either end of the long line, and by hauling along this line the planking could be kept quite regular, and when finished were marked by range stakes set up on the adjacent dry banks. The depth of water ranged from eight feet to less than one foot at low tide, at which latter depth many fine sponges are found. By use of a water-glass, the plantlings could be observed at any time without disturbing them. In cutting the sponge it was done as nearly as possible in a line with the radial circulating canals, and that each piece should have on it a part of the outer cuticle. As many were not cut in this way, and lived, it may not be at all necessary. Each piece was about one inch square on top, and somewhat more in length, coming to a point, averaging 25 to a sponge. In cutting, care was taken not to express the natural juices or milk, and quickly attaching to the sinkers, were immediately put into the water. The poles held on an average 12 pieces, placed 12 inches apart; and with one assistant I was able to plant about 200 cuttings per day. With a more suitable boat, having a well to keep the Sponge in, and another assistant, I could easily plant from 600 to 800. This work was continued, with intervals, from November, 1889, until 11th June, 1891, with various results, under all the conditions of bottom, depth, current, etc. With but few exceptions, the sponge survived the cutting process and began a good healthy growth, to be afterwards lost or destroyed in various ways. In many cases, notably one lot planted back of Elliott's Key, in 4 feet of water, on hard bottom, 75 per cent. lived, and in 6 months had doubled in size; these were mostly taken up before reaching maturity, as a gale would have swept them away, and did so with those that were left. Mature specimens were gotten from many of the other plantings, but the average loss from defective fastenings and other causes were greater. The results can be summed up as follows:—

"*Material for anchoring cuttings.*—While very many things other than those used suggested themselves in the progress of the work, I kept strictly within the limits of what was economical and practicable; therefore poles and stone seemed best suited, preferably the former arranged so as to be elevated a short distance above the bottom to avoid smothering with silt, and to avoid the coral, etc., which is apt to grow in with the sponge. Fastenings of just the right character have yet to be invented.

"*Location.*—Anywhere within the bays and lagoons free from heavy sea, too strong current, and too much fresh water, and in moderate depths for easy handling and observation.

"*Growth.*—This is faster in strong currents, but the shape is apt to be poor and quality harsh. This point, however, is not fully determined. Under favourable conditions the cuttings double their size in 6 months; consequently 18 months to 2 years will produce marketable sponge. The sheepswool sponge was the only one of the useful kinds experimented on, although a few cuttings of velvet, grass, and others seemed to thrive and do equally well. It is quite possible that with State protection to the planters, and better methods to be determined upon by further experiment, sponge culture might be quite profitable. My belief is, gained in oyster culture from spawn, is that a similar method with sponge will eventually prove the correct one; but until more is known of sponge biology, it would be useless to suggest methods, notwithstanding the fact that several points in connection with it have been, to my mind, quite clearly demonstrated."

The above clearly shows that sponges may be grown by culti vation, and that to ensure success particular regard must be given to the means by which the cuttings are attached to their support, and more especially to the locality in which they are planted. The cultivation might perhaps be more successful if means were taken to provide material for the young motile sponge to settle upon. After fixation, the material with the attached sponge could be transported to places calculated to encourage rapid growth; and in planting cuttings, it might be advantageous to fix them with the apical portion down. If suspended in this manner, the inhalent pores would be less liable to the influence of silt or mud. It is within my own experience that the finest specimens of sponges, and many other fixed organisms, are generally found suspended under stones or from the roof of caves. Under such conditions they are shaded from excessive light, and possibly have a more abundant food supply, or the inverted position gives the sponge a better chance of obtaining food. A sponge suspended from the roof of a cave or from a large stone is less liable to injury from large heavy moving objects than it would be on the bottom.

My colleague, Mr. Edgar R. Waite, informs me that during his diving experience in 1894, in search of the eggs of *Heterodontus*,[9] he noticed many sponges *in situ*. He was particularly struck

[9] Waite—Jour. Linn. Soc., Zool., xxv., 1895, p. 326.

with the fact that whenever an overhanging ledge was met with, the under-surface supported a luxuriant growth of sponges, and formed the opinion that such sheltered situations are much more adapted to the furtherance of sponge-life than more exposed positions.

Mr. J. Brice, in a Report on the Fish and Fisheries of the Coastal Waters of Florida,[10] gives an account of the sponge industry at Key West, Florida. The following quotations are from it:—"The sponge fishery is carried on with vessels of a schooner or sloop rig, ranging from five to forty-seven tons (averaging about thirteen tons), which resort chiefly to the grounds in the Gulf of Mexico; and with smaller vessels, mostly sloops of less than five tons' burden, which make most of the catch on the grounds about the keys of the southern and eastern Florida coasts. The larger vessels carry from five to thirteen men, the smaller ones from three to five. Two men go in each of the dingies or small boats from which the sponging is done, the odd man of the crew being left in charge of the vessel. . . . Sponges are taken by means of a three-tooth hook, attached to a long pole. Poles of various lengths are used, to correspond with the different depths of water in which the sponging is done. Before the depletion of the shoal grounds, comparatively short poles were employed, but as the spongers have extended their operations into deeper and deeper water, longer poles have been required, until at the present time the limit seems to have been reached in a length of fifty or fifty-two feet. . . . The only other apparatus required in taking sponges is the very simple but effective water-glass. This is an ordinary water-bucket, the bottom of which has been replaced by glass. By means of it the sponger is able to distinguish objects on the bottom with great clearness, even in comparatively deep water, and he finds it an essential article in all of the sponging now carried on, except in shallow water. One glass is the complement of each boat. While one man is steadying or propelling the boat with an oar, the other member of the crew leans over the side of the boat and manipulates the water-glass and pole, and as the sponges are brought into view by aid of the glass, he detaches them by inserting the hook beneath them and pulls them to the surface. . . When first taken from the water, the sponges are black and slimy. The essential treatment they subsequently receive before being sold consists (1) in exposing them to the action of the sun and air, on the vessel's deck, until they are killed, which usually requires several days; (2) in placing them for about a week in the 'crawls' or pens where the decay of the 'gurry' or animal matter, that began on the vessel, is continued; (3) in beating the sponges, while wet, with a wooden paddle to drive out the decomposed animal matter, and in scraping with a

[10] U.S. Commissioner's Report Fish., 1896 (1898), p. 299.

knife those sponges to which the black scum still adheres; (4) in squeezing them to force out the remaining gurry and water, and placing them on shore; (5) in threading them by means of a large needle, threaded with coarse twine, and tying them in bunches about five feet in circumference. . . . The use of the Mediterranean diving system in the Florida Sponge Fishery has been experimentally tried . . . It is reported that a thorough test of the feasibility of this method was made, and that it was found impracticable . . . The principal reasons for abandoning this attempt to introduce improved methods into the fishery are as follows:—(1) The expense of maintaining a crew of divers was out of proportion to the value of the sponges taken. (2) It is stated that sponges were not found anywhere in very dense beds, and that a hooker could secure more sponges on the same grounds and in the same time. (3) The uneven character of the bottom is reported to be unfavourable for divers. (4) The heavy and cumbrous diving apparatus had the effect of destroying the growth of young sponges—a result already observed in Europe and Turkey, and had led to the passage of a law prohibiting the use of the diving method on the sponge grounds. In 1889 a law was enacted by the Florida legislature which is still in force, forbidding the taking of sponges by diving either with or without diving suits."

The above extract from Mr. Brice's report is a very complete account of the methods adopted for obtaining and preparing sponges for the market.

Mr. P. L. Simmonds[11] deals with the economic sponge at some length, and gives a most complete history from a commercial aspect. The following statistical information is gleaned from his work:—The Florida fishery is conducted on the share-principle; the crew receives two-thirds, and one-third is allowed for the vessel, the total amount paid out per annum reaching about £48,000. At the Bahamas, "about five hundred vessels are constantly engaged in the trade, three thousand men find employment, and through it £20,000 to £30,000 sterling are annually circulated and spent in the colony." The total value of sponges imported into the United Kingdom in 1870 (no returns published since) amounted to £160,162. The above figures are quoted to show the value of sponges as articles of commerce.

In commencing the work of identification, I had serious misgivings about undertaking the task—not from any lack of material for comparison, but from the want of a series of authentically named specimens. The Museum collection is extremely rich in sponges; it includes upwards of a thousand examples from Port Phillip,[12]

11 Simmonds—Commercial Products of the Sea, 2nd ed., 1883, pp. 155-195.

12 Presented by the late Mr. J. B. Wilson, of Geelong, Victoria.

most of which are undetermined; and an equal number, dredged, trawled, or collected on the coast by the writer, and others, during the past fifteen years. The exhibition cases contain over six hundred specimens, representing about four hundred species, of which number two hundred and ninety-five belong to the type collection as named and described in the "Catalogue of Sponges in the Australian Museum,"[13] by Dr. R. von Lendenfeld. Since his departure in 1885, the Trustees have received numerous donations of sponges from various parts of Australia.

With a view to subsequent remarks, I deem it advisable to give a short account of this type collection.

During 1884–5, Dr. Lendenfeld was employed by the Trustees to write a Descriptive Catalogue of the Sponges in the Australian Museum, and a considerable portion of the work was accomplished in my presence, as the author of the Catalogue and the present writer occupied the same study. When the work of determination was concluded—just previous to his departure for Europe—Dr. Lendenfeld carefully labelled and numbered all the specimens; the dry examples had the labels tied on, and those in spirit had a black-lead label and a number placed on each bottle. From the time of his departure to the publication of the Catalogue, the collection remained undisturbed, and was under my care. Shortly after the book was issued, it was found that the published names did not agree with the manuscript names accompanying the sponges. The author, at the request of the Trustees, subsequently forwarded a numbered list with the amended nomenclature. It devolved upon the writer to add the correct names as they appeared in the Catalogue, and this was accomplished without disturbing the original labels or numbers.

In 1894, the collection was placed on exhibit; the dry examples were mounted on black wooden stands, the original label pasted underneath, and the stand numbered in accordance with the list. The specimens in spirits were in most cases mounted in the original bottles, and their contents left intact. In the process of mounting I took especial care to avoid any error or mixing of the labels. The numbers in the manuscript list and the specimen numbers were found to correspond in all cases, excepting some few which were marked with a query by the author.

In identifying sundry collections by means of the Catalogue and the Lendenfeldian types, I have found numerous discrepancies between the descriptions and the types; and in working out the Fisheries' donation I have encountered so many similar disagreements between the specimen and the description, that I regard the Catalogue as unreliable for the determination of species. A few of the more striking errors noted, may now be mentioned:—

13 Aust. Mus. Cat., xiii., Sponges, 1888.

Name.	Spicles of the fibres as described.	Kind of Spicule actually present.
Arenochalina mirabilis, Lendenfeld	oxea.	styli.
Echinonema anchoratum, Carter.		
var. *ramosa*, Lendenfeld......	oxea.	styli.
var. *densa*, Lendenfeld	oxea.	styli.
var. *lamellosa*, Lendenfeld ...	oxea.	styli.
levis, Lendenfeld	styli.	oxea.
Clathria macropora, Lendenfeld ...	oxea and styli	oxea.
australis, Lendenfeld	styli.	oxea.
Plectispa macropora, Lendenfeld ... (echinating)	spined styli.	smooth styli
arborea, Lendenfeld .... (echinating)	smooth styli.	spined styli
Thalassodendron typica, Lendenfeld	styli.	oxea.
Axinella aurantiaca, Lendenfeld ...	curved styli.	oxea and strongyla

More than half the above-mentioned forms are the undoubted types, with which I have long been acquainted, having been present when they were obtained by the trawl or dredge.

Clathria australis, Lendenfeld, really belongs to the genus *Plumohalichondria*, Carter. *Clathria macropora*, Lendenfeld, and *Echinonema levis*, Lendenfeld, are—if not identical with *C. australis*—varieties distinguished by difference in habit only. The spicules in the fibres of *C. australis* are described as "straight styli," *C. macropora* is stated to possess "oxea and styli," and in *Echinonema levis* they are described as "straight or slightly curved" styli. The types of *C. australis* (Nos. 285 – 413), *C. macropora* (Nos. 267 – 290), and *Echinonema levis* (Nos. 213 – 278 – 443), when carefully examined, were found to have the fibres cored with smooth straight oxea, without any trace of smooth styli. The descriptions of all the three forms are devoid of any reference to the numerous isochelæ present in the ground substance; and no mention is made of the abundant smooth oxea and spined styli scattered throughout the body of the sponge, and which form a dense external crust, nearly 1 mm. in thickness.

Axinella auratiaca, Lendenfeld.—The figured type of this species (No. 245), is a well preserved spirit specimen. The description states that the "skeleton consists of a dense network of slightly curved styli, measuring 0·29 × 0·007 mm., pervaded by fibres 0·1 mm. thick, composed of similar spicules in the axis." The actual figured type, when examined, was found to have the fibres composed of oxea and strongyla, and the styli were so scarce that only three were observed after prolonged search, in fact it is possible that they did not belong to the sponge but were of foreign origin. The spicules were examined *in situ*, and, after boiling in nitric acid, they were found to be as follows: Megascleres, oxea, strongyla, and styli (?).

(*a*) Slightly curved oxea, either abruptly pointed or tapering from the middle. Size—0·25 to 0·35, by 0 007 to 0 012 mm.

(*b*) Strongyla, curved or sinuous. Size—0·5 to 1·25, by 0·003 to 0·006 mm.

Thorecta ramsayi, Lendenfeld (No. 60), is a discoloured example of *Clathriopsamma lobosa*, Lendenfeld.

Holtenia pourtalesii, Schmidt (No. 188), is according to the original label in the cup of the sponge *Holtenia carpenteri*, Wyv.-Thomson, and was obtained by "H M.S. Porcupine" in 1870.

There are many other instances of errors in identification and incorrect descriptions which will be found noted in the accounts of the species. The foregoing are sufficient to show the difficulties encountered in the work of identification by means of the "Catalogue of Sponges in the Australian Museum," notwithstanding all the advantages in the shape of an immense collection for comparison, an extensive acquaintance with the types, and a general knowledge of the Australian sponge fauna. It would be much more difficult for a worker at a distance, who lacks the above advantages. Descriptions, such as indicated in the tabular list, are responsible for wrong identifications, and the augmentation of synonymy.

In proceeding with the work of determination, two courses were open—one easy, the other difficult. The former course would be to compare any given specimen with the type, and accept the name as correct, more especially when the examples compared were the exact counterpart of each other. After consultation with the Curator, I decided to follow the safe or difficult method; and in all cases I tried to ascertain the whole of the characters of the species before attempting its identification. This being accomplished, the description was consulted; if this failed to agree, then the type was examined, and critically compared with the example selected for identification. Frequently the latter had to be laid aside and a thorough examination of the type begun; and often the result involved the re-description of the latter, either wholly or in part. Upwards of one hundred and twenty of the exhibited specimens have thus been subjected to a careful microscopical examination, and many sections mounted for future use. In each case, when dealing with the Lendenfeldian collection, the specimen number has been given.

After realising the position I was placed in by the want of an authentic series of named specimens, it was decided by the Curator and myself to ask the assistance of Professor Arthur Dendy, of

Canterbury College, Christchurch, New Zealand, who very generously presented to the Trustees seventy-nine microscopic slides, representing about seventy-four species, many of which contained sections used in the preparation of his "Catalogue of Non-calcareous Sponges." Subsequently the Trustees received another instance of his generosity in the loan of about two hundred and twenty-four pieces of sponges, originally taken from Carter's specimens in the British Museum, including forty-seven types. Sections from these examples were prepared and mounted in canada balsam for future reference. The above-mentioned slides have proved of great value in the work of determination; and personally I am greatly indebted to Professor Dendy for his kindness in so promptly obliging me.

Sub-Class NON-CALCAREA.

Order MONAXONIDA, *Ridley and Dendy.*

Family HOMORRHAPHIDÆ.

Sub-family RENIERINÆ.

Reniera, *Nardo.*

Reniera dendyi, *sp. nov.*

(Plate x., fig. 1).

Sponge cup-shaped, shortly pedunculate, generally broader than high, sides more or less longitudinally folded, margin thin, acute, rarely continuous, often lobate, and sometimes exhibiting deep incisions between the lobes. Surface pretty even, harsh to the touch, minutely porous throughout, vents not evident. Texture in the dried condition hard, moderately tough and flexible. Colour yellowish cream, often tinted with red. The largest example measures 110 mm. in height, 160 mm. in breadth, and from 3 to 5 mm. in thickness. The skeleton consists of rather stout multispicular primary lines, which curve gracefully outwards and terminate in dermal tufts of spicules. The primary lines are 0·05 mm. or less in diameter, and from 0·1 to 0·15 mm. apart the secondaries are uni- or bispicular, and rather irregularly disposed. The spicules consist of oxea of two sizes:—(*a*) Short, slightly curved, subfusiform, and gradually sharp pointed. Size—0·2 by 0·01 mm. (*b*) Elongate, curved, or slightly sinuated, cylindric to within a few diameters of the rather variable extremities. As a rule, both ends are gradually and equally sharp pointed, sometimes one or both ends are subacute, and in rare cases obtuse. Size—0·6 to 0·8 by 0·01 to 0·012 mm.

Four examples; two from Lake Illawarra, and two from Tuggerah Beach.

Reniera corticata, *sp. nov.*

(Plate x., fig. 2).

This species exhibits two marked forms, simulating in this respect *Halichondria panicea*, Johnston. One is lobulate and consists of six or more erect lobes, which arise from a short peduncle; the lobes anastomose here and there, tapering above and below the middle; the surfaces exhibit a few rounded elevations. Each lobe has a large central tube, which commences at the base and terminates in a circular aperture at the summit; their diameter varies from 5 to 10 mm. The walls of the tubes are regularly perforated with oscula-like openings about 1 or 2 mm. in diameter. The dermal membrane is fine, very close, and renieroid in texture; in water-worn examples the subdermal surface exhibits numerous round or oval pores, these are uniformly distributed and generally under 1 mm. in diameter.

The other form is flabellately expanded, and consists of two or more lamellæ, with prominent oscula scattered over the surface and along the semicircular margin; their diameter rarely exceeds 3 mm. The texture in the dry state is hard and scarcely compressible; when wet very soft and elastic. There is a distinct cortical layer, about 1 mm. in thickness, it is tough and often remains intact after the inner ground substance has been washed out. Sections of well preserved specimens exhibit a much larger proportion of spongin in the cortex than in the ground substance.

Skeleton consisting of a number of more or less distinct main fibres, two or three spicules wide, which curve outwards from the centre to the surface; these are united by unispicular secondaries, with generally a triangular mesh. Spicules slightly curved and gradually sharp-pointed oxea. Size about 0·11 by 0·006 mm. Colour grayish brown or light stone.

Two specimens from Tuggerah Beach.

This species would naturally fall into the genus *Pellina*, Schmidt.[14]

Halichondria, *Fleming.*

Halichondria panicea, *Johnston.*

Halichondria panicea, Johnston, Brit. Sponges, 1888, p. 114, pl. xi., fig. 5; Bowerbank, Mon. Brit. Sponges, i., p. 278, pl. xix., fig. 303; Bowerbank, *ib.*, pp. 97 – 99, pl. xxxix., pl. xl.; Ridley and Dendy, Chall. Rep., Zool., xx., 1887, p. 2, pl. ii., figs. 2 – 3 (spicules).

A single much worn example of this species is present in the collection from Tuggerah Beach. The length of the larger oxeote spicules is about 0·7 mm.

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[14] See remarks on the genus by Ridley and Dendy—Chall. Rep., Zool., xx., p. 15.

Sub-family CHALININÆ.

Pachychalina, *Schmidt.*

Pachychalina aurantiaca, Lendenfeld, Zool. Jahrb., ii., 1887, p. 768; Dendy, Cat. Non-Calcareous Sponges, Proc. Roy. Soc. Vict., n.s., vii., 1895, p. 241.

A single example is here with some hesitation referred to this species. This form is rather common on the coast. In habit it varies from simple strap-shaped to palmate or digitate; the branches are generally flattened and about twice as broad as thick. The margins are thin, and bear one or two rows of closely placed vents, from 1 to 2 mm. in diameter; occasionally one or more vent-bearing ridges are present on the anterior or posterior surfaces. In well preserved examples there is a distinct dermal layer of oxeate spicules, forming a white incrustation. The surface spicules are held together by a minimum of spongin, hence beach specimens are usually denuded of the dermal crust. The subdermal surface is neatly reticulated, and exhibits numerous round pores, about 0·7 mm. in diameter, and from 0·5 to 1·5 mm. apart.

The description given by Dendy agrees in the main, but the spicules are rather stouter than in the example from Port Phillip. (R.N. 823 Dendy).

The spicules are slightly curved oxea, tapering gradually to within two diameters of the ends, from thence suddenly to acute points. Size—0·14 by 0·0065 mm.

In the Port Phillip specimen, the spicules (according to Dendy) measure 0·14 by 0·004 mm.

In length the spicules are pretty constant, but they vary considerably in diameter.

A fine specimen from Maroubra Bay is 450 mm. in height, the main branch is 30 mm. wide and 15 mm. in thickness.

One example, from Tuggerah Beach.

Pachychalina punctata, *Ridley and Dendy.*

Pachychalina punctata, Ridley and Dendy, Chall. Rep., Zool., xx., 1887, p. 24, pl. vi., figs. 2, *2a*, *2b*, *2c*, pl. xlvi., figs. 1 – 2; Lendenfeld, Zool. Jahrb., ii., 1887. p. 776.

Over twenty specimens of this common form are in the collection. These have been compared with sections of the type from the British Museum. The largest measures 400 mm. in height, 300 mm. in breadth, and between 40 and 50 mm. in thickness. The sponge usually consists of a broad basal plate, from which arises a compressed peduncle, about twice as high as wide, with several pillar-like supports at the base; the top of the peduncle rapidly expands, and gives rise to two or more large flabellate fronds, disposed in the same plain, and more or less fused together basally.

The margins of the lamellæ are split into numerous large or small fronds, these again producing other compressed lobes. The thickness of the lamellæ rarely exceeds 7 or 8 mm. The surface exhibits many wavy lines of growth; the texture is fine, close, elastic, and very tough; the colour is dark amber-brown. The oscula are generally confined to the inner aspect of the lamellæ; their diameter is between 1 and 2 mm.; the margins are thin and somewhat elevated, the walls being supported by pillars of fibre between which occur several circular apertures. The spicules consist of slightly curved oxea from 0·07 to 0·09 mm. in length, and about 0·005 in diameter.

In habit this species is extremely variable, ranging from bunches of lingulate branches to flabellate or half cup-shaped.

A Museum specimen, labelled *Plachochalina pedunculata*, var. *dura*, Lendenfeld (No. 230), is identical with the above.

A single plate-shaped specimen, from the Hawkesbury River, resembles *Euplacella australis*, Lendenfeld, yet the spicular characters are the same. The example arises from a central peduncle, 60 mm. in length. The circular plate-like lamina is over 300 mm. in diameter, and from 3 to 5 mm. in thickness. The sponge exhibits five or six longitudinal folds; the outer surface presents numerous concentric ridges or growth lines; these lines are also visible on the outer half of the upper surface; the latter is closely sprinkled with oscula, about 1 mm. or less in diameter, and from 1 to 2 mm. apart. The spicules are curved oxea, gradually sharp pointed. Size—0·07 to 00·8, by 0·004 to 0·005 mm.

From Tuggerah Beach.

PACHYCHALINA COMMUNIS, *Lendenfeld, sp.*

Chalinissa communis, Lendenfeld, Zool. Jahrb., ii., 1887, p. 772; *id.*, Aus. Mus. Cat., xiii., Sponges, 1888, p. 87, pl. vii.

This species is very common in Port Jackson, and also along the coast. It exhibits great variation in habit, ranging from flabellate to digitate. In the quiet waters of Port Jackson, the sponge usually consists of a flabellate or folded lamella, or it may be composed of a bunch of flattened branches, which are connected at the base, forming broad lamellæ here and there, as represented by the figured type. In the rougher waters of the coast, large subflabellate examples are absent. The habit is digitate, with narrow angular or subcylindrical branches. It appears highly probable that *P. communis*, with its varieties *flabellum* and *digitata*, Lendenfeld; *P. macropora*, Lendenfeld; *P. elegans*, Lendenfeld; *P. elongata*, Lendenfeld; and *P. tenuifibris*, Lendenfeld; are all close allied forms, differing in habit and density according to the habitat in which they have grown. The number of intermediate stages between them are endless, and a well grown example would furnish branches which, if taken singly and compared with the descriptions and figures, might pass as distinct species or varieties. This species presents a regular series of variable forms, similar to *Chalina polychotoma*, Carter. The oscula vary from 1 to 5 mm. in diameter; in *P. communis* they are slightly prominent, and have thin elevated margins; the aperture displays features similar to *P. punctata*, as figured by Ridley and Dendy.[14] In the rest of the forms, the surface is marked by angular projections and generally more or less elongated ridges; the latter are acute and bear numerous small oscula along the ridge, and often a large one at its termination. In some cases *P. elegans* exhibits, at the margins of the compressed branches, long rounded ridges, which finally terminate in short incipient branches with a large osculum at the summit of each branch; the smaller oscula are rare or absent. The oxeote spicules are variable in size, ranging from 0·55 to 0·8 mm. in length, and 0·003 to 0·006 mm. in diameter.

Six specimens from Tuggerah Beach.

CHALINA, *Grant.*

CHALINA GLOBOSA, *Lendenfeld, sp.*

(Plate x., fig. 4).

Cacochalina globosa, Lendenfeld, Zool. Jahrb., ii., 1887, p. 762, pl. xviii., fig. 1.

The sponge usually occurs in circular cake-shaped masses, about 150 or more mm. in diameter, and from 70 to 100 mm. in height. The upper surface is pretty even, but fibrous; the under-surface invariably exhibits deep depressions, indicating attachment to some angular projecting rock. The circular oscula are fairly numerous, and scattered irregularly over the upper surface; they vary from about 1·5 to 4 mm. in diameter. The texture in good examples, in the dried state, is tough, hard, and scarcely compressible; beach-worn specimens are frequently soft and easily broken.

Colour when fresh, light sandy yellow; after prolonged exposure they become dark rusty brown, and very similar in appearance to some species of *Thorecta*.

The skeleton consists of a rather open irregular reticulation, with stoutish main fibres, which traverse the sponge from the base to the apex, with numerous slender more or less transverse connecting fibres. The fibres contain rather dense masses of oxeote spicules, cemented by little obvious spongin. The oxea are straight or slightly curved, gradually tapering to within three

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[14] Ridley and Dendy—Chall. Rep., Zool., xx., 1887, pl. vi., fig. 2*b*.

or four diameters of the extremities, thence tapering rapidly to acute points. Size—0·16 by 0 004 to 0·006 mm.

There are seven specimens from Tuggerah Beach, four from Swansea, and three from the Hawkesbury River.

Chalina palmata, *Lamarck.*

Chalina palmata (Lamarck), Ridley and Dendy, Chall. Rep., Zool., xx., 1887, p. 26, pl. v., fig. 4.

Cladochalina euplax, Lendenfeld, Zool. Jahrb., ii., 1887, p. 769, pl. xxvii., fig. 26; *id.*, Aust. Mus. Cat. xiii., Sponges, 1888, p. 85.

Sponge variable in habit, occurring in roundish clumps, with several points of attachment, either palmate, flabellate, digitate, or half cup-shaped, with digitate or subflabellate branches along the margins, which generally exhibit dichotomous division. The outer surface is usually concave, and the inner convex. The oscula are mostly confined to the inner surfaces. In well preserved specimens the margins are thin, even, and slightly elevated; in worn examples they are irregularly substellate. Colour when alive, drab or dark slate; beach-worn examples vary from sandy yellow to dark rusty brown. The spicules are slightly curved oxea; they occur in the ground substance as well as in the fibres. Size—0·07 by 0·0024 mm.

There are twenty-five specimens from Tuggerah Beach, three from the Hawkesbury River, and two from Swansea.

Chalina finitima, *Schmidt.*

Chalina finitima, Schmidt, Grundzüge einer Spongien-Fauna Atlantischen Gebietes, 1870, p. 33.

Acervochalina finitima, Ridley, Zool. Coll. "Alert," 1884, p. 399.

Ceraochalina finitima, Lendenfeld, Zool. Jahrb., ii., 1887, p. 781.

This is probably the most common sponge occurring on the coast. There is one specimen in the Lendenfeldian collection which bears the manuscript name of *Cladochalina irregularis*, Lendenfeld (No. 323). The sponge generally consists of a pair of irregular, elongated, subflabellate expansions, more or less connected at their inner bases. Occasionally the intervening spaces between the thick lamellæ are filled in with fibre, leaving two long ridges with a more or less distinct valley between. The height rarely exceeds 100 mm., whilst the length is often over 200 mm.; the thickness varies between 10 and 20 mm. The oscula are from 1 to 4 mm. in diameter; they are abundant on the upper inner aspect of the often truncated margins, and are also present on the inner surfaces, rarely on the outer; frequently they occur on the inferior borders of the lamina. The spicules are very slender hair-like oxea, measuring 0·1 by 0·0018 mm.

This form is probably identical with *Chalina, sp.* (*b*) of Ridley and Dendy.[15]

Of this species there are twenty specimens from Botany Bay, and twenty-seven from Lake Illawarra, and fragments from almost all the other localities enumerated.

CHALINA CYLINDRICA, *Lendenfeld, sp.*

Dactylochalina cylindrica, Lendenfeld, Proc. Linn. Soc. N.S.W., x., 1886, p. 570; *id.*, Zool. Jahrb., ii , 1887, p. 812; *id.*, Aust. Mus. Cat. xiii., Sponges, 1888, p. 101.

Several examples of this species were obtained at Tuggerah Beach.

The spicules measure about 0·085 mm. in length, and 0·002 mm. in diameter; they are abundant in the ground substance as well as in the fibres.

CHALINA ? SPICULIFERA, *sp. nov.*

(Plate x., fig. 5).

Sponge digitate, with usually a basal plate and a short cylindrical peduncle; the branches are numerous, elongate, round, or compressed, dichotomously divided and frequently anastomosing. In two examples the branches are round and somewhat nodular, and from 5 to 8 mm. in thickness. A third specimen exhibits flattened branches, chiefly in one plane, with frequent fusions in the lower half of the sponge. In the latter form the oscula are almost wholly confined to the lateral margins of the branches; they are 1 mm. or less in diameter, very prominent, and give an irregular appearance to the margins when viewed in profile. In the cylindrical form the oscula are either scattered or seriate; they are not prominent, and generally under 1 mm. in diameter. Texture firm, tough, compressible but not very elastic. Surface even and finely reticulate, to the unaided eye appearing smooth, but very harsh to the touch. Colour when dry, yellowish stone.

Skeleton with rather wide and usually angular mesh; main fibres stoutish, frequently branched, and gracefully curving outwards from the centre to the surface; they are cored with a dense axial string of oxeote spicules. The stouter secondary fibres rarely have more than two or three spicules in a row; the rest of the secondaries and the dermal reticulation consist of very slender unispicular fibres. The spicules, as a rule, are placed end to end, and shortly overlap each other at the points; some of the longer fibres have as many as six spicules thus arranged.

The dermal skeleton is renieroid, with a more or less triangular mesh, formed by the union of three spicules, which meet and

[15] Ridley and Dendy—Chall. Rep., Zool., xx., 1887, p. 28.

cross each other at the points. The fibres contain very little spongin. The axial string of spicules in the primaries occupies the whole of the fibre, whilst the spicules in the secondaries and dermis are invested with a sheath of spongin about twice the diameter of the spicule. The spicules are stout slightly curved oxea, tapering rather suddenly to acute points at about two or three diameters from their extremities. Size—0.11 by 0·01 mm. A few slender forms occur in the ground substance.

In habit and appearance this species is like a *Chalina*, yet the small amount of spongin present and the stout spicules are not in strict conformity with the generic definition.

Three examples, obtained at Tuggerah Beach.

Chalina ligulata, *sp. nov.*

(Plate x., fig. 6).

Sponge usually with an attachment expansion—a short, thick angular or compressed peduncle, from which a tangled mass of branches arises; they are mostly disposed in a single plane, and are dichotomously divided. The branches at their origin are short, compressed, or angular, and frequently coalesce; the middle and distal branches are flat, thin, strap-shaped and of nearly equal width throughout their length, with evenly rounded apices; they vary from 5 to 20 mm. in breadth, 1 to 3 mm. in thickness, and from 10 to 150 mm. in length. Texture of the basal portion of the branches dense, hard, and incompressible; upper parts of the sponge tough, flexible, and elastic. Colour in the dried state sandy yellow. Surface even, smooth, with a thin dermal incrustation, supported by a very fine meshed reticulation. There are numerous pores about 0·1 mm. in diameter, and abundant oscula scattered over the surface and along the margins of the branches; their diameter varies from 0·8 to 1 mm.

Skeleton consisting of a fine rectangular network. The main fibres are from 0·15 to 0·25 apart, 0·08 in diameter, and are cored with an axial thread of rather irregularly disposed oxea, usually about three or four spicules wide. The primaries bend outwards from the centre towards the surface; they are pretty evenly connected by secondaries, about 0·04 in diameter, forming square or oblong meshes from 0·1 to 0·2 mm. in width. The axial series of spicules in the finer fibres are few, disconnected, and frequently absent, and rarely form more than a single row in the stouter ones. The spicules are straight or but little curved oxea; they are cylindrical to within three or four diameters of the acutely pointed extremities. Size—0·07 by 0·003 to 0·004 mm.

Seven examples are in the collection from Tuggerah Beach. Several specimens were obtained by the writer at Newcastle in 1889.

SIPHONOCHALINA, *Schmidt*.

SIPHONOCHALINA PROCUMBENS, *var.* FLABELLIFORMIS, *Carter*.

Patuloscula procumbens, var. *flabelliformis*, Carter, Ann. Mag. Nat. Hist., (5), xvi., 1885, p. 286.

Four specimens from Tuggerah Beach.

SIPHONOCHALINA INTERMEDIA, *Ridley and Dendy*.

Siphonochalina intermedia, Ridley and Dendy, Ann. Mag. Nat. Hist., (5), xviii., 1886, p. 231; *id.*, Chall. Rep., Zool., xx., 1887, p. 30, pl. vii., fig. 1, pl. xlvi., fig. 3.

Phylosophina intermedia, Lendenfeld, Zool. Jahrb., ii., 1887, p. 800, pl. xxiii., fig. 47; *id.*, Aust. Mus. Cat., xiii., Sponges, 1888, p. 93.

This sponge, when well grown, forms dense low rounded masses, often over 200 mm. in diameter, but rarely exceeds about 80 mm. in height. Usually it has several points of attachment, with a few root-like processes. The branches frequently anastomose, either about the middle or at the dilated summit; in some cases they fuse along the whole length, and the upper surface is subcontinuous. The large oscula, in well preserved specimens, are usually contracted at their summits, the margin being thin and elevated. The colour, when alive, is dark slate; when dry, drab or silver gray. The spicules are sharp pointed oxea. Size—0·1 by 0·004 to 0·006 mm.

There are seven examples from Tuggerah Beach, one from the Hawkesbury River, and two from Port Stephens.

SIPHONOCHALINA STALAGMITES, *Lendenfeld*.

Siphonochalina stalagmites, Lendenfeld, Zool. Jahrb., ii., 1887, p. 799, pl. xxiii., fig. 49; *id.*, Aust. Mus. Cat., xiii., Sponges, 1888, p. 94.

There are numerous examples in the Museum collection, and several in the Fisheries donation.

The sponge is generally somewhat flabelliform in habit, and consists of a series of tubular processes more or less fused together. The sides are covered with prominent elevations in the form of short, thick, and generally transversely disposed ridges, which gives the surface a peculiar gnarled aspect. In some specimens the ridges are ill-defined, in others they project outwards a distance equal to the transverse diameter of the tubes.

Examples from the Wollongong district are frequently overgrown by a species of Alcyonaria *(Callipodium)*. The surface of the sponge not occupied by the *Callipodium* continues to grow and partly invest the organism. In beach-worn examples which have had the alcyonarian growth removed, the surface presents a series of meandering grooves, and the usual warty processes are scarcely noticeable.

The spicules are slightly curved oxea, which are abruptly narrowed at the ends, but not very sharp pointed. Size—0·75 by 0·0075 mm.

Three specimens from Lake Illawarra, and two from Tuggerah Beach.

Arenochalina, *Lendenfeld.*

Arenochalina mirabilis, *Lendenfeld.*

(Plate x., fig. 7).

Arenochalina mirabilis, Lendenfeld, Zool. Jahrb., ii., 1887, p. 821, pl. xxvi., fig. 70; pl. xxvii., fig. 28; *id.*, Aust. Mus. Cat., xiii., Sponges, 1888, p. 103.

This species is common on the coast, and is represented in the Museum collection by a fine series of specimens. Owing to the very open character of the mesh, the ground substance is easily washed away, and most of the examples met with present a washed out skeleton not unlike some species of Thorecta. The habit is subject to great variation. The sponge may consist of a single, elongate, finger-like lobe, about twice as broad as thick. One example is 220 mm. in height, 40 mm. in its widest part, and 15 mm. in its lesser diameter. Some individuals are hand-shaped, having a short peduncle and a palmatified lamina. One specimen of this kind measures 230 mm. in height, 210 mm. in breadth, and the basal half from 10 to 12 mm. in thickness. The distal branches are flat, and are somewhat variable in breadth and length, but uniform in their narrow diameter. Abundant oscula occur on the lateral margins, their diameter ranging between 2 and 3 mm. Texture in the dried state, firm, slightly brittle, and not very elastic. Colour when alive, reddish-purple; when washed, gray with a rusty or purplish tint in the deeper parts, especially near the base.

The skeleton is accurately described in the Catalogue of Sponges, and a portion is figured in the Zool. Jahrbüch., on plate xxvii., fig. 28. There is, however, one serious error in the account of the spicules, they are described as "oxea 0·02 mm. long, and 0·004 mm. in thickness." All the spicules seen *in situ* in the secondary fibres proved to be straight styli, with a small rounded base and an abruptly pointed apex. Size—0·19 to 0·02 mm. by 0·004 to 0·005 mm.

Although this species is enumerated in the Catalogue of Sponges, there is no example named by the author. The name occurs three times in the manuscript list, each time with a query (Nos. 136, 275, 276). Upon examination, the specimens proved to be two examples of *Hircinia caliculata*, Lendenfeld, and one *Siphonochalina intermedia*, Ridley and Dendy. The latter bears the number 274 in the list, which may account for the mistake.

There are two specimens in the Fisheries' donation from Tuggerah Beach.

Family HETERORRHAPHIDÆ.

Chondropsis, *Carter.*

Chondropsis kirkii, *Carter, sp.*

Dysidea kirkii, Carter, Ann. Mag. Nat. Hist., (5), vii., 1881, p. 374.

Sigmatella australis, Lendenfeld, Aust. Mus. Cat., xiii , Sponges, 1888, p. 195; *id*, Mon. Horny Sponges, 1889, p. 611, pls. xl., xli., and xlii

Sigmatella corticata, Lendenfeld, Aust. Mus. Cat., xiii., Sponges, 1888, p. 199; *id.*, Mon. Horny Sponges, 1889, p. 618, pls. xl. and xli.

Chondropsis kirkii, Dendy, Proc. Roy. Soc. Vict., (n.s.), vii., 1895, p. 251.

There are three water-worn specimens from Tuggerah Beach.

Rhaphisia, *Topsent.*

Rhaphisia rubra, *Lendenfeld, sp.*

Halichondria rubra, Lendenfeld, Aust. Mus. Cat., xiii., Sponges, 1888, p. 80, pl. ii., fig. 1.

The types (Nos. 212 – 372, and 450) present the features of a *Rhaphisia,* and exhibit abundant hair-like rhaphides. The original description states that "The spicules are straight oxy-strongyla, with sharp or blunt points, 0·2 mm. long, and 0 006 mm. thick. Similar but more slender spicules are scattered abundantly through the ground substance."

No. 372 appears to be a portion of the figured type of the var. *digitata.* The abruptly pointed oxea measure from 0·15 to 0·2 by 0·004 to 0·0045 mm. The rhaphides are variable in length; usually they measure about 0·25 mm. No. 450 agrees with the description as to habit; the oxeote spicules are, however, slightly longer and stouter than in the var. *digitata,* they measure from 0·2 to 0·25 by 0·0045 to 0·006 mm. The microscleres are about the same as in the variety.

The sponge is light, open, spongy, and bread-like in texture. It varies from simple finger-like processes, to massive, with incipient dome-shaped branches; the latter are generally surmounted by one or more oscula from 5 to 10 mm. in diameter. The abruptly pointed oxeote spicules form distinct main and secondary fibres, very similar in diameter and arrangement to that exhibited by Carter's *R. anonyma,* but the spicules are much more abundant, shorter and stouter in *R. rubra.* Blunt ended megascleres are present, but very scarce.

There are seven examples from Port Stephens.

Family DESMACIDONIDÆ.

Pseudohalichondria, *Carter*.

Pseudohalichondria fibrosa, *sp. nov.*

(Plate x., fig. 8).

Sponge subtriangular in outline, consisting of a stout short stem, with numerous compressed branches, more or less disposed in a single plane; their apices attain to nearly the same level. All the branches have one or more continuous longitudinal grooves, which in the living sponge probably terminated in oscula; the grooves are from 2 to 4 mm. in diameter. Surface villous and conulose; the dermal membrane exhibits numerous round pores about 1 mm. in diameter. Texture hard, rather inelastic, but tough, fibrous, and harsh to the touch. Colour in the dried and somewhat water-worn condition, yellowish-gray.

Skeleton consisting of a rather loose rectangular network of strongly developed fibres. Primary lines rather sinuous, about 0·2 mm. in diameter, generally 0·6 mm. or less apart, cored with abundant cylindrical styli, held togother by a minimum quantity of spongin. Secondary connecting fibres usually at right angles to the primaries, and densely multispicular; they measure from 0·05 to 0·1 mm. in diameter; even in the most slender fibres it is difficult to estimate the number of spicules occurring in a row. The dermal membrane contains abundant spinose C-shaped microscleres, superposed by a dense layer of smooth stylote spicules.

Megascleres—Straight, smooth, cylindrical styli, with a well rounded base and acute or subacute apex. Size—0·24 to 0·27 by 0·005 to 0·007 mm. These occur abundantly in the dermis ground substance and in the fibres.

Microscleres—Spined isochelæ, sparingly scattered through the ground substance, and densely packed in the dermis. Size—0·018 mm. in length. The chelæ—apart from their larger size—do not differ from those of *Pseudohalichondria clavilobata*, as figured by Carter.[16]

This species differs from the type of the genus in the total absence of foreign matter, and in the remarkable development of the fibres. Height 145, breadth 190, thickness from 5 to 15 mm.

A single specimen was obtained at Lake Illawarra.

Desmacidon, *Bowerbank*.

Desmacidon dendyi, *sp. nov.*

(Plate x., fig. 9).

Sponge massive, light, open, and cancellous throughout. The walls of the reticulated surface have their edges directed outwards, they are slightly conulose and vary between 1 and 2 mm. in

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[16] Carter—Ann. Mag. Nat. Hist., (5), xviii., 1886, pl. x., figs. 8*a*.–*d*.

thickness; the areolation is mostly rounded, the spaces being 2 to 3 mm. in diameter. Oscula scattered, about 5 mm. or more in diameter. The surface presents a delicate porous membrane, which is abundantly charged with scattered spicules. Texture spongy, inelastic, and somewhat brittle. Colour yellowish-gray.

Skeleton consisting of a series of wavy longitudinally arranged whispy fibres, with a moderate amount of pale spongin; secondary connecting fibres abundant but ill defined, occasionally with three or four spicules in a row, but more frequently consisting of scattered whispy bundles. Main fibres about 0·1 mm. in diameter, and 0·15 to 0·2 apart. Mesh very irregular, angular to oblong, often filled in with scattered spicules.

Megascleres—(*a*) Strongyla of the fibres and ground substance straight or slightly curved, with well rounded and often inflated ends. Size—0·21 to 0·25 by 0·007 to 0·009 mm. (*b*) Slender strongyla, generally straight, with or without oval heads, abundant in the dermal membrane and scattered in the ground substance. Size—0·15 to 0·2 by 0·0025 to 0·0035 mm.

Microscleres—(*a*) Large tridentate isochelæ, with but little bent shaft and well developed flukes. Size—0·025 mm. in length. (*b*) Small isochelæ, probably young forms of (*a*). Size—0·018 mm. (*c*) Sigmata simple and contorted. Size—0·035 to 0·04 mm. The microscleres are extremely abundant in all parts of the sponge.

The larger specimen measures 70 mm. in height, 160 mm. in length, and 125 mm. in breadth.

Two examples were obtained at Port Stephens.

SUB-FAMILY ECTYONINÆ.

MYXILLA, *Schmidt.*

MYXILLA ISODICTYALIS, *Carter, sp.*

Halichondria isodictyalis, Carter, Ann. Mag. Nat. Hist., (5), ix., 1882, p. 285, pl. xi., fig. 2; *id.*, Ann. Mag. Nat. Hist., (5), xvii., 1886, p. 52.

Myxilla isodictyalis, Dendy, Proc. Roy. Soc. Vict., (n.s.), viii., 1896, p. 30.

Sponge compressed, measuring 55 mm. in length, 45 mm. in breadth, and 20 mm. in thickness. The texture is brittle and somewhat bread-like. Colour, dark cream.

The spicules are as follows:—(*a*) Smooth styli, often tending towards tylostyli; generally with a slight bend at the basal fifth or sixth, the rest of the shaft is straight and tapers to within about two diameters of the end, from thence it is abruptly narrowed and acute. Size—0·17 by 0·007 mm. (*b*) Straight smooth tylota, the ends about equal to the middle in diameter. Size—0·25 by 0·005 mm. (*c*) Isochelæ. Size—0·021 mm. in length. (*d*) Sigmata, simple and contorted. Size—0·018 mm. in length.

The megascleres are slightly stouter than in Dendy's example (R.N. 793). They agree in size with the British Museum specimen of *Halichondria incrustans* (Reg. 86-12-15-391).

This species would fall into the genus *Lissodendoryx*, Topsent.

A single much worn example was obtained at Tuggerah Beach.

Clathria, *Schmidt.*

Clathria typica, *Carter, sp.*

Echinonema typica, Carter, Ann. Mag. Nat. Hist., (5), vii., 1881, p. 378.

Echinonema anchoratum, Carter, Ann. Mag. Nat. Hist., (5), vii., 1881, p. 379.

Echinonema flabelliformis, Carter, Ann. Mag. Nat. Hist., (5), xiv., 1885, p. 352.

Echinonema pectiniformis, Carter, Ann. Mag. Nat. Hist., (5), xiv., 1885, p. 353.

Phakellia ventilabrum, var. *australensis*, Carter, Ann. Mag. Nat. Hist., (5), xviii., 1886, p. 379.

Clathria typica, Dendy, Proc. Roy. Soc. Vict., (n.s.), viii., 1896, p. 32.

This species has a superficial resemblance to *C. australis*, Lendenfeld. The specimens from Tuggerah Beach have been compared with several from Port Phillip, and although they differ in habit they agree in their spicular characters.

The Megascleres are as follows :—(*a*) Spined styli, 0·04 to 0·05 by 0·007 mm. (*b*) Smooth styli, 0·2 to 0·25 by 0·004 to 0·006 mm.

Microscleres—(*a*) Small isochelæ, 0·012 to 0·014 mm. in length. (*b*) Curved toxa and toxadragmata.

Under *Echinonema anchoratum*, Carter, Dr. Lendenfeld described three varieties.[17] In this instance there is no specimen bearing this name in the collection, and there is no locality given under the description. It appears highly probable that *E. anchoratum*, Carter, was accepted as an ideal species, around which the three new varieties might be grouped. Throughout the catalogue many such species have been created, which consist solely of a series of varieties, often of forms that have previously been described as species.

During the examination of *Clathria typica*, it was found necessary to compare the types of the varieties of *Echinonema anchoratum*, var. *ramosa;* var. *dura;* and var. *lamellosa.* The localities, as given in the catalogue, do not agree with the labels ; the latter, in Dr. Lendenfeld's own handwriting, gives Western Australia as the habitat for each of the three forms. The labels are no doubt correct, and the specimens were collected by the late Mr. Bailey, a Victorian naturalist. There is, however, a series of errors in

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17 Lendenfeld—Aust. Mus. Cat. xiii., Sponges, p. 319 - 320.

the descriptions of the spicular characters; in each case they are described as "oxea." The specimens, when examined, only yielded smooth styli. The following is a brief summary of the examination of the types:—

Echinonema anchoratum, Carter, var. *ramosa*, Lendenfeld, (No. 307).

The description is perfect as applied to the outward form:—"Small, erect, digitate sponges, with irregular and high processes all over the surface." The colour is reddish-brown, with purplish tints in the interior. Height of specimen 55 mm., breadth 35 mm., and the thickness of the ultimate branches about 5 mm.

Megascleres—(*a*) Stout, strongly spined, echinating styli. Size—0·1 by 0·008 mm. (*b*) Stout, smooth styli, occurring in the fibres and also in the ground substance. Size—0·8 by 0·01 mm. A few slender forms, with slightly inflated bases, are also present. Chelæ not observed.

Echinonema anchoratum, Carter, var. *dura*, Lendenfeld, (Nos. 309 – 322).

The description of the habit does not agree with the specimens. The types are very similar in appearance. The larger example consists of numerous meandering coalesced lamellæ, with their edges directed outwards, forming a honeycomb-like structure with very large cells. The surfaces of the lamellæ are longitudinally corrugated; the distal margins are thin and uneven. A few indistinct grooves are present near the base, these gradually fade away before reaching the summits of the laminæ. The texture is hard, tough, and minutely porous throughout. The surface reticulation is very fine, and cannot be seen distinctly with the unaided eye. Height of specimen 90 mm., breadth 90 by 100 mm., thickness of the lamella 3 to 5 mm. Colour dull stone with a slight tint of red in the unexposed parts. The fibres are abundantly echinated with spined styli; the primaries are cored with a moderate number of stout smooth styli; the connecting fibres are generally uni- or bi-spicular. A few stout styli and many slender forms are present in the ground substance, together with some ill-defined and hair-like and a fair number of small isochelæ.

Megascleres—(*a*) Spined styli, with the spines more pronounced in the middle and at the subtruncated base. Size—0·06 by 0 006 mm. (*b*) Stout smooth styli. Size—0·15 by 0 01 mm. (*c*) Slender smooth styli. Size—0·17 by 0·0035 mm.

Microscleres—Isochelæ 0·01 in length.

Although the description of the outward form does not agree, the MS. name is strictly applicable to this form, i.e., "*Anthero-spongia dura.*"

Echinonema anchoratum, Carter, var. *lamellosa*, Lendenfeld, (No. 317).

The type is flabellate, and measures 175 mm. in height, 165 mm. in breadth, and varies from 3 to 5 mm. in thickness. There is a short, broad peduncle, and six or seven small lamellæ at right angles to the main frond; the distal margin of the latter is even and slightly rounded. The surface is longitudinally ridged throughout; the ridges are about 1 mm. apart, nearly straight, but very uneven, the surfaces being studded with minute conulæ. The depressions between the ridges exhibit numerous round pores, about 0·4 mm. in diameter. Texture hard, close, and tough. Colour dark stone. The specimen is slightly beach-worn, and without dermal incrustation.

The fibres of the skeleton form a close and somewhat fasciculate reticulation; the primaries rarely exceed 0·05 mm. in diameter, and the secondaries are usually about 0·02 mm. Both kinds are moderately echinated by spined styli.

Megascleres—(*a*) Spined echinating styli, with a slightly enlarged base, and the shaft studded with numerous minute spines. Size—0·8 by 0·006 mm. (*b*) Smooth stout styli, tending to become tylostyli, often with a well defined constriction above the base. Size—0·28 by 0·0095. (*c*) Slender smooth styli or tylostyli. Size—0·16 by 0·0035.

Microscleres—(*a*) Small isochelæ 0·0012 in length. (*b*) A few slender hair-like spicules.

With regard to the above three varieties, it seems very doubtful if they have any relationship with *Clathria typica*, Carter, more especially if the difference in habit, texture, and spicular characters are duly considered. I feel assured that the specimens examined are the genuine types, as the manuscript names, specimen numbers, and list numbers are all in accord; but it is very singular that the spicules occurring in the fibres and ground substance should in each case be described as oxea, when they possess styli only.

Clathria tenuifibra, *sp. nov.*

(Plate xi., fig. 10).

Sponge clathrate, flabellate, consisting of very numerous compressed main branches, each of which gives off many short branchlets; the latter are subtriangular and frequently anastomose. The spaces between the branches and branchlets are very irregular in shape and somewhat dentate, owing to the numerous short incipient branchlets. As growth proceeds, many of the short branchlets meet and coalesce, forming connecting bars, and in the lower parts of the sponge the spaces become filled in. Spaces that have thus almost closed usually exhibit a central vent-like opening, surrounded by five or more radiating grooves. The oscula are scattered over the whole surface, including the margins;

they are about 1 mm. in diameter. The specimen is perforated by a small Isopoda, and it is impossible to distinguish the oscula from the holes occupied by the crustacean. Surface even, reticulation very fine and regularly porous; the pores vary from 0·1 to 0·2 mm. in diameter. Texture compact, tough, and highly elastic. Colour when alive, bright red; when dry, dark stone, with a tint of red in the deeper parts.

Skeleton closely reticulate, with oval or oblong mesh, from 0·3 to 0·5 mm. in the longer diameter, and about 0·1 to 0·15 mm. in the shorter. Primary fibres from 0·1 to 0·15 mm. in diameter, with much yellow spongin, and a few ill-arranged stylote spicules, rarely with more than six in a row, frequently four or less. Secondary connecting and dermal fibres, usually bi- or unispiculous, diameter from 0·025 to 0·05. The echinating styli are abundant, and irregularly scattered on the fibres, but rarely more than their length apart.

Megascleres—(*a*) Stout, slightly curved, subfusiform, smooth styli; base rounded, with or without a contraction about one diameter from the end; shaft gradually tapering from the middle to the acute apex. Size—0·14 by 0·01 mm. (*b*) Slender straight smooth styli, a little inflated at the base, and rather suddenly acute at the apex. Size—0·11 by 0·004 mm. (*c*) Spined styli, gradually tapering from a rounded or slightly swollen base to an acute apex; spines numerous, but small. Size—0·7 by 0·0075 mm.

Microscleres—(*a*) Small isochelæ. Size—0·008 to 0·01 mm. (*b*) Short stoutish toxa, with a central bend about 0·03 mm. in depth; the shaft is gracefully curved on each side of the centre, and the ends are smooth and sharp pointed. Size—0·08 to 0·1 mm. (*c*) Rather slender toxa, with a slight median band, the ends are smooth and acute. Size—0·13 to 0·13 mm.

One specimen from Lake Illawarra.

I collected two examples of this species at Wollongong some years ago.

CLATHRIA DURA, *sp. nov.*

(Plate xi., fig. 11).

Sponge rather variable in habit, consisting of a series of compressed or cylindrical branches which are often united at various points, especially near the base. The largest example is flabellately expanded; it is about 150 mm. in height, 230 mm. in width, and in the thickest part 30 mm.; individual branches are rarely more than 5 mm. in their lesser diameter. The branches arise from a short stout peduncle; they are compressed, subradiate, and disposed in one plane, and more or less connected along their lateral margins; in some portions the frond is continuous, and in others clathrate. The main branches retain their individuality, and can generally be traced to their origin; the terminal branches are mostly free, and exhibit dichotomous branching. Surface even, rather harsh to the touch, with a minutely reticulated dermal membrane. Oscula scattered over the surface or confined to the margin of the free branches, about 1 mm. or less in diameter. Texture very fine, dense, and tough; in the lower parts of almost stony hardness; the upper portions are scarcely compressible between the fingers. The tips of some of the washed out branches are compressible, and highly elastic. Colour sandy yellow.

The skeleton consists of a close rectangularly meshed network of strongly developed horny fibre. The main fibres are about 0·04 mm in thickness; they are centrally cored with a thread of smooth styli, 0·01 mm. or less in diameter. The fibres and the ground substance contain numerous smooth and spined styli, the latter also echinate the fibres and are present in considerable numbers. The axial core of smooth styli is well defined in the secondary connecting fibres, and also in the dermal reticulation; the latter consists of a fine square meshed network of densely spiculous fibres, with little obvious spongin; the mesh is about 0·2 mm. in diameter. The ends of the main fibres project slightly through the dermis, and are ensheathed with closely placed spined styli.

Megascleres—(*a*) Smooth styli, slightly curved at their basal third, a little tapering to within about one or two diameters of the extremity, thence abruptly tapering to a not very acute point. Size—0·08 to 0·01 by 0·004 mm. (*b*) Spined styli of nearly uniform diameter to within a short distance of the apex, moderately beset with short recurved spines. Size—0·04 to 0·05 by 0·005 mm.

Microscleres—Abundant isochelæ, 0·014 mm. in length.

Four specimens from Tuggerah Beach.

CLATHRIA AUSTRALIENSIS, *Carter*, *sp.*

(Plate xi., fig. 12).

Wilsonella australiensis, Carter, Ann. Mag. Nat. Hist., (5), xiv., 1885, p. 366.

Clathriopsamma lobosa, Lendenfeld, Aust. Mus. Cat. xiii., Sponges, 1888, p. 227.

Thorecta ramsayii, Lendenfeld, Aust. Mus. Cat. xiii., Sponges, 1888, p. 142.

Clathria australiensis, Dendy, Proc. Roy. Soc. Vict., (n.s.), viii., 1896, p. 33.

This common species ranges from digitate to flabellate, or even incrustating or lobate. A specimen from Port Phillip consists of two flabellate lamellæ, about as high as broad, and more or less connected by vertical lamellæ within, and having on the outer aspect a series of low ridges or lamellate lobes about half the size of the lamellæ from which they originate. Examples from the coast of New South Wales are, however, more compact, and the laminæ are much stouter, at least in the deep-water specimens which are washed up on the various beaches. Littoral forms, such as occur at Jervis Bay, are flabellate, digitate, or clathrate. Coastal specimens are usually in the form of massive rounded clumps, consisting of two or more thick lamellæ, with truncated or evenly rounded margins, upon which the osculæ are seated. The surface, when perfect, is thinly coated with a white incrustation, consisting of foreign spicules, sand grains, and foraminifera. The oscula are confined to the margins and the inner surfaces; at the sides they are substellate, on the rounded or angular margins they are elliptic, and at the summit circular, often with narrow transverse grooves between. The oscula vary from 1 to 5 mm. in diameter, and the grooves rarely exceed about 1·5 mm.

The type of *Clathriopsamma lobosa*, Lendenfeld, (No. 401), is a spirit specimen which has longitudinally bisected. The surface is finely reticulated, the mesh being regularly polygonal and about 0·25 mm. in diameter; the fibres of the network are very irregular in outline, and under a low magnifying power they are rugose and bristling with echinating spicules. All the fibres are densely cored with sand grains and spicule fragments. Texture very hard and incompressible when dried. Colour when alive light brick red; beach-worn examples are white or gray, and after long exposure dark brown. Notwithstanding the difference in habit, the spicules are fairly constant in shape and size.

Megascleres—(*a*) Echinating spined styli. Size—0·07 by 0·004 mm. (*b*) Smooth styli, occurring in the fibres and in the ground substance. Size—0·15 by 0 004 mm.

Microscleres—(*a*) Small abundant isochelæ. Size—0·012 mm. (*b*) Strongly bent toxa. Size—0·08 mm.

The spicular characters of the Port Phillip example agree with the type and other specimens examined.

Thorecta ramsayii, Lendenfeld, is a sun-burnt example of this species, its colour being like that of a *Thorecta*, and the specimen agrees perfectly with the description of the outward form. It will be noticed that *T. ramsayii* is omitted in the Monograph of Horny Sponges.

Of this species fourteen specimens are present in the collection from Tuggerah Beach, two from Botany Bay, and three from Port Stephens.

CLATHRIA RUBENS, *Lendenfeld, sp.*

(Plate xi., fig. 13).

Thalassodendron rubens, Lendenfeld, Aust. Mus. Cat. xiii., Sponges, 1888, p. 223.

A small washed out example of this species is present in the collection from Broken Bay. Under this genus there are six species and two varieties enumerated, all of which—except *T.*

digitata—have been examined. *Thalassodendron typica* and *T. viminalis* are quite distinct. *T. brevispina*, *T. paucispina*, *T. rubens* and its varieties *dura* and *lamellosa*, are very similar in external appearance, especially as to surface, differing slightly in habit but very little in their spicular characters. From a large well grown specimen it would be possible to select portions which might be passed as distinct species or varieties if the habit and general appearances alone were considered, the rest of the characters do not differ very materially. It is indeed highly probable that the above forms represent one variable species. They are all characterised by having a white incrustation,—when perfect consisting of a porous layer of stylote spicules. When the dermal layer is removed, the surface is hispid; a character which is well illustrated in *Clathria lendenfeldii*, Ridley and Dendy.[18]

The following descriptions are based on the examination of the types:—

Thalassodendron typica, Lendenfeld, (No. 364).

This specimen consists of a shallow vase-shaped sponge, which has been bisected. In appearance it resembles a washed-out *Chondropsis*, but the lamina is much thinner than in any species in that genus. The published description agrees with the specimen as far as the habit is concerned. The fibres and spicular characters do not agree with the diagnosis. The main fibres are densely charged with smooth oxeote spicules, held together by very little obvious spongin. Smooth "straight styli" are extremely rare. The connecting fibres are stated to be "aspiculous." I failed to find any such aspiculous fibres; even the finest consist of an axial thread of spicules, with just a trace of investing spongin. Both kinds of fibres are echinated by spined styli; and smooth styli, if present as echinating spicules, are accidental and belong to the axial thread, they are not echinating in the strict sense of the term.

Megascleres—(*a*) Spined echinating styli, rather blunt at the apex. Size—0·1 by 0·001 mm. (*b*) Slightly curved smooth oxea, abruptly but rarely acutely pointed. Size—0·02 to 0·035 by 0·0065 to 0·012 mm. (*c*) Straight smooth styli. Size 0·8 to 1 by 0·0015 mm.

Thalassodendron rubens, Lendenfeld, (No. 286).

The type is a washed-out specimen, having been purposely reduced to a skeleton when obtained. The spicules are as follows:

Megascleres—(*a*) Spined styli, rather scarce. Size—0·06 by 0·007 mm. (*b*) Stout smooth styli. Size—0·15 by 001 mm. (*c*) Medium smooth styli. Size—0·17 by 0·005 mm. (*d*) Slender smooth styli. Size 0·12 by 0·0015 mm.

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[18] Ridley and Dendy—Chall. Rep., Zool., xx., 1887, pl. xxviii., fig. 5.

Thalassodendron rubens, var. *dura*, Lendenfeld, (No. 343).

This variety differs from the typical form, and also from the following variety, in having a greater number of echinating styli; they are longer, sharper pointed, and less spiny than in *T. rubens* or in the variety *lamellosa*, and I failed to find any smooth styli echinating the fibres. The projecting smooth spicules were observed, but they are incipient secondary fibres with one or two smooth stylote spicules.

Megascleres—(*a*) Spined styli, very numerous. Size—0·08 to 0·1 by 0·006 mm. (*b*) Smooth styli. Size—0·27 by 0·005 mm. (*c*) Smooth styli. Size—0·2 by 0·002 mm.

Microscleres—Chelæ 0·0014 mm. in length.

Thalassodendron rubens, var. *lamellosa*, Lendenfeld, (No. 432).

In the figured type the spicules generally are fewer than in the typical form. The description states that the echinating styli are "pretty scarce."

Megascleres—(*a*) Spined styli, very scarce. Size—0·05 by 0·0045 mm. (*b*) Smooth styli. Size—0·1 to 0·16 by 0·006 mm. (*c*) Smooth styli. Size—0·8 by 0·0015 mm.

Microscleres—Chelæ 0·001 mm. in length.

Thalassodendron brevispina, Lendenfeld, (No. 361).

This form does not differ materially from *T. rubens*, var. *dura*, except in the size of the spicules.

Megascleres—(*a*) Spined styli. Size—0·03 by 0·005 mm. (*b*) Smooth styli. Size—0·18 by 0·0065 mm. (*c*) Smooth styli. Size—0·25 by 0·0015 mm.

Microscleres—Isochelæ 0·008 in length.

Thalassodendron paucispina, Lendenfeld, (No. 360).

In habit this form resembles *T. rubens*, and in its spicular characters agrees with the preceding, excepting that the echinating styli are more spiny and less acute.

Megascleres — (a) Spined styli. Size—0·04 by 0·006 mm. (*b*) Smooth styli. Size—0·18 by 0·008 mm. (*c*) Smooth styli. Size—0·1 by 0·002 mm.

Microscleres—Isochelæ 0·008 mm. in length.

Thalassodendron viminalis, Lendenfeld, (No. 365).

The type does not accord with the description. The latter states that: "The sponge consists of a number of pretty regular cylindrical upright branches which are not much branched." The example in the collection bearing the above name and number, is clathrate and consists of a series of short flattened branches, from 4 to 20 mm. wide, 2 to 4 mm. thick, and from 5 to 30 mm. long, The lamellæ have their edges directed outwards; towards the centre and at the sides they exhibit frequent coalescence, the whole forming a very irregular honeycomb-like sponge, 100 mm. in height, 80 mm. in breadth, and 27 mm. in thickness. The specimen has been longitudinally bisected, and is now about half its original size. The surface is hispid throughout, and numerous small oscula are scattered in the deeper parts at the bases of the lamellæ. Texture soft, tough, and slightly elastic. Colour, yellowish-gray.

Skeleton reticulate, consisting of main and secondary fibres, the former from 0·1 to 0·15 mm. in diameter, separated by oval or elongated spaces, from 0·15 to 3 mm. in diameter, and cored by loosely arranged smooth styli; they are invested with a small amount of spongin. The connecting fibres are about 0·025 mm. in diameter, and contain a few smooth, ill-disposed styli. All the fibres are remotely echinated by scarce smooth, or nearly smooth styli. A few exhibit incipient spines, which give the spicule a slightly sinuous outline.

Megascleres—(*a*) Smooth or very minutely spined styli. Size—0·06 by 0·007 mm. (*b*) Smooth styli of various dimensions. Sizes—0·3 by 0·008, 0·17 by 0·005, and 0·15 by 0·0025 mm.

The spicular measurements in the original diagnosis are: Smooth (?) echinating styli, 0·5 by 0·005 mm., and the styli in the fibres 0·14 by 0·006 mm.

The prevailing features of this form are those of an *Echinoclathria*, in which genus it might find a place when better material is available.

CLATHRIA ARBOREA, *Lendenfeld, sp.*
(Plate xi., figs. 15, 15*a*).

Plectispa arborea, Lendenfeld, Aust. Mus. Cat., xiii., Sponges, 1888, p. 226.

Several examples of this common species are in the collection. The specimens are generally reticulately branched in one plane. The branches are compressed, and vary from 3 to 10 mm. in diameter. The spaces between the coalesced branches measure from 5 to 20 mm. or more, and are very irregular in shape, varying from round to elongate. Surface rough, covered throughout with warty elevations and numerous small circular oscula-like apertures. Texture firm, tough, and elastic. Colour when alive, brick-red; in the dried state, light stone. The main fibres are cored with numerous smooth styli, about 0·185 mm. long, and 0·008 mm. in diameter; abundant subtylostyli occur throughout the sponge, they are 0·25 mm. in length and 0·002 in breadth. Echinating styli few, rapidly tapering, acute and spined throughout. Size—0·085 mm. long, and 0·006 in diameter.

In the description of this species,[19] the fibres are stated to be echinated by "very scarce smooth styli." I have examined the

[19] Lendenfeld—Aust. Mus. Cat., xiii., Sponges, 1888, p. 226.

type (No. 346), and find that the styli are spined. It seems that the description of the spicules of this species has been transposed, and should be placed under *Plectispa macropora.* In the type of the latter, the echinating spicules are smooth, and not "slightly spined or rough styli."

Locality.—Tuggerah Beach. Common on all the coastal beaches after gales.

ECHINOCLATHRIA, *Carter.*

ECHINOCLATHRIA MACROPORA, *Lendenfeld, sp.*

Plectispa macropora, Lendenfeld, Aust. Mus. Cat., xiii., Sponges, 1888, p. 226.

Numerous examples of this common coastal sponge are in the collection.

In general appearance this species is closely allied to, if not identical with *Echinoclathria carteri*, Ridley and Dendy.[20]

Specimens from the coastal beaches generally form low densely branched hemispherical or elongated clumps, with several points of attachment. They are frequently 100 mm. high, and from 100 to 200 mm. in diameter. The branches are at first simple, but when about 25 mm. or more long, they divide at the summits and become dichotomous; the secondary branches again bifurcate, and frequently each stem will exhibit five or six bifurcations. Coalescence takes place at nearly all points of contact. The diameter of the branches is very variable, ranging between 5 and 10 mm., except at the origin of two branches, then they may be 20 mm. in the longer diameter and about 8 or 10 in the shorter. The apices of the simple branches are roundly conical.

The type of this species is No. 358.—Surface regularly honeycombed, the width of the polygonal mesh being about 2·5 to 3 mm. across; walls lamellate and minutely perforate, with the smooth thin edges directed outwards. Texture when dry, moderately firm, tough, and highly elastic. Colour varying from light to dark yellowish-stone. Main fibres with a moderate amount of spongin, cored with numerous smooth slightly curved styli; they are slightly constricted near the base, and the apex is gradually tapering and acute. Size—0·1 by 0·004 mm.; frequently somewhat larger. Numerous straight or but little curved subtylostyli are present throughout the ground substance. Size—0·15 by 0·0015 mm. A few scattered isochelæ occur in well-preserved examples. Size—0·01 mm. The echinating spicules are smooth styli, 0·075 in length and 0·004 in breadth.

Locality.—Tuggerah Beach. Very common on all the ocean beaches both north and south of Sydney.

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20 Ridley and Dendy—Chall. Rep., Zool., xx., 1887, p. 162, pl. xxix., figs. 12, 12*a*, pl. xxxi., figs. 3, 3*a*.

ECHINOCLATHRIA ELEGANS, *Lendenfeld, sp.*

Plectispa elegans, Lendenfeld, Aust. Mus. Cat., xiii., Sponges, 1888, p. 226.

A single example of this rather uncommon species was obtained at Tuggerah Beach.

The type of this species is No. 347.—This form is erect in habit, generally with a short distinct peduncle, from which arise numerous subcylindrical, erect, rarely coalescent branches; frequently the branches exhibit a series of nodes, the intervening spaces being about one-third less in diameter. The mesh of the honey-comb is very small, and the walls are comparatively thick. Texture very fine, smooth, and rather brittle when dry, but highly elastic when wet. Colour yellowish-stone.

Main and secondary fibres cored with smooth, straight or curved gradually, sharp-pointed styli. Size—0·1 by 0·006 mm. Echinating spicules smooth, slightly swollen in the middle. Size—0·8 by 0·005 mm. Numerous slender subtylostyli are present in the ground substance. Size—0·14 by 0·0017.

PLUMOHALICHONDRIA, *Carter*.

PLUMOHALICHONDRIA AUSTRALIS, *Lendenfeld, sp.*

(Plate xi., figs. 14, 14*a* – 14*b*).

Clathria australis, Lendenfeld, Aust. Mus. Cat., xiii., Sponges, 1888, p. 222.

Clathria macropora, Lendenfeld, *loc. cit.*, p. 221.

Echinonema lævis, Lendenfeld, *loc. cit.*, p. 220.

The type of *Clathria australis*, Lendenfeld (No. 285), agrees with the description of the outward form. It is 125 mm. high, 200 mm. broad, and 15 mm. or more in thickness. The typical form is fairly common on the coast, and there are many specimens in the collection. When alive it is brick red in colour; when dried the surface presents a white incrustation and numerous radiating grooves.

The description of the skeleton and the spicules are not in accord with the type. In the first place, the character of the fibres in regard to main and connecting, is not correctly given; secondly there are no connecting fibres without a well-defined axial core; and thirdly, the smooth spicules of the fibres are oxea, and not styli. The skeleton consists of a series of stoutish fibres; they are chiefly longitudinally disposed, presenting a very wavy outline, and give off numerous branchlets. The latter arise at very acute angles, and are axially a continuation of the parent branch. The fibres frequently anastomose, but it is only a union of the spongin, the individuality of the fibres remaining more or less distinct. The character of the mesh is very striking, varying from lanceolate to rhomboidal, with the apical and basal angles acute. In the denser parts the fibres form plexiform columns.

The main fibres measure from 0·15 to 0·2 mm. in diameter, the smaller branchlets from 0·05 to 0·01 mm. The axial core of oxeote spicules is very dense and imbedded in much spongin; the latter is abundantly charged with very spiny styli, many of which are arranged parallel with the axis, but the majority are echinating; they are exceedingly numerous, so that under a low magnifying power the fibres have a villous appearance. The dermal skeleton consists of a thin layer of smooth oxea, and a thickish external crust of slender, curved, spined styli.

Megascleres—(*a*) Smooth straight oxea. Size—0·18 to 0·2 by 0·006 to 0·0065 mm. (*b*) Spined echinating styli; base and lower two-thirds of shaft with numerous often recurved spines; apex very acute and smooth. Size—0·1 to 0·14 mm. by 0·0065 to 0·01 mm. (*c*) Slightly curved spined styli of the dermis and of the ground substance. Size—0·08 to 0·1 by 0·0055 to 0·006 mm.

Microscleres—Small tridentate isochelæ. Size—0·012 to 0·015 mm.

Clathria macropora, Lendenfeld (Nos. 267 and 290).

(Plate xi., fig. 14).

The types differ from *C. australis* in their branched or lobate habit. The description accurately describes the dry example. It will be noted that the surface is "undulating and grooved," and that the "skeleton consists of a network of mostly longitudinally disposed fibres, which contain an axial bundle of slender oxea and styli, the former being the most abundant." It is not stated whether the styli are spined or smooth. I failed to find any of the latter either *in situ* or in spicules obtained by boiling. With regard to the oscula "5 mm. wide," I am in doubt as to their real nature, as most of them are inhabited by a small Isopod—a species of Cymodoce—which is found infesting many sponges on the coast. This is particularly the case with *E. lævis*, which often appears as if it had been riddled by a shot gun, the holes in the flabellate forms being continued through the frond. The spicules obtained by boiling yield the following measurements:—

Megascleres—(a) Generally straight smooth oxea. Size—0·18 to 0·2 by 0·0055 to 0·006 mm. (*b*) Echinating spined styli 0·1 to 0·12 by 0·008 to 0·01 mm. (*c*) Curved spined styli 0·08 to 0·09 by 0·006 mm.

Microscleres—Small, tridentate isochelæ 0·012 to 0·016 mm.

Echinonema lævis, Lendenfeld (Nos. 213, 278, 443).

(Plate xi., fig. 14*a*).

The types conform to the description, excepting that the axial spicules of the fibres are oxea, and not styli. Here again we note that the "skeleton consists of irregularly curved, for the most part longitudinally extending fibres."

Megascleres—(*a*) Straight smooth oxea. Size—0·18 up to 0·2 by 0·0055 to 0·006 mm. (*b*) Spined echinating styli. Size—0·1 to 0·12 by 0·008 to 0·01 mm. (*c*) Curved spined styli. Size—0·08 to 0·1 by 0·006 mm.

Microscleres—Small tridentate isochelæ. Size—0·012 to 0·016 mm.

In addition to the many examples from the coast, there are several well preserved specimens in the collection, presented by the late J. B. Wilson, from Port Phillip.

RASPAILIA, *Nardo*.

RASPAILIA ATROPURPUREA, *Carter*, *sp.*

Axinella atropurpurea, Carter, Ann. Mag. Nat. Hist., (5), xvi., 1885, p. 359.

Raspailia atropurpurea, Dendy, Proc. Roy. Soc. Vict., (n.s.), viii., 1896, p. 47.

One specimen obtained at Port Stephens. Although water-worn it still retains its dark purple colour in the protected parts. The tips and sides of some of the branches are grayish-purple.

Height of example, 45 mm., breadth 80 mm., thickness about 25 mm., diameter of branches 5 mm.

RASPAILIA BIFURCATA, *Ridley*.

Raspailia bifurcata, Ridley, Zool. Coll. "Alert," 1884, p. 459, pl. xl., fig. *j.*; pl. xlii., figs. *l l.*

The example is much branched, and measures 75 mm. in height, 80 mm. in the shorter, and 100 mm. in the longer diameter; the cylindrical branches are about 5 mm. in diameter; a few branches are flattened and twice as broad as thick. The smooth oxea and styli are variable in size, the majority are rather less than in the "Alert" example. The spined styli are also somewhat shorter, and rarely exceed 0·08 mm. in length. The specimen is slightly water-worn, but still retains its purple colour.

A single specimen is present in the collection from Tuggerah Beach.

FAMILY AXINELLIDÆ.

AXINELLA, *Schmidt*.

AXINELLA AURANTIACA, *Lendenfeld*.

Axinella aurantiaca, Lendenfeld, Aust. Mus. Cat., xiii., Sponges, 1888, p. 235, pl. v., fig. 1.

The types (No. 244 dry, and No. 245 in spirit from which the photograph was taken for the illustration) have been subjected to a careful examination, and also other specimens from Lake Illawarra.

I find that the spicules do not agree with the original description. The skeleton is stated to "consist of dense network of slightly curved styli." In the skeleton of the figured type, the fibres are composed of slightly curved oxea, more or less bound together by long sinuous strongyla, which are usually disposed at right angles to the columns of oxeote spicules in the main fibres.

I failed to find a single styli *in situ*, but observed two or three in a mass of spicules obtained by boiling a piece of the sponge in nitric acid.

Megascleres—(*a*) Slightly curved oxea, either abruptly pointed or tapering gradually from the middle. Size—Variable, from 0·25 to 0·35, by 0·007 to 0·012 mm. (*b*) Strongyla curved or sinuous. Size—From 0·5 to 1·5, by 0·003 to 0·006 mm.

Two well preserved specimens were obtained at Lake Illawarra.

CIOCALYPTA, *Bowerbank*.

CIOCALYPTA COMPRESSA, *Carter*, *sp*.

(Plate xi., fig. 16).

Leucophlœus compressa, Carter, Ann. Mag. Nat. Hist., (5), xii., 1883, p. 324, pl. xiv., fig. 16.

Ciocalypta compressa, Dendy, Proc. Roy. Soc. Vict., (n.s.), ix., 1897, p. 240.

Two specimens were obtained at Lake Illawarra. They agree with published descriptions. A few of the larger oxea are, however, much stouter than in Dendy's example (R.N. 961), and measure 0·4 by 0·014 mm.

HORNY SPONGES.

ORDER MONOCERATINA.

FAMILY AULENIDÆ.

AULENA, *Lendenfeld*.

AULENA GIGANTEA, var. MICROPORA, *Lendenfeld*.

Aulena gigantea, var. *micropora*, Lendenfeld, Proc. Linn. Soc. N.S.W., x., 1886, p. 849; *id*., Aust. Mus. Cat., xiii., Sponges, 1888, p. 232; *id*., Mon. Horny Sponges, 1889, p. 100, pl. ix., fig. 2.

Three beach-worn examples of this variety were obtained at Tuggerah Beach, and two from Port Jackson.

FAMILY SPONGIDÆ.

SUB-FAMILY EUSPONGINÆ.

CHALINOPSILLA, *Lendenfeld*.

CHALINOPSILLA IMPAR, *Carter*, *sp*.

Dactylia impar, Carter, Ann. Mag. Nat. Hist., (5), xv., 1885, p. 309.

Chalinopsilla impar, Lendenfeld, Mon. Horny Sponges, 1889, p. 146, pl. i., fig. 9, pl. iii., fig. 12.

Several examples are hesitatingly referred to this species. The branches are thinner and broader than in examples from Port Phillip. The main fibres, however, are filled with the same kind of large isolated sand grains.

The specimens were obtained at Lake Illawarra.

CHALINOPSILLA DICHOTOMA, *Lendenfeld.*

Chalinopsilla dichotoma, Lendenfeld, Proc. Linn. Soc. N.S.W., x., 1886, p. 570; *id.*, Aust. Mus. Cat., xiii., Sponges, 1888, p. 102; *id.*, Mon. Horny Sponges, 1889, p. 142, pl. i., fig. 1, pl. ii., fig. 4, pl. iii., figs. 3 - 11.

A single example of this species was obtained at the Hawkesbury River.

CHALINOPSILLA ARBOREA, var. MACROPORA, *Lendenfeld.*

Chalinopsilla arborea, var. *macropora*, Lendenfeld, Aust. Mus. Cat., xiii., Sponges, 1888, p. 110; *id.*, Mon. Horny Sponges, p. 150, pl. i., figs. 5, 10.

A small water-worn example is present in the collection from Port Stephens.

PHYLLOSPONGIA, *Ehlers.*

PHYLLOSPONGIA DENDYI, var. DIGITATA, *Lendenfeld.*

Phyllospongia dendyi, var. *digitata*, Lendenfeld, Mon. Horny Sponges, 1889, p. 178.

Two examples of this variety were obtained at Lake Illawarra. There are numerous specimens in the Museum. At Jervis Bay it is fairly common about low-tide line.

The sponge is more or less frondose in habit, and usually consists of numerous lamellæ and digitate processes. One specimen is 120 mm. high, 100 mm. broad, and the main lamina is 5 mm. in thickness. The surface is minutely conulose, with many scattered pores, about 0·5 mm. in diameter. In the deep folds of the lamellæ, and also between the digitations, a moderate number of circular openings are present, measuring from 1 to 5 mm. in diameter. The main fibres are uneven, trellis-like, and cored with abundant spicule fragments and small sand grains.

Specimens from Western Australia are generally more regular in form and the lamellæ somewhat thinner than in the variety *digitata*, Lend., and agree closely with the description and figure of *P. dendyi*, var. *frondosa*, Lendenfeld.

LEIOSELLA, *Lendenfeld.*

LEIOSELLA LEVIS, *Lendenfeld.*

Leiosella levis, Lendenfeld, Proc. Linn. Soc. N.S.W., x., 1885, p. 536; *id.*, Aust. Mus. Cat., xiii., Sponges, 1888, p. 121; *id.*, Mon. Horny Sponges, 1889, p. 213, pl. xii., fig. 14, pl. xv., fig. 6, pl. xx., fig. 14.

Numerous examples of this well marked species are in the collection from Lake Illawarra.

LEIOSELLA FLABELLUM, *Lendenfeld.*

Leiosella flabellum, Lendenfeld, Mon. Horny Sponges, 1889. p. 218, 1889, fig. 2.

Two specimens were obtained at Lake Illawarra.

LEIOSELLA SILICATA, *Lendenfeld.*

Leiosella silicata, Lendenfeld, Proc. Linn. Soc. N.S.W., x., 1886, p. 545; *id.*, Aus. Mus. Cat., xiii., Sponges, 1888, p. 122; *id.*, Mon. Horny Sponges, 1889, p. 215, pl. xii., fig. 1, pl. xx., figs. 12, 13, 16, pl. xxi., fig. 3.

This species is frequently washed up on our coastal beaches after heavy gales. There are four examples: two from Lake Illawarra and two from Tuggerah Beach.

The type specimen is evidently only a young form or a fragment, judging from the examples now under notice. The measurements of the type are 70 mm. in length, 40 mm. in breadth, and 20 mm. in height. A specimen from Lake Illawarra is 100 mm. in height, 224 mm. in length, and 180 mm. in breadth. The sponge consists of a series of lamellæ, from 5 to 15 mm. thick, generally forming irregular cups, which vary in size from a few mm. in depth and width to 100 or more mm. The margins of the cups are thick, and either rounded or truncated, with numerous depressions, like such as would be produced by pressure from the tips of fingers, depressions of the same kind occur more or less on all parts of the surface. The line of coalescence between two or more cups is usually distinct, depressed, and marked by numerous vent-like openings, generally under 1 mm. in diameter. Similar apertures are scattered over the whole surface, but they are better defined on the outer aspect of the walls. The secondary fibres exhibit a single axial row of regularly arranged spicules of many kinds. The texture is like that of the finest bath sponge, soft and velvet-like to the touch.

EUSPONGIA, *Bronn.*

EUSPONGIA IRREGULARIS, var. SILICATA, *Lendenfeld.*

(Plate xii., figs. 17 – 17*a*).

Euspongia irregularis, var. *silicata*, Lendenfeld, Proc. Linn. Soc. N.S.W., x., 1886, p. 495; *id.*, Aust. Mus. Cat., xiii., Sponges, 1888, p. 134; *id.*, Mon. Horny Sponges, 1889, p. 225, pl. xiii, fig. 1, pl. xxi., fig. 10.

This variety is very common on the coastal beaches, and attains to a very large size. The description, as given in the Monograph of Horny Sponges, is not sufficiently accurate—as regards the larger specimens—for identification. The contents of the fibres are not correctly described, if the single spirit specimen (No. 54) in the Lendenfeldian collection is rightly named.

There are seven well grown examples in the Fisheries' donation, and very many others on exhibit and in the duplicate collection. These are, however, all beach-worn to some extent, and present characters not evident in the small spirit specimen.

The sponge, in its young state, is often massive, higher than broad, with incipient vertical lamellæ in the form of strongly developed ridges. In well grown adult specimens the sponge consists of flabellate expansions, more or less semicircular in outline, with several points of attachment along the base, and frequently there are one or more vertical lamellæ placed at right angles to the main frond. The height is usually about equal to the breadth; the basal portion measures from 20 to 30 mm. in thickness, at the distal fourth the lamina gradually decreases in diameter and the upper margin is subacute. The surface bears numerous conuli, from 1 to 6 mm. high, the average being about 5 mm.; they are arranged in circles, and surround the funnel-shaped inhalent pores; the raised margins of the latter, with the conuli, form elevated longitudinal or subradiate ridges about 5 mm. wide. The pores are from 1 to 2·5 mm. in diameter. The spaces between the ridges are occupied by grooves 4 mm. in width; they are generally well developed near the distal margin, but frequently they are continuous from the base to the summit; in transverse section they form half or two-thirds of a circle; in many cases they are tubular at their origin, but rarely circular at their termination. In the massive lobose forms there are numerous scattered oscula on the sides of the lamellæ, but they are more abundant on the margins no matter what the shape may be, their diameter varies from 3 to 8 mm. Texture in the dry state very hard and scarcely compressible between the fingers; when wet, moderately soft, very tough, and highly elastic. This variety would be useful for any purpose requiring a firm, tough, durable sponge. Colour varying from dark yellowish- to purplish-brown.

Skeleton.—The arrangement of the fibres and their diameter agrees with the description; they are remarkable for their uniformity in thickness. The foreign spicules in the spirit specimen and also in all the others examined, are never so numerous as to form "a dense axial column"; they are generally two or three in a row and are very scarce in the central parts of the sponge, becoming more frequent as the surface is approached. The fibres of the conuli have an axial core, consisting of one or two rows of foreign spicules, and in well preserved specimens numerous spicules occur outside the fibres.

Euspongia irregularis, var. areolata, *var. nov.*

(Plate xii., fig. 18).

Sponge usually consisting of a main semicircular flabellate lamina, which gives off at right angles from one to four or more short lateral leaflets; the latter rarely reach to the upper margin of the main frond. The main lamina is usually about 25 mm. in thickness at the base; the average thickness is about 10 mm. The apical margins are subacute and 5 mm. in diameter. The upper semicircular margin presents a few large circular oscula, ranging from 5 to 20 mm. in diameter. On the external surface their course is more or less marked on each side by prominent rounded longitudinal ridges, and the apical external diameter of the elevated oscula is often three or four times greater than the edge of the lamina. The margins of the oscula are generally prominent and serrated. The serrations, when viewed in profile—by transmitted light—are seen to be the terminations of dense longitudinal bundles of fibres. Numerous smaller oscula are scattered over the surface and along the margins; they are not prominent, and often the outer wall is incomplete, they are open externally, forming deep grooves which are variable in length, sometimes extending from the base to the summit; frequently near the summit deep grooves are present on both surfaces, with a thin central partition between them. The surface exhibits numerous grooves besides those which terminate at the margin; these are separated by high irregular ridges, or a series of isolated columns, both of which are apically clothed with numerous rigid villi from 1 to 3 mm. high. The inhalent pores are very abundant, and are scattered all over the surface; their diameter is 1 mm. or less, and about the same distance apart. A series of larger openings is present here and there in the walls of the oscula and scattered over the ridges of the lamina; they are very irregular in shape and rarely circular. Texture in the dried condition, soft, elastic, but rather harsh to the touch. Colour grayish to dark fawn.

Skeleton net consisting of a close, fine reticulation. The main fibres are rather sinuous, and cored with sand grains and spicule fragments, the latter predominating; they are 0·05 mm. in diameter, and from 0·2 to 0·5 mm. apart. The stouter secondary connecting fibres are rather scarce; they are 0·03 mm. in diameter and together with the primaries form an open network, with elongated or angular mesh, about 0·1 by 0·2 mm. The spaces between primaries and the stouter secondaries are filled with slender much branched fibres, which form a very close reticulation; the fibres are generally about 0·01 mm. in diameter.

Five specimens are in the collection from Lake Illawarra. This variety is not uncommon on the coast near Sydney.

Euspongia illawarra, *sp. nov.*

(Plate xii., fig. 19).

Sponge flabellately expanded; the base measures 200 mm. in length and from 80 to 100 mm. in width, and has several points of attachment. The upper margin is semicircular in outline, and about 30 mm. in thickness in the centre, the lateral margins become thinner and are subacute at their extremities. The height of the frondose lamina is 140 mm. The whole of the margin and several side processes are osculiferous at the summit. The oscula are closely placed, and are separated by walls from 1 to 2 mm. in thickness, the walls on the outer aspect of the margin are often wanting, and when viewed from above consist of about two-thirds of a circle. At the vertex of the margin the oscula form a transverse row; laterally they decrease in number, and at the extremities they consist of a single series; their diameter is usually about 4 mm. The surface is fairly even and marked by a raised reticulation, consisting of ridges, surmounted by rather broad conuli about 5 mm. high, which tend to become seriate and follow the course of the oscula. The inhalent pores are scattered in abundance between the conulose ridges; they are funnel shaped, rather deep seated, and measure from 1 to 3 mm. in diameter; the conuli are on an average about 2·5 mm. apart.

The dried skeleton is soft and very elastic; when wet it is tough, elastic, and apparently very durable. Colour, light yellowish-brown. The main fibres are entirely free from foreign bodies, such as sand grains and spicule fragments; they are not readily distinguishable from the stouter secondaries; here and there in the central region they are trellis-like in their arrangement; usually they are 0·08 mm. in diameter, and 0·2 mm. apart. The secondary connecting fibres are generally curved, the stouter measure 0·06 in diameter, and the slender kind are about 0·03 mm. or less; the latter occur near the surface and in the less dense parts of the sponge. The skeleton mesh is generally angular or polygonal, about 0·15 mm. in diameter; the angles or corners are sharply defined, and exhibit little or no thickening at the juncture of the fibres. The above description is based on two examples from Lake Illawarra. A third specimen from Tuggerah Beach differs in shape, is much coarser in appearance, and the texture is more open. The example is only a fragment of a very large sponge; it measures 200 mm. in height, 250 mm. in length, and about 120 mm. across the broad, flat, upper border, which exhibits fourteen oscula in a tranverse row. The external surface and the fibres do not differ from those described above. This sponge is by far the best occurring on the coast, and is equal, if not superior, to many of the commercial sponges procurable in Sydney.

EUSPONGIA OFFICINALIS, var. SPINOSA, *Lendenfeld.*

Euspongia officinalis, var. *spinosa*, Lendenfeld, Mon. Horny Sponges, 1888, p. 273, pl. xxii., fig. 14.

A single example of this form was obtained at Coogee Bay. The specimen is incrusting, and measures 130 mm. in length and 90 mm. in breadth; on one side it is 50 mm. in height, and on the other from 5 to 15 mm. The upper surface exhibits numerous pit-like depressions from 10 to 20 mm. in diameter, and a series of irregular ridges, surmounted by numerous oscula, from 2 to 3 mm. wide; frequently the outer margins of the oscula are incomplete on one side; this marks the termination of a groove which is often branched at its origin. Occasionally the oscula are surrounded by shallow branched grooves. The surface is minutely villose and extremely harsh to the touch; this harshness is due to the number of spicules in the slender terminal fibres forming the villi. Texture in the dried condition firm but not very elastic; when wet fairly soft and elastic, but easily torn.

A second example in the Museum collection, from Maroubra Bay, measures 80 mm. in height and 60 mm. in diameter at the middle. There is a small attachment base, and an indistinct peduncle; the surface exhibits shallow pits and low short ridges, with numerous oscula surrounded by more or less evident grooves.

EUSPONGIA OFFICINALIS, var. DURA, *Lendenfeld.*

(Plate xii., fig. 20).

Euspongia officinalis, var. *dura*, Lendenfeld, Proc. Linn. Soc. N.S.W., x., 1886, pp. 531 and 533; *id.*, Aust. Mus. Cat., xiii., Sponges, 1888, p. 130; *id.*, Mon. Horny Sponges, 1889, p. 275, pl. xii., fig. 2, pl. xxii., fig. 7.

A single massive specimen (No. 58) is present in the Lendenfeldian collection. According to the Register it was purchased from the late J. F. Bailey, of Melbourne, and was obtained in Western Australia. It is very similar to the specimen figured, and is probably half of the original.

There are three specimens from Lake Illawarra.

The sponge is incrustating, massive or flabellate, with one or more vertical lamellæ attached to the sides of the main frond. The marginal ridges in two examples are somewhat acute, and bear two or more rows of oscula, about 2 mm. in diameter; at the sides of the margins they are frequently incomplete, the outer wall is wanting, and they appear as grooves from 30 to 40 mm. in length, and 1 to 15 mm. in diameter. In a third specimen the upper margin and side lobes are broad at the apices, and bear several rows of oscula, from 2 to 4 mm. in diameter, there are also a few scattered over the sides of the lamellæ. The surface is closely covered with small slender conuli, 2 or 3 mm. high; they are somewhat seriate and disposed longitudinally, with shallow depressions between, in which the inhalent pores occur. The pores are about 1 mm. or less in diameter; transversely they are 1 or 2 mm. apart; longitudinally they are often remote, and separated by spaces of from 3 to 5 mm. Texture when dry, close, hard, and incompressible; when wet, tough, firm, and highly elastic. Colour bright sandy yellow. Height of larger example 120 mm., breadth 130 mm., the lesser diameter varying from 15 to 30 mm.

The skeleton agrees fairly well with the description. In the neighbourhood of the stouter main fibres the arrangement is often trellis-like, the connecting fibres are rather stout and slightly exceed the measurements given in the original diagnosis.

According to Lendenfeld, this variety is identical with *Spongia liqnea*, Hyatt, from near Sydney, New South Wales.

EUSPONGIA PIKEI, *Hyatt*, *sp.*

(Plate xii., figs. 21 – 21 *a*).

Stelospongia pikei, Hyatt, Mem. Bost. Soc. Nat. Hist., ii., 4, 1877, p. 532, pl. xvii., fig. 20.

Euspongia pikei, Lendenfeld, Aust. Mus. Cat., xiii., Sponges, 1888, p. 132; *id.*, Mon. Horny Sponges, 1889, p. 279, pl. xxii., figs. 3, 8, 12.

This species is represented in the Lendenfeldian collection by two specimens, one (No. 57) from Port Chalmers, New Zealand, and the other (No. 351) from the coast of New South Wales.

In habit the sponge varies from half-cup shape to subflabellate, and in some specimens it is flabellate, with numerous lobate processes. The sponge may be pedunculate, or have a broad base of attachment. The lamellæ rarely exceed 130 mm. in height, 80 to 100 mm. in breadth, and 10 mm. in thickness. The oscula are between 2 and 3 mm. in diameter; they occur on the rounded margins and are also scattered over the convex surfaces, where they are often prominent. The whole surface is covered with minute conuli, which are situated on the slightly elevated ridges of the reticulation; between the ridges numerous inhalent pores are situated, their diameter is about 1 or 2 mm., and rather less than that distance apart. Texture in the dry condition, light, spongy, moderately firm and elastic, but easily breaking with slight pressure. Colour, yellowish-gray, with a dull surface, quite unlike that of any other *Euspongia* known to the writer.

Skeleton consisting of bundles of trellised main fibres, which curve gracefully outwards towards the surface, these are connected by a series of very fine secondaries. The track of the main trellis bundles is marked by the presence of a thick line of foreign bodies; the latter appear to be cemented in the spaces of the trellised fibres, and do not, so far as I can determine, form an axial core in the fibres. The stouter trellis-like bundles are from 0·3 to 0·5 mm. apart, and often 0·5 mm. in diameter, with two or more strands of foreign bodies. The more slender bundles usually have a single thread of sand grains, and are from 0·1 to 0·2 mm. in diameter. The individual main fibres are 0·04 mm. in diameter, and are usually separated by spaces about 1 mm. or less. The secondaries measure about 0·01 mm.; the mesh is angular and frequently elongate, with the longer diameter transverse to the trellised bundles; length of mesh 0·1 mm.

The form described above closely agrees with Hyatt's figure; the description has been chiefly drawn from the dry example named *Euspongia pikei*, by Dr. Lendenfeld (No. 351); the latter author, in his account of the skeleton, states that "The main fibres of the skeleton are irregular, flattened, and perforated trellis-like. These perforated plates attain a maximum breadth of 0·25 mm. No foreign bodies are observed in them." If the latter remarks were intended to apply to the single fibres they are probably correct. But a longitudinal section of the specimen bearing the name of *Euspongia pikei* in Dr. Lendenfeld's handwriting, and numbered 351, contains dense axial strings of sand grains in each bundle of trellised fibres, and under a low power this character is very peculiar, and would at once arrest the attention of the observer. These foreign bodies are present in every specimen examined; they appear to be cemented in the spaces of the trellis work and attached to the fibres. Even in specimens that have been washed about on the beach to such an extent as to lose nearly all their external characters, these strings of sand grains are still present.

There are two examples from Lake Illawarra, and two from Tuggerah Beach.

HIPPOSPONGIA, *Schulze.*

HIPPOSPONGIA EQUINA, var. ELASTICA, *Lendenfeld.*

(Plate xii., fig. 22).

Hippospongia equina, var. *elastica*, Lendenfeld, Mon. Horny Sponges, 1889, p. 307, pl. xvi., fig. 1.

This species is represented by seven specimens from the following localities—Botany Bay, Lake Illawarra, and Tuggerah Beach.

The largest example measures 200 mm. in height, 260 mm. in its greater and 220 mm. in its lesser diameter.

HIPPOSPONGIA MOLLISSIMA, *Lendenfeld.*

(Plate xiii., fig. 23).

Hippospongia mollissima, Lendenfeld, Mon. Horny Sponges, 1889, p 310, pl. xvii., fig. 13.

A single specimen is in the collection from Lake Illawarra.

The example is subglobose, about 100 mm. broad and 60 mm. in height.

HIPPOSPONGIA CANALICULATA, var. ELASTICA, *Lendenfeld.*

Hippospongia canaliculata, var. *elastica*, Lendenfeld, Proc. Linn. Soc. N.S.W., x., 1886, p. 502; *id.*, Aust. Mus. Cat., xiii., Sponges, 1888, p. 139; *id.*, Mon. Horny Sponges, 1889, p. 321, pl. xii., figs. 4-5, pl. xviii., fig. 1, pl. xix., figs. 2, 3, 4, 7.

A single specimen of this variety was obtained at Lake Illawarra. It measures 100 mm. in height and 20 mm. in breadth.

COSCINODERMA, *Carter.*

COSCINODERMA DENSA, *Hyatt, sp.*

(Plate xiii., figs. 24 – 24*a*).

Spongelia farlovii, var. *densa*, Hyatt, Mem. Bost. Soc. Nat. Hist., ii., 4, 1877, p. 536.

This species is frequently found on the coast, more especially at Wollongong. There are two examples in the Fisheries donation from Lake Illawarra, and two from Port Stephens.

The sponge is unusually flabellate, and higher than wide; generally there is a short compressed peduncle, which is often sharply defined, but occasionally it gradually merges into the lamina; the latter varies in outline, but in most cases it is suborbicular. The surface invariably exhibits elevated, rounded ridges, which indicate the course of the oscula tubes; they are strongly marked near the margin, at least on one side, and frequently on both. There is also a series of shallow depressions scattered irregularly over the general surface. In some specimens the main lamina gives off at right angles small oscula bearing ridges or lamellæ, which often attain to nearly the size of the original frond. The oscula are from 1 to 5 mm. in diameter; they occur at regular intervals along the upper border, and sometimes they surmount a prominent ridge or lobe at the sides of the lamina. The whole surface of the sponge exhibits a great number of inhalent pores 0·6 to 0·8 mm. in diameter, and about 1 mm. or less apart. Numerous branching grooves are present here and there, being well marked at the base and also near the margin; their width is usually under 1 mm. Texture fine, very dense, hard and highly elastic. Colour, bright yellowish-brown.

The skeleton is arranged as in *Coscinderma lanuginosa*, Carter; the fibres are, however, stouter, especially the secondaries, and the mesh is much finer; the main fibres are interruptedly cored with smaller foreign bodies. These consist of spicule fragments and sand grains; generally they are arranged in a single row, and only occupy about one-third of the dense and strongly laminated horny fibre. The primary fibres are about 0·15 mm. in diameter, and from 0·2 to 0·4 mm. apart. The longitudinally arranged main fibres of the central region are usually without foreign bodies; the stouter transverse fibres have an interrupted core, which becomes continuous as the surface is approached. The connecting fibres are free from deposits of sand grains; they vary from 0·04 to 0·08 mm. in diameter, and their distance apart rarely exceeds 0·2 mm. in the centre, and from 0·5 to 0·1 mm. near the surface.

Specimens of this species have been compared with examples of *Coscinoderma lanuginosa*, Carter, from Port Phillip, and also with a mounted section from a specimen in the British Museum. It exhibits several important differences, which may be enumerated as follows:—The texture is closer, the inhalent pores are smaller; the oscula are more numerous, less in diameter, and never project so as to give a serrated outline to the margin. The largest specimen measures 300 mm. in height, 250 mm. in width, and from 7 to 25 mm. in thickness; the peduncle is 60 mm. in length, 10 mm. in thickness at its juncture with the frond, and about 40 mm. at the base. A smaller example is 180 mm. in height, 130 in breadth, and 10 mm. in thickness, the peduncle is 75 mm. in length, 5 mm. in its lesser and 35 mm. in its greater diameter.

Thorecta farlovii, Lendenfeld,[21] is undoubtedly distinct from the var. *densa*, Hyatt,[22] as figured on plate xvii., yet this fig. 14 is quoted in the Monograph under *T. farlovii.*

Hyatt's illustration clearly exhibits "superficially extending oscula tubes and corresponding grooves in the skeleton," which ought—according to the definition of the genus *Thorecta*—to forbid its admission as a species of that genus.

The following remarks in reference to the affinities of the genus *Thorecta* are sufficient to show that the author of them had not seen examples of Hyatt's var. *densa* :—"We may derive it [the genus *Thorecta*] from *Coscinoderma*, which it resembles very closely in the structure of the canal system, and the peculiar arenaceous cortex, by assuming that the skeleton-net, which is very dense in *Coscinoderma*, has become looser, the meshes wider, and the fibres stouter."

It is very unlikely that a form such as the var. *densa*, Hyatt, —which is closer in texture than the type of the genus *Coscinoderma*—would be placed in the genus *Thorecta*. (See Plate xiii., fig. 27).

It seems highly probable that *Thorecta farlovii*, Lendenfeld, is identical with *Spongelia palmata*, Hyatt; it does not agree with Hyatt's figure 15 on plate xvii, but with one of the "two other specimens" mentioned on page 532. Hyatt remarks that "The largest is a foot broad by nine inches in height, and the surface is pitted with shallow depressions or hollows, about one half of an inch in diameter." The above lines apply to a sponge which is not uncommon on the coast, of which I have seen very many specimens. Lendenfeld's figures of *T. farlovii* are good representations of this form, but it is quite distinct from *Spongelia farlovii*, var. *densa*, Hyatt. A comparison of the figures is sufficient to prove their distinctness. Hyatt's figure exhibits a series of "superficially extending oscula tubes," and presents a broken surface on the left lower portion of the frond, which clearly indicates the density of the sponge. Such a broken surface is scarcely possible in a soft wide meshed sponge.

If the whole of the evidence afforded by the preceding remarks, and the published descriptions and figures are duly considered, it will be seen that *Spongelia farlovii*, var. *densa*, Hyatt, really

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21 Lendenfeld—Mon. Horny Sponges, 1889, p. 353.

22 Hyatt—Mem. Bost. Soc. Nat. Hist., ii., (4), 1887, p. 536, pl. xvii., fig. 14.

belongs to the genus *Coscinoderma*, and that *Thorecta farlovii*, Lendenfeld, is identical with *Spongelia palmata*, Hyatt.

Sub-family APLYSININÆ.

Thorecta, *Lendenfeld.*

Thorecta murrayi, *Poléjaeff.*

Cacospongia murrayi, Poléjaeff, Chall. Rept., Zool., ii., 1884, p. 57, pl. iv., fig. 3.

Thorecta murrayi, Lendenfeld, Mon. Horny Sponges, 1889, p. 347, pl. vi., fig. 8.

A single specimen was obtained at Tuggerah Beach.

Thorecta cacos, *Lendenfeld.*

Thorecta cacos, Lendenfeld, Mon. Horny Sponges, 1889, p. 349.

Two specimens are in the collection from Lake Illawarra.

Hitherto recorded from South Australia.

Thorecta radiatus, *Lendenfeld.*

(Plate xiii., fig. 26).

Thorecta radiatus, Lendenfeld, Mon. Horny Sponges, 1889, p. 350.

A single small specimen from Port Jackson is here doubtfully referred to this species. The example is pedunculate and flabellate; it is 130 mm. high, 95 mm. broad, and 25 mm. thick in the centre; the lamina is sublenticular, and rapidly decreases to the margin. The apical border is convex, and bears six oscula; the central ones are rather prominent, and measure about 7 mm. in their longer diameter. When viewed by transmitted light the main fibres are seen to be beautifully radiate and gracefully curved outwards, and in the lower half downwards, so that extremities of the fibres are lower than their origin at the centre of the sponge. The secondary fibres are not very evident at the surface; the main fibres are very conspicuous, and are radiately arranged. The texture is very similar to *Thorecta exemplum*, var., *marginalis*, but the surface lacks the reticulation which forms such a marked feature of that species.

The main fibres are somewhat knotty, and cored with abundant sand grains; the secondaries are slender and generally at right angles to the primaries in the denser parts, with oblong or square mesh. Near the surface the mesh becomes more irregular, and the sand-cored fibres are very abundant.

Thorecta meandrina, *Lendenfeld.*

Thorecta meandrina, Lendenfeld, Mon. Horny Sponges, 1889, p. 350, pl. xxiii., fig. 6.

Four examples are referred to this species. The sponge has several points of attachment, and consists of a series of meandering lamellæ; the oscula are thickly scattered along the margins of the lamellæ, and occasionally on the sides; their diameter varies from 2 to 3 mm. The whole surface, except the margins, exhibit numerous inhalent pores about 1 mm. in diameter. The main fibres terminate at the surface, giving it a hispid appearance like that of *Thorecta tenuis*, Hyatt. The texture is, however, much closer, and the surface more even. The main fibres are interruptly cored with sand grains, and are very uneven, especially at the nodes, or rather at the points of origin of the secondaries. The largest example is 170 mm. in length, 100 mm. in height, and 140 mm. in breadth; the lamellæ vary from 15 to 40 mm. in thickness.

Four specimens from Swansea.

THORECTA TENUIS, *Hyatt.*

(Plate xiv., figs. 28 – 28*a*).

Spongelia rectilinea, var. *tenuis*, Hyatt, Mem. Bost. Soc. Nat. Hist., ii., (4), 1877, p. 537, pl. xv., fig. 13.

Thorecta exemplum, var. *prima*, Lendenfeld, Aust. Must. Cat., xiii., Sponges, 1888, p. 143; *id.*, Mon. Horny Sponges, 1889, p. 357, pl. xxiv., fig. 7.

This species is well represented in the Fisheries and the Museum collections.

A specimen from Lake Illawarra is the exact counterpart of the example figure by Hyatt in every character except size. It measures 140 mm. in height, 160 mm. across the cup, and the cavity is 145 mm. in depth; the attachment base is 50 mm. in its lesser and 110 mm. in its longer diameter. The wall of the cup is from 15 to 25 mm. in thickness.

Another example from Botany Bay, with the sand cortex more or less complete, equals Hyatt's specimen in size, the height being 223 mm. The peduncle is generally short, very broad, and often exhibits a series of root-like processes around the outer margin. The external surface in the cup-shaped forms is usually ornamented with broad, rounded, longitudinal ridges, which are strongly marked at their origin and gradually fade away towards the upper margin; the larger ridges have a corresponding depression on the inner side of the cup. In the valleys between the ridges there are numerous inhalent pores about 1 mm. or less in diameter; on other parts they are indistinct, and when the cortex is intact they are difficult to see without a lens. The inner surface exhibits a great number of oscula from 1 to 2·5 mm. in diameter; they become smaller as the margin is approached, and cease at about

10 or 15 mm. from it. The texture is close, hard, scarcely compressible between the fingers, and very harsh to the touch; waterworn examples are, however, frequently soft, and easily yield to pressure. Colour, brownish to yellowish-olive; after long exposure yellowish-grey.

Skeleton—With stoutish knotty main fibres, cored with very unequal sand grains; the arrangement of the fibres is very peculiar; they present a feature which has not been noted. In section the wall of the cup exhibits a narrow excentric column of fibres, which are parallel, longitudinal, and situated much nearer the inner surface than the outer. On the inner side of the column the lateral branches and terminal ends of the fibres are short and obliquely bent upwards. On the outer side they are long and gracefully curved in their basal third or half, thence straight, parallel, and at right angles to the column. The ends of the main fibres are thus presented to the outer surface, rendering it bristly in appearance and harsh to the touch. The diameter of the fibres is about 0·2 mm., and they are from 0·8 to 1 mm. apart. The secondary fibres are 0·1 mm. or less in diameter; they are usually at right angles to the primaries, with square or oblong mesh 0·3 to 0·5 mm. in diameter; near the surface the fibres are finer, more branched, and the mesh becomes angular and smaller.

In the Catalogue of Sponges, and also in the Monograph, *Spongelia rectilinea*, var. *tenuis*, Hyatt, is treated as being identical with *Thorecta exemplum*, var. *secunda*, Lendenfeld. How this conclusion was arrived at I fail to comprehend. Hyatt's var. *tenuis*, as figured on Plate xiv., is certainly very different in form from Lendenfeld's var. *secunda*, as illustrated on Plate xxvii. in the Monograph. The latter are more or less pyriform in outline, and are described as having a peduncle, which "measures in large specimens at the base about 4 mm." Hyatt states that his figures are all reduced to about one-fourth the original size. The basal diameter of his figured specimen would, therefore, be about 60 mm., and the height about 40 mm. The variety *secunda* is described as having the cup "very shallow," whilst variety *tenuis*, Hyatt, is stated to be "regular and vase shaped."

There are two specimens in the Lendenfeldian collection labelled *Thorecta exemplum*, var. *secunda*. No. 67 is in spirits; the lower portion of the sponge is wanting; the upper part is flabellate, and has a row of oscula on the thick rounded superior border; there is no trace of any central depression at the apex, and the fibres are cored with sand grains, which are described as being "free from foreign bodies." No. 74 is from the Northern Territory of South Australia, the specimen is dry and still retains some of the sand cortex. It is trumpet shaped, and 170 mm. in height; the peduncle is 8 mm. in the lesser and about 19 mm. in the greater diameter. The cup is 65 mm. across and about the same in depth. A large osculum is present at the base, and numerous smaller oscula are scattered over the inner surface. The outer surface is reticulately ridged, with deep, rounded, or elongated pits between the ridges, especially in the upper portion of the sponge. The main fibres are cored with sand grains and foreign spicules; in some cases the axial core is dense, knotty, and continuous; in others the sand grains are wanting, or are remote from each other. Foreign spicules are often present, and frequently project from the fibres. There is a large example of this form in the exhibited collection from Henley Beach, South Australia. It measures 325 mm. in height, with a peduncle 120 mm. in length, and 20 mm. in thickness; the cup is 200 mm. in diameter across the summit, and 180 mm. in depth. The distal third of the outer surface presents a series of irregular longitudinal ridges, with deep wide valleys between. The lower two-thirds is thickly studded with angular processes 20 mm. high and about 10 mm. in thickness; they are often isolated, but generally they are more or less connected by thin bridges of fibre, which connect the ridges and processes and form the boundaries of the pits. The main fibres are charged with spicule fragments and large sand grains.

Thorecta exemplum, var. *prima*, Lendenfeld, is represented in the exhibited collection by five specimens named by the author (Nos. 66, 70, 71, 72, 73). No. 66 is exactly like No. 67 which is labelled *Thorecta exemplum*, var. *secunda*, neither of which agree with the descriptions. No. 70 to 73 are in accord with the diagnosis, and are undoubtedly young examples of *Spongelia rectilinea*, var. *tenuis*, Hyatt.

In the Fisheries collection there are over a hundred specimens of this form; they exhibit a great range of variation, from flabellate to half or complete cup-shaped, with almost every intermediate stage represented between them, from the simple pedunculate frond 50 mm. high and 55 mm. broad, and 3 mm. in thickness, to the massive vase-shaped kind, such as that illustrated by Hyatt. They all exhibit the same texture, arrangement, and contents of the fibres, their differences being confined to the shape, size, and the aspect of the outer surface: the latter, in immature flabellate or half cup-shaped examples, is often nearly smooth, whilst in some there are slight depressions, such as might be made by pressure from the tips of fingers; the depressions are rarely surrounded by raised ridges; in even the largest examples the depressions are always shallow, never deep and pit-like. Young specimens generally have a distinct peduncle; as growth proceeds this becomes broader, with scarcely any increase in length; this feature is constant, and certainly does not afford any evidence of affinity with the long-stalked form described as var. *secunda*.

The varieties *secunda* and *tertia*, of *Thorecta exemplum*, Lendenfeld, are very soft and elastic, whilst the var. *prima* (*tenuis*), Hyatt, is hard, rigid, and possesses very little elasticity.

THORECTA ERECTA, *Hyatt.*

(Plate xiv., figs. 29, 29*a* – *e*).

Spongelia rectilinea, var. *erecta*, Hyatt, Mem. Bost. Soc. Nat. Hist., ii., (4), 1877, p. 537, pl. xvii., figs. 12 – 13.

Thorecta exemplum, var. *secunda*, Lendenfeld, Aust. Mus. Cat., xiii., Sponges, 1888, p. 145; *id.*, Mon. Horny Sponges, 1889, p. 359, pl. xxiv., figs. 3 – 5.

Thorecta exemplum, var. *tertia*, Lendenfeld, Aust. Mus. Cat., xiii , Sponges, 1888, p. 145; *id.*, Mon. Horny Sponges, 1889, p. 359, pl. xxiv., figs. 3 – 5, pl. xxxiii., figs. 2, 3, 4, 6, 7, 10.

This species is represented by numerous examples, which exhibit great variation in habit. There are also six specimens, named by Dr. Lendenfeld, labelled *Thorecta exemplum*, var. *tertia*, Lendenfeld, and two bearing the name of *Thorecta exemplum*, var. *secunda*, Lendenfeld. The former are numbered as follows:—Nos. 65, 75, 76, 78, 79, 80, and in each case they agree with the diagnosis. Hyatt's description introduces an element of doubt as to whether his examples are identical with the variety *tertia*, Lendenfeld. According to the latter author, "The body of the sponge itself appears massive, conical, irregular, distended above. It attains a largest horizontal transverse diameter of 50 mm.". . . . . "Each osculum is slightly prominent. In large specimens there is generally one large osculum in the middle which measures 10 – 15 mm. in diameter, and a number of small oscular scattered around it." It will be noted that there is no mention made of a cup-like cavity at the summit, yet Hyatt's account states that "The inside of the cup is very shallow." From the above quotations and the specimens under examination, it appears to my mind that both forms are simply extreme variations of one species. There is a regular graduated series connecting the conical forms with those that are cup-shaped. Certain characters are common to both forms; these are: deep pits on the outer surface, a large central osculum (which may be seated on a conical elevation or at the bottom of a cup-like depression), and either with a series of smaller ones arranged around it, as in the latter, or with one or two occupying the lateral aspect of the ridge in those that are conical. The texture of the sponge is the same, and the contents of the fibres consist of large sand grains and foreign spicules.

The following brief descriptions will convey some idea of the variation exhibited by this species, all of which are more or less distinctly pedunculate :—

(*a*) Lobose; 130 mm. by 9 mm. across the flattened summit, and with numerous large scattered oscula, sides deeply pitted.

(*b*) Compressed, with a broad rounded semi-circular margin, bearing three or more oscula in a row, from 8 to 10 mm. in diameter. Sides deeply pitted, with the apertures directed upwards.

(*c*) Compressed, with one or two conical processes, surmounted by large oscular openings. Sides with distant shallow pits, and low angular ridges.

(*d*) Elongate, subcylindrical, with a single axial osculum, which extends downwards to the apex of the peduncle; surface with wide angular shallow pits.

(*e*) Subflabellate, with a narrow apical groove, in which are seated a row of large oscula and a number of small ones, about 2 or 3 mm. in diameter. Surface with few distant shallow depressions.

(*f*) Compressed, oblong, having a shallow apical cup about as wide as deep, and with or without a large central osculum, but invariably with a number of the smaller kind. External surface deeply pitted.

(*g*) Trumpet-shaped, wlth a shallow apical cup, the sides lined with numerous oscula, and with or without a large one in the centre. Surface deeply pitted.

(*h*) Regularly cup-shaped, with a wide deep cavity, which is evenly rounded at the bottom internally. The inner surface is closely sprinkled with oscula, from 3 to 4 mm. in diameter; the external surface exhibits high ridges, conical elevations, deep grooves, and pits.

In some examples the cup is incomplete, and is accompanied by conical osculiferous processes; in others there are two shallow depressions, each with a central funnel-shaped osculum.

In two specimens there are indications of three or four incipient cups at the summit. Each have a large central osculum, and many small ones on the sides of the depression.

Notwithstanding the great variation in shape and surface, the texture, arrangement, and the nature of the foreign bodies in the fibres are the same, in all the specimens examined.

THORECTA MARGINALIS, *Lendenfeld.*

(Plate xv., figs. 30, 30*a* – *d*.)

Thorecta exemplum, var. *marginalis*, Aust. Mus. Cat., xiii., Sponges, 1888, p. 147; *id.*, Mon. Horny Sponges, 1889, p. 361, pl. xxiv., fig. 2, pl. xxxiii., fig. 1.

This species displays considerable variation, and exhibits three marked forms with numerous intermediate stages between them, none of which approach towards *Thorecta tenuis* or *T. erecta*. The texture of the latter is not unlike that of *T. marginalis*, but all its remaining characters are different.

(*a*) Well developed specimens attain a height of between 200 and 300 mm.; one-fourth of the length consists of a compressed peduncle, twice or thrice as broad as thick; the expanded base usually has a few root-like processes. The upper three-fourths is generally tongue-shaped, widest above the middle, with the broad anterior and posterior surfaces concave, and the sides either flat or slightly convex. The angles bear seriate and somewhat elongate oscula, at fairly even distances apart; their shorter diameter is about 2 5 mm., and the longer about 4 mm. The upper extremity is thin, acute, and may either be truncated or pointed.

(*b*) This form rarely attains to more than half or two-thirds the height of (*a*). The peduncle is sharply defined, and is often sub-cylindrical, but usually a little broader than thick. The upper two-thirds of the sponge consists of three or four vertical lamellæ; four is the usual number, and a median transverse section would be more or less cruciform. The oscula are seriate and confined to the margins.

(*c*) In this form the peduncle is similar to that of the preceding. The lamella is strongly and longitudinally concave; a transverse section through the middle would be semi-circular, with even inner and sinuous outer margins. The inner surface is smooth; the outer often bears two or more low longitudinal ridges, and sometimes it is evenly convex. The oscula are confined to the convex surface, and are irregularly scattered. The position of the oscula are exactly the reverse of what obtains in *Thorecta tenuis* and *T. erecta*, in which they are confined to the concave surface. Another character which tends to show the distinctness of *T. erecta* is the frequent presence of large oscula; these are wanting in *T. marginalis*, and also in *T. tenuis*.

The main fibres contain very large sand grains, and near the surface a few spicule fragments. The sand grains are often isolated, and frequently about 0·5 mm. in diameter, whilst the fibre on each side of the grain is only about 0·15 mm. in width. Another peculiarity which is noticed in the original description is the tendency of the secondary fibres to form "trellis-like closer recticulations in the vicinity of the main fibres." The latter feature is not evident in *T. erecta* or *T. tenuis*.

The following Table is a brief summary of the principal characters of *Thorecta tenuis*, *T. erecta*, and *T. marginalis*:—

Species.	Habit varying from	Peduncle.	Oscula.	Arrangement of Fibres.	Contents of the Fibres.
Thorecta tenuis.	Flabellate to deep vase-shape.	Short and broad.	Small, usually between 1 and 2 mm., confined to the inner surface	With an eccentric axial column, and short terminals on the inner, and long ones on the outer side of the column.	An interrupted axial column of sand grains.
Thorecta erecta.	Conical to shallow cup-shape.	Narrow and elongate.	Of two kinds— (*a*) Large, seated on conical elevations or at the base of the cups, 5 to 10 mm. (*b*) Small, 3 to 4 mm., confined to the inner surface of the cup.		Sand grains and spicule fragments
Thorecta marginalis	Ligulate to very deep half cup-shape.	Narrow and elongate.	Marginal or scattered on the outer surface.	Secondaries forming trellis-like bundles around the main fibres.	Large, isolated, sand grains and spicule fragments

Thorecta lobosa, *Lendenfeld.*

Thorecta lobosa, Lendenfeld, Mon Horny Sponges, 1889, p. 365, pl. xxiii., fig. 4.

This species is represented by a single specimen from Tuggerah Beach.

Thorecta byssoides, *(Lam.), Lendenfeld.*

Thorecta byssoides, Lendenfeld, Mon. Horny Sponges, 1889, p. 365, pl. xxxiii., fig. 3.

This species is represented by three examples. One is pyriform, pedunculate, and has a single central osculum ; the other two are flabellate, with indistinct oscula on the upper semi-circular margin. The texture is very open, and the fibres are densely charged with small sand grains, which occupy three-fourths of the fibres.

Three specimens from Port Stephens.

Thorecta palmata, *Hyatt.*

(Plate xiii., figs. 25 – 25*a*).

Spongelia palmata, Hyatt, Mem. Bost. Soc. Nat. Hist., ii , (4), 1877, p. 537, pl. xvii., fig. 15.

Thorecta farlovii, Lendenfeld, Mon. Horny Sponges, 1889, p. 353, pl. xxiii., fig. 7, pl. xxiv., fig. 4.

This species is usually flabellate and much wider than high ; the lamina arises from a compressed and often compound peduncle ; in some examples the latter is simple, in others it is made up of several strands, which, although united in part or wholly, still retain their individuality. The frondose portion is mostly semi-circular in outline, with oblique lower borders ; the latter are generally about equal to two-thirds of the height of the sponge. Both surfaces are marked with depressions arranged in concentric zones, their width and depth varying in different parts, and often they are almost imperceptible in some specimens ; the depth of the wave like depressions is generally proportionate to the thickness of the frond. In a specimen 16 mm. in thickness the depressions are not more than 3 or 4 mm. in depth ; it agrees very closely with the specimen figured by Hyatt (pl. xvii., fig. 15). In another example 30 mm. in thickness, the depressions are from 6 to 10 mm. in depth, and in several larger and thicker specimens they are deeper in proportion. In some smaller specimens the frondose portion of the sponge is very thick, and the peduncle rather long. This form is well depicted by Lendenfeld's figure (pl. xxiv., fig. 4), in which the depressions are very deep. The oscula form a continuous row along the margin ; they measure between 3 and 6 mm. in diameter, and are rarely more than their own width apart. The inhalent pores in the skeleton are not plainly visible, except on the lower central regions ; they are from

1·5 to 2 mm. in diameter. Texture open, firm, and elastic. Colour, dark or reddish-brown.

Skeleton—Reticulate, with usually square mesh, but often oblong or angular; main fibres 0·5 to 0·15 mm. in diameter, and from 0·6 to 0·8 mm. apart; they are cored with foreign spicule fragments, and with a few large and many small sand grains, the diameter of the core being about half that of the fibre. The connecting fibres are free from foreign bodies; their diameter varies from 0·04 to 0 06, and they are generally about 0·3 mm. apart.

There are three specimens from the Hawkesbury River and three from Lake Illawarra.

Sub-family STELOSPONGINÆ.

Stelospongia, *Schmidt*.

Stelospongia levis, *Hyatt*.

(Plate xv., figs. 32, 32*a* – *b*).

Stelospongia levis, Hyatt, Mem. Bost. Soc. Nat. Hist., ii., (4), 1877, p. 531, pl. xv., fig. 16.

Stelospongia levis, var. *rotunda*, Hyatt, *loc. cit.*, p. 531, pl. xvii., figs. 23-24.

Stelospongia levis (Hyatt), Carter, Ann. Mag. Nat. Hist., (5), xv., 1885, p. 303.

Stelospongia australis, var. *conulata*, Lendenfeld, Aust. Mus. Cat., xiii., Sponges, 1888, p. 168; *id.*, Mon. Horny Sponges, 1889, p. 516, pl. xxv., fig. 3.

Stelospongia australis, var. *fovea*, Lendenfeld, Aust. Mus. Cat., xiii., Sponges, 1888, p. 170, pl. xi.; *id.*, Mon. Horny Sponges, 1889, p. 518, pl. xxiv., fig. 8.

Stelospongia levis, as figured by Hyatt on plate xv. is strikingly like *Stelospongia australis* var. *fovea*, as figured by Lendenfeld on plate xi. in the Catalogue of Sponges. They are very similar in shape and in the terminations of the fibres at the surface. If the various descriptions are compared it is difficult to see were the differences come in, except in outward form, which is extremely variable, and ranges from broadly fusiform to globose, with a large central or excentric oscula; others again are lobose, or appear to be composed of several individuals having a common peduncle and numerous oscula which may be seriate or scattered. There are over 60 examples in the Fisheries collection, and scarcely any two are alike in habit. The surface is equally variable, the height and disposition of the conuli differing in the same example. Lendenfeld objects to Hyatt's varieties on the ground that "the conuli vary in one and the same individual as much as in Hyatt's varieties." The latter remarks apply with equal force to the numerous examples under notice. The ends of the trellised columns of fibres project from the general surface from 3 to 5 mm.; they often consist of subcylindric bundles of from two to four fibres, which gives the surface a pilose aspect. In other cases the bundles are compressed, and form flat tufts from 1 to 3 mm. broad, and in very many examples there is a complete reticulation of narrow ridges spread over the whole body; frequently this reticulation is confined to the upper surface, the lower portion being covered with isolated tufts. There is a single flabellate specimen with a series of six marginal oscula; the surface does not differ from some of the globose examples. This is probably *Stelospongia levis*, Poléjaeff.

Stelospongia canalis, *Lendenfeld.*

(Plate xv., fig. 31).

Stelospongia canalis, Lendenfeld, Aust. Mus. Cat., xiii., Sponges, 1888, p. 164; *id.*, Mon. Horny Sponges, 1889, p. 495, pl. xxiv., fig. 10.

Four examples of this are present in the Fisheries collection. There are also two named by Dr. Lendenfeld (Nos. 94 and 319). The specimen bearing the No. 319 was dredged by the writer, and recognised by the author of the species as *Cacospongia canalis*. When alive the colour was bright terra cotta. The main fibres of this species are described as being free from foreign bodies. In both the specimens No. 94 and 319 the main fibres contain a thin axial string of spicule fragments and very small sand grains. Similar foreign bodies are present in all the examples examined. This sponge exhibits considerable variation in habit. In many examples the habit is flabellate, without any distinct digitations; both surfaces are regularly and radiately grooved. The latter are usually opposite to each other, and terminate at the wavy semi-circular margin. Laterally, and here and there on the surface generally, there are numerous small branching grooves from 1 to 1·5 in diameter. The whole surface, including the grooves, are thickly covered with inhalent pores about 1 mm. in diameter. The flabellate forms usually have a short broad peduncle, and frequently possess one or more narrow vertical lamellæ. Other specimens are irregularly lobose, with fully formed or incipient digitations, with broad wavy grooves running up from the base to the summit; on the digitate processes there is as a rule only one groove, which is deeper and wider than those occurring in the flabellate examples. No. 319 yields the following measurements:—Height, 240 mm.; breadth, 150 mm.; thickness, from 20 to 30 mm.; digitations, from 30 to 90 mm. in length and

20 mm. in diameter at their origin, narrowing to about 10 mm. at the summits; grooves, about 8 mm. in diameter. A flabellate specimen measures 190 mm. in height, 250 mm. in breadth, and about 25 mm. in thickness; the grooves are from 3 to 4 mm. in diameter.

STELOSPONGIA FLABELLIFORMIS, *Carter.*

Stelospongus flabelliformis, Carter, Ann. Mag. Nat. Hist., (5), xv., 1885, p. 305.

Stelospongia flabellum, Lendenfeld, Mon. Horny Sponges, 1889, p. 501, pl. xxxix., fig. 6.

A single worn example is here doubtfully referred to this species. The specimen agrees with Lendenfeld's figure, and has been compared microscopically with two slides prepared from specimens named by Carter, one of which presents characters identical with the Lake Illawarra example. The main fibres consist of trellised columns, cored with sand grains; the diameter of the fibres is about 0·2 mm. The connecting fibres consist of a few stout kinds about 0·8 in thickness; these branch and give rise to a dense, close, felt-like network of extremely thin fibres, which fill up the interstices between the main and the stouter secondaries. The denser parts of the sponge, on the cut surface, appears like chamois leather in texture, the density being due to the abundance and fineness of the fibres. In appearance the specimen presents characters such as would be evident in half of the example figured by Lendenfeld without the peduncle. The colour is like that of a light-coloured bath sponge; the texture is hard, tough, and scarcely compressible; the surface is minutely conulose, and bears abundant inhalent pores from 0·5 to 1·5 in diameter. The central grooves are continuous and axially parallel; the lateral grooves are oblique and occasionally branched; their diameter is between 3 and 5 mm., and their depth is about 4 mm.

Locality, Lake Illawarra.

HIRCINIA, *Nardo.*

HIRCINIA VARIABLIS, *Lendenfeld.*

Hircinia variabilis, Lendenfeld, Mon. Horny Sponges, 1889, p. 557, pl. xxxvi., figs. 11 to 14.

Two specimens from Tuggerah Beach.

HIRCINIA AUSTRALIS, *Lendenfeld.*

Hircinia australis, Lendenfeld, Mon. Horny Sponges, 1889, p. 573, pl. xxxvi., figs. 7-9.

One example from Tuggerah Beach.

Hircinia caliculata, *Lendenfeld.*

Hircinia caliculata, Lendenfeld, Mon. Horny Sponges, 1889, p. 572.

Two specimens of this well marked species are present in the collection from Tuggerah Beach.

Order HEXACERATINA.

Family APLYSILLIDÆ.

Ianthella, *Gray.*

Ianthella flabelliformis, *Pallas.*

Ianthella flabelliformis, Lendenfeld, Mon. Horny Sponges, 1889, p. 696, pl. xlvii., figs. 1, 4, 6, pl. xlvii., figs. 1-4, pl. xlix., figs. 1-3.

A single fragment of this species was obtained at the Hawkesbury River.

ADDENDUM.

During the heavy gales which swept our coast towards the end of June with such disastrous results to life and shipping, immense seas cast on the harbour and ocean beaches an enormous amount of marine products. Seaweed was piled up to a depth of three or four feet, and with it a vast quantity of animal life. Some of the heaps, composed of the smaller organisms, were simply large, brilliantly variegated mounds, containing representatives of a great proportion of our marine fauna and flora. In addition to the large and varied accumulation of seaweeds, the beaches were strewn with Fish, Ascidians, Molluscs, Crustacea, Worms, Alcyonarians, Echinoderms, Zoophytes, and Sponges; of these the Sponges and Ascidians were the most abundant, and also the most varied in their tints. The beaches in some places were carpeted with organisms resplendent with all the colours of the rainbow.

After the storm I visited several of the inner and outer beaches with a view of ascertaining the colour of the Sponges dealt with in the foregoing pages. I succeeded in obtaining living specimens of some of the species, and others, although dead, were in good condition. The following remarks are based on the fresh material obtained :—

PACHYCHALINA AURANTIACA, *Lendenfeld, sp.*

The colour in life is reddish-orange ; when dried yellowish-white.

CHALINA GLOBOSA, *Lendenfeld, sp.*

A very large example of this form was found stranded at Shell Beach ; it measures 300 mm. in length, 225 mm. in breadth, and 150 mm. in height. The dermal membrane is more or less intact ; it is thin in texture, and the surface is pretty even ; the oscula are much smaller than in the dried examples. The dermal skeleton consists of ill arranged oxeote spicules, which are somewhat renieroid in their disposition, with generally a triangular mesh.

PSEUDOHALICHONDRIA FIBROSA, *Whitelegge.*

In life this species is covered with a thick gelatinous membrane, with an even, smooth surface ; the oscula are very minute, and confined to the tips of the branches. The dermal membrane is easily separable from the body, when denuded the sponge presents an appearance like that of the figured type.[23]

CLATHRIA TYPICA, *Carter.*

Colour in life, dark terra cotta.

CLATHRIA DURA, *Whitelegge.*

Several living examples of this species were obtained at Balmoral Beach. One measures 400 mm. in length, and 260 mm. in height. The colour is dark orange-buff when alive. The dermal membrane is extremely thin, and charged with numerous spined styli.

ECHINOCLATHRIA MACROPORA, *Lendenfeld, sp.*

Some examples of this species were of a bright madder brown, and others dark yellowish-stone.

EUSPONGIA IRREGULARIS, var. SILICATA, *Lendenfeld.*

Many specimens of the species were collected. The colour of the ground substance in life is canary yellow, after death it changes to a bright purple.

EUSPONGIA OFFICINALIS, var. SPINOSA, *Lendenfeld.*

This variety occurs at low tide line at Maroubra Bay. The colour when alive is dark grayish-brown.

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23 See Plate x., fig. 8.

EUSPONGIA OFFICINALIS, var. DURA, *Lendenfeld.*

The dermal membrane is yellowish-cream, and the ground substance of a yellowish tint.

EUSPONGIA PIKEI, *Hyatt, sp.*

This species does not present any distinctive colouration.

HIPPOSPONGIA EQUINA, var. ELASTICA, *Lendenfeld.*

The dermal membrane is of a pale cream colour, and the ground substance light cinnamon-brown.

AULENA GIGANTEA, var. MICROPORA, *Lendenfeld.*

A single branch of this species was obtained at Maroubra Bay. It is nearly 600 mm. in length and 50 mm. in diameter.

CORRECTIONS.

See p. 60, line 11—*for* "planking" *read* "planting."

,, 69—*after* "PACHYCHALINA, *Schmidt*," *insert* subheading:

PACHYCHALINA AURANTIACA, *Lendenfeld.*
(Plate x., fig. 3).

,, 82, line 9—*for* "conulæ" *read* "conuli."

,, 83, line 30—*for* "Size—0 13 to 13 mm." *read* "Size—0·13 to 0·16 mm."

,, 85, line 7—*for* "osculæ" *read* "oscula."

,, 95, line 14—*for* "fig. 1," *read* "fig. 2."

,, 99, line 13—*for* "pl. xii." *read* "pl. xiii."

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RECORDS

OF THE

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R. ETHERIDGE, JUNR, J.P.,

Curator.

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SEP 1901

LINGULA ASSOCIATED WITH *LEPIDODENDRON.*

By R. Etheridge, Junr., Curator.

The Rev. J. M. Curran recently presented to the Trustees some interesting specimens of a *Lingula*, associated with *Lepidodendron*, discovered by him near Orange, in beds that he believes to be of Upper Devonian age.

The remains of this *Lingula* are pressed and matted together in enormous numbers, forming a bed of some thickness, and extending over a considerable area, so forming an excellent horizon for geological work in the district in question.

The type is that of *Lingula mytiloides*, Sby., of the Carboniferous Period, and might pass for a large variety of it. One valve has been sufficiently exposed from the matrix to afford the following details. Like those of *L. mytiloides* the convexity of the valves is lessened along the middle line longitudinally, widening as the surface so formed extends towards the front, the sharper declivities of the lateral portions giving rise to apparent angularities at the junction of the central and lateral surfaces, and assuming the appearance of radii. This feature in *L. mytiloides* is only partially shown in Davidson's figures of the latter,[1] but better in those of *L. credneri*, Geinitz,[2] also a Carboniferous form, and is still more apparent in one of Phillips' figures of *L. mytiloides*.[3] It is also seen in *L. punctata*, Hall,[4] of the Hamilton Group, in North America, and again in *L. cuyahoga*, Hall,[5] although not to the same extent.

Only one Palæozoic *Lingula* has so far been described from our rocks, *L. ovata*, Dana,[6] from the Upper Marine Series of Black Head, Illawarra, but this is of an entirely different type.

It will be seen from the foregoing remarks that the combination of characters yielded by this *Lingula* point either to a Devonian or Carboniferous facies, or to be more precise either of Upper Devonian or Lower Carboniferous age.

1 Davidson—Mon. Brit. Foss. Brach., ii., Perm. and Carb. Species, pt. 5 (4), 1861, pl. 48, figs. 29-30.

2 *Ibid*, figs. 38-40.

3 Phillips—Geol. Yorksh., pt. ii., 1836, pl. xi., fig. 17.

4 Hall—Pal. N. York, iv., pt. 1, 1867, pl. i., fig. 6 *a - g*.

5 *Ibid*, pl. i., fig. 5.

The importance of this fossil from a stratigraphical point of view demands that it shall receive a name, for instance, that of—

Lingula gregaria, *sp. nov.*

(Fig. 14).

Sp. Char.—Ventral valve elliptical, narrow, greatest width at about the middle of the length; sides sub-parallel; front gently rounded; umbonal region attenuated, the umbonal slopes extending well forward; beak small, quite posterior; general surface gently convex, decidedly triareal, divided into the two umbonal slopes and the central triangular surface, the latter somewhat flattened, and widening towards the front, defined by two radii, which separate it from the umbonal slopes. Sculpture consisting of the finest, almost microscopic, concentric lines. Average length, $6\frac{1}{2}$ mm.; breadth, 3 mm.

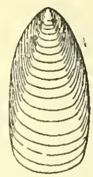

Fig. 14.

Obs.—*L. gregaria* is associated with a *Lepidodendron* in the Knorria-condition, probably of the *L. veltheimianum* group.

Loc.—Nyrang Creek, about five miles from Canowindra, N. S. Wales.

6 Dana—Wilkes U.S. Explor. Expedn., Geology, x., 1849, p. 695, pl. ii., fig. 6 *a* and *b*.

SEP 1901

A REVISION OF THE TYPES OF THE MARINE SHELLS OF THE CHEVERT EXPEDITION.

By Charles Hedley, Conchologist.

(Plates xvi. - xvii.)

The largest collection yet made of the marine mollusca of tropical Queensland, is that taken under the direction of Sir William Macleay, in 1875, by the staff of the "Chevert," and now in the Macleay Museum, Sydney. This collection was partly described by Mr. J. Brazier in the earlier volumes of the Proceedings of the Linnean Society of New South Wales.

Later writers, who have studied the marine mollusca of this region, have failed to identify species therein described, and have complained that the account given is inadequate for recognition.[1] In fairness to the Sydney Conchologist, it should be remembered that a debased style, dispensing with figures or dimensions in diagnoses, introduced by the Brothers Adams, then prevailed in London, and naturally lowered the level of work abroad.

It has resulted that recent Monographs include the names of the "Chevert" shells among the doubtful or unknown species. Where these species have been again taken, they have in several cases been described and named anew.

My intention has been to correct synonomy, and to rehabilitate neglected species. The "Chevert" novelties are treated in the order in which they were described, under the names which I consider they ought now to bear. As the drawings and measurements now given, in addition to details already published, should suffice to indicate the species, I have held redescription to be beyond the limits of this article.

I am indebted to Professors Haswell and David, custodians of the collection, for permission to examine the types and to embody the results in the present paper. To these gentlemen, and to Mr. George Masters, Curator of the Macleay Museum, my thanks are due.

Drillia mastersi, *Brazier*.

Drillia mastersi, Brazier, Proc. Linn. Soc. N.S.W., i., 1876, p. 153.

No example of this could be found.

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1 Watson—Chall. Rep., Zool., xv., 1886, p. 42, note to *Puncturella, sp.*; and Melvill and Standen—Journ. Linn. Soc., Zool., xxvii., 1899, p. 153.

DRILLIA SPALDINGI, *Brazier.*
(Plate xvi., fig. 1).

Drillia spaldingi, Brazier, Proc. Linn. Soc. N.S.W., i., 1876, p. 153.

The specimen figured is 14 mm. long. It is labelled "Long Island," a locality immediately north of Bet Island. This station is not noted in the original description.

CLATHURELLA DARNLEYI, *Brazier.*

Clathurellia darnleyi, Brazier, Proc. Linn. Soc. N.S.W., i., 1876, p. 154.

Mangilia darnleyensis (Braz.), Tryon, Man. Conch., vi., 1884, p. 256, pl. xix., fig. 73.

CLATHURELLA RAMSAYI, *Brazier.*

Clathurella ramsayi, Brazier, Proc. Linn. Soc. N.S.W., i., 1876, p. 157.

No example of this could be found.

CLATHURELLA ALBIFUNICULATA, *Reeve.*

Clathurella albifuniculata, Reeve, Conch. Icon., i., Pleurotoma, 1846, pl. xxviii., fig. 350.

C. barnardi, Brazier, Proc. Linn. Soc. N.S.W., i., 1876, p. 157.

After consulting examples of *C. albifuniculata*, determined by the late Rev. J. Hervier, who so carefully studied this group,[2] I hold Brazier's species to be a small and dark form of Reeve's. His name might be retained for the variety. To *C. albifuniculata* I also refer *Mangelia trachys*, T. Woods,[3] on examination of examples of the latter, collected at the original locality, compared with the type, and forwarded by Mr. J. H. Gatliff. It further seems probable that *Clathurella rufozonata*, Angas,[4] is the same.

CLATHURELLA MACLEAYI, *Brazier.*
(Plate xvi., fig. 2).

Clathurellia macleayi, Brazier, Proc. Linn. Soc. N.S.W., i., 1876, p. 157.

The specimen figured is from Cape Grenville, and is 6 mm. in length.

GLYPHOSTOMA TRICOLOR, *Brazier.*
(Plate xvi., fig. 3).

Clathurella tricolor, Brazier, Proc. Linn. Soc. N.S.W., i., 1876, p. 158.

I have here emended Brazier's generic reference. The specimen figured is from the Palm Islands, and is 6 mm. long. I collected this species at Milne Bay, British New Guinea.

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2 Hervier—Journ. de Conch., xlv., 1897, p. 92.
3 Ten. Woods—Trans. Roy. Soc. Vict., xiv., 1877, p. 57.
4 Angas—Proc. Zool. Soc., 1877, p. 38, pl. v., fig. 14.

MUREX ADUNCOSPINOSUS, *Reeve.*

Murex aduncospinosus, Reeve, Conch. Icon., iii., 1845, Murex, pl. xxiii., sp. 93.

Murex eximius, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 170.

The two individuals from Darnley Island are smaller and less thorny than Reeve's figure, but no specific differences are apparent.

MUREX CONFUSUS, *Brazier.*

(Plate xvi., fig. 4).

Murex confusa, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 172.

The shell figured is from Darnley Island, and is 27 mm. in length.

TRITONIUM ANGASI, *Brazier.*

Tritonium angasi, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 174.

No specimen of this could be found.

MARGINELLA LÆVIGATA, *Brazier* (emend).

(Plate xvi., fig. 5).

Marginella lavigata, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 225.

? M. valida, Watson, Chall. Rep., Zool., xv., 1886, p. 267, pl. xvi., fig. 3.

I am pretty confident that Brazier's shell was redescribed as above. One of the shells from Katow, New Guinea, 5 mm. long, is here figured. A curious feature, not noticed in either description, is the dislocation of the parietal teeth; possibly the "Challenger's" shell, which is smaller, was not old enough to exhibit the character.

COLUMBELLA CLATHRATA, *Brazier.*

(Plate xvi., fig. 6).

Columbella clathrata, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 229.

The example drawn is 8 mm. in length, and from Katow, New Guinea. *C. brevissima*, Hervier,[5] seems from the figure to resemble it.

COLUMBELLA MARIÆ, *Brazier.*

(Plate xvi., fig. 7).

Columbella mariæ, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 230.

The example drawn is 10 mm. in length, and from Hall Sound, New Guinea.

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5 Hervier—Journ. de Conch., 1899, pl. lxiv., fig. 10.

COLUMBELLA MOLECULINA, *Duclos.*
(Plate xvi., fig. 8).

Columbella moleculina, Duclos, Hist. Nat. Coquilles, Columbella, 1835, pl. ix., figs. 1, 2; *ibid.*, Hervier, Journ. de Conch., xlvii., 1899, p. 330.

Columbella inscripta, Brazier, Proc Linn. Soc. N.S.W., i., 1877, p. 230.

The example drawn is 7 mm. in length, and from Katow, New Guinea. I have taken this species at Port Moresby.

COLUMBELLA MERITA, *Brazier.*
(Plate xvi., fig. 9).

Columbella merita, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 231.

My drawings show the form and colour pattern of a shell from Darnley Island, 7 mm. in length.

COLUMBELLA PUDICA, *Brazier.*
(Plate xvi., fig. 10).

Columbella pudica, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 231.

The specimen is from Darnley Island, and is 6 mm. long.

COLUMBELLA ABYSSICOLA, *Brazier.*

Columbella abyssicola, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 232; *ibid.*, Tryon, Man. Conch., v., 1883, p. 141, pl. li., fig. 65.

COLUMBELLA LÆTA, *Brazier.*
(Plate xvi., fig. 11).

Columbella læta, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 232.

The shell drawn is 4 mm. in length, and from Darnley Island.

TURBONILLA DARNLEYENSIS, *Brazier.*
(Plate xvi., fig. 12).

Turbonilla darnleyensis, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 257.

Odostomia (Turbonilla) dipsycha, Watson, Chall. Rep., Zool., xv., Gasteropoda, 1886, p. 494, pl. xxxii., fig. 8.

As Watson's species was described from immature material, I have figured a more developed specimen of the "Chevert" types from Darnley Island, 6·3 mm. in length.

TURBONILLA CHEVERTI, *Hedley (nom. mut.)*
(Plate xvi., fig. 13).

Turbonilla eximia, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 257 *(non T. eximia*, A. Adams, Ann. Mag. Nat. Hist., (3), vi., 1860, p. 418).

The example figured is from the Percy Islands, and is 3 3 mm. in length. The original name was preoccupied by Adams for a Japanese shell.

TURBONILLA APLINI, *Brazier.*
(Plate xvi., fig. 14).

Turbonilla aplini, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 258.

The specimen drawn is 7 mm. in length, and from Katow, New Guinea.

TURBONILLA CONFUSA, *Brazier.*

Turbonilla confusa, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 258.

Odostomia (Turbonilla) rhabdoides, Watson, Chall. Rep., Zool., xv., Gasteropoda, 1886, p. 492, pl. xxxii., fig. 5.

ODONTOSTOMIA CLARA, *Brazier.*
(Plate xvi., fig. 15).

Odostomia clara, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 259.

The shell drawn is 5·5 mm. in length, and from Darnley Island.

ODONTOSTOMIA COMPTA, *Brazier.*
(Plate xvi., figs. 16, 17, 19; xvii., fig. 18).

Odostomia affinis, Brazier + *O. compta,* Brazier + *O. polita,* Brazier + *O. parvula,* Brazier, Proc. Linn. Soc. N.S.W., i., 1877, pp. 259, 260 *(non O. polita,* Bivona *nec* Pease).

The shells so labelled are slight variations of one form. I have sketched *O. affinis* (fig. 17), length 5 mm., from Cape York; *O. compta* (fig. 16), length 5·5 mm., from Darnley Island; *O. polita* (fig. 18), length 4 mm., from Darnley Island; and *O. parvula* (fig. 19), length 3 mm., from Darnley Island. On the box containing *O. affinis,* Brazier wrote "variety." The "*n. sp.?*" of the text seems to relate to the doubt if it differed from *O. compta.* The species is like *O. simplex,* Angas, but differs by being keeled.

SYRNOLA PULCHRA, *Brazier.*
(Plate xvi., fig. 20).

Syrnola pulchra, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 261.

The type figured is decollated and plugged, it is 5·5 mm. long, and is from Darnley Island.

EULIMA NITENS, *Brazier.*
(Plate xvii., fig. 21).

Eulima nitens, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 285.

The example drawn is 6·5 mm. in length, and from Darnley Island.

EULIMA AMABILIS, *Brazier.*

Eulima amabilis, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 285.

Eulima australasiaca, Melvill and Standen, Journ. Linn. Soc., Zool, xxvii., 1899, p. 173, pl. x., fig. 7.

SEPARATISTA SEPARATISTA, *Dillwyn.*

(Plate xvii., fig. 22).

Turbo separatista, Dillwyn, Cat. Recent Shells, ii, 1817, p. 867.
Trichotropis tricarinata, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 313.

This species has a complicated synonymy. The first binomial application is *Turbo helicoides*, Gmelin, 1790, which Watson disallows,[6] because repeated in the same work for another shell. Since the *T. helicoides*, applied to *S. separatista*, has page precedence over the other, this ruling is doubtful. I follow Pilsbry[7] in selecting the specific name as of Dillwyn, 1817, long prior to the name of Adams, used by Watson. The species has lately been recorded from Torres Straits by Melvill and Standen,[8] who, perhaps in correction, but probably in neglect of Watson's labours, name it *S. blainvilleana*, Petit.

Brazier's specimen of *S. tricarinata*, 5 mm. long, is here figured, so that if the names assembled by Watson be dispersed, this synonym may be rightly allotted.

SEPARATISTA GRACILENTA, *Brazier.*

(Plate xvii., fig. 23).

Trichotropis gracilenta, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 313.

The specimen drawn is 5·5 mm. long, and is from Darnley Island. It is obvious that this, *Trichotropis gabrieli*, Pritchard and Gatliff,[9] and *T. torcularis*, T. Woods,[10] are nearly related to *S. separatista*. The superficial character of the untwisting of the last whorl, valued as of generic importance, fail here. It will therefore be necessary to abolish or to reform *Separatista*. Taking the latter course *T. gabrieli*, *T. gracilenta*, and *T. torcularis* may conveniently be distinguished from the typical northern *Trichotropis*, and assembled under *Separatista*.

ATAXOCERITHIUM ABBREVIATUM, *Brazier.*

(Pl. xvii., fig. 24).

Cerithium abbreviatum, Brazier, Proc. Linn. Soc., N.S.W., i., 1877, p. 316.

The shell figured is 6 mm. long, and is from Katow, New Guinea.

The genus *Ataxocerithium*, to which I refer this species, was indicated by Sowerby[11] and established by Tate.[12] I suggest that

6 Watson—Chall. Rep., Zool., xv., 1886, p. 428.
7 Pilsbry—Cat. Mar. Moll. Japan, 1895, p. 59.
8 Melvill and Standen—Journ. Linn. Soc., Zool., xxvii., 1899, p. 169.
9 Pritchard and Gatliff—Proc. Roy. Soc. Vict., 1898, p. 183, pl xx., fig. 7.
10 Hedley—Rec. Aust. Mus., iv., 1901, p. 22, fig. 2.
11 Sowerby—Conch. Icon., xv., 1865, Cerithium, sp. 146.
12 Tate—Proc. Roy. Soc. N.S.W., xxxii, 1894, p. 179.

the unrecognised *C. tubulus*, Dunker,[13] from Bass Straits belongs to this genus, and, further, that it is probably synonymous with *A. serotinum* = *A. rhodostoma*. So arranged the genus would contain two recent and one fossil species.

CERITHIUM BICANALIFERUM, *Brazier*.
(Pl. xvii., fig. 25).

Cerithium bicanaliferum, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 317.

The shell drawn is 10 mm. in length, and is from Darnley Island.

CERITHIUM ELEGANTISSIMUM, *Hedley*.

Cerithium minimum, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 317 (*non C. minimum*, Hutton, Cat. Mar. Moll. New Zealand, 1873, p. 27); *C. elegantissimum*, Hedley, Aust. Mus. Mem., iii., 1899, p. 436, fig. 24 (March); *Bittium torresiense*, Melvill and Standen, Journ. Linn. Soc., Zool., xxvii., 1899, p. 168, pl. x., fig. 6 (July).

RISSOINA EFFICATA, *Brazier*.
(Pl. xvii., fig. 26).

Rissoina efficata, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 366.

R. semisculpta, Tate, Trans. Roy. Soc. S.A., xxiii., 1899, p. 241, pl. vii., fig. 10.

To support the above synonomy I have drawn one of Brazier's types from the Barnard Islands; the decollated shell is 8 mm. long.

RISSOINA, TERES *Brazier*.
(Pl. xvii., fig. 27).

Rissoina teres, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 367.

The specimen drawn is from Katow, and is 7 mm. in length.

RISSOINA PULCHELLA, *Brazier*.

Rissoina pulchella, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 367.

R. honoluluensis, Watson, Chall. Rep., Zool., xv., 1886, p. 619, pl. xlvi., fig. 9.

RISSOINA INERMIS, *Brazier*.
(Pl. xvii., fig. 28).

Rissoina inermis, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 367.

The example drawn is 5·5 mm. in length, and is from Darnley Island.

RISSOINA CARDINALIS, *Brazier*.

Rissoina cardinalis, Brazier, Proc. Linn. Soc. N.S.W., i., 1877, p. 368.

R. mercurialis, Watson, Chall. Rep., Zool., xv., 1886, p. 619, pl. xlvi., fig. 8.

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13 Dunker—Mal. Blatt., 1871, p. 152.

Rissoina inconspicua, *Brazier.*

(Pl. xvii., fig. 29).

Rissoina inconspicua, Brazier, Proc Linn. Soc. N.S.W., i., 1877, p. 368.

The decollated example figured is 2·5 mm. in length, and from Sue Island.

Euchelus granosus, *Brazier.*

(Pl. xvii., fig. 30).

Clanculus granosus, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 43.

I transfer this species to *Euchelus.* The specimen figured is 6 mm. in height, and from Katow.

Turcia maculata, *Brazier.*

Thalotia maculata, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 44.

Turcia maculata, Pilsbry, Man. Conch., xi., 1889, p. 417, pl. 67, fig. 78.

Two shells from Port Molle, Queensland, described by Smith[14] as a variety of *Trochus elisus*, Gould, appear from his remarks to be not that but *T. maculata. Tectarius montrouzieri*, Fischer, also from Torres Straits, appears to me to be a *Turcia.*

Stomatella stellata, *Souverbie.*

Stomatella stellata, Souverbie, Journ. de. Conch., 1863, p. 169, pl. v., fig. 10.

Stomatella ornata, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 47.

The above rectification was made by Pilsbry,[15] and I can confirm it.

Dentalium duodecimcostatum, *Brazier.*

(Pl. xvii., fig. 31).

Dentalium duodecimcostatum, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 56.

The specimen figured is from Darnley Island, and is 21 mm. in length.

Dentalium robustum, *Brazier.*

(Pl. xvii., fig. 32).

Dentalium robustum, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 56.

The specimen drawn is from Katow, and is 21 mm. in length.

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14 Smith—Zool. Col. Alert., 1884, p. 74.
15 Pilsbry—Man. Conch., xii., 1890, p. 26.

DENTALIUM KATOWENSE, *Brazier.*
(Pl. xvii., fig. 33).

Dentalium katowense, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 156.

The specimen drawn is 15 mm. in length, and from Katow.

DENTALIUM CHEVERTI, *Sharp and Pilsbry.*
(Pl. xvii., fig. 34).

Dentalium septemcostatum, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 57 (*non D. septemcostatum*, Abich, Bull. Soc. Nat., Moscow, xxxii., 1859, p. 314, pl. vi., fig. 5).

D. cheverti, Sharp and Pilsbry, Man. Conch., xvii., 1897, p. 9 (*nom. mut.*)

The specimen drawn is 15 mm. in length and from Cape York.

DENTALIUM QUADRICOSTATUM, Brazier.
(Pl. xvii., fig. 35).

Dentalium quadricostatum, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 58.

The specimen figured is from Katow, and is 16 mm. in length. There are in the Australian Museum specimens from Cape Sidmouth, Queensland, collected from anchor mud, and presented by Mr. A. U. Henn.

DENTALIUM, ANNULOSUM, *Brazier.*
(Pl. xvii., fig. 36).

Dentalium annulosum, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 58.

The specimen drawn is 14 mm. long, and is from Princess Charlotte Bay.

CADULUS LÆVIS, *Brazier.*

Dentalium læve, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 59.

C. lævis, Hedley, Proc. Linn. Soc. N.S.W., 1900, p. 499, pl. xxvi., fig. 8, 9, 10.

RINGICULA ABYSSICOLA, *Brazier.*
(Pl. xvii., fig. 37).

Dentalium abyssicola, Brazier, Proc. Linn. Soc N.S.W., ii., 1877, p. 78.

The specimen drawn is 1·9 mm. in length, and from Darnley Island.

RETUSA AMPHIZOSTA, *Watson.*

Cylichna minuta, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 80 (*non C. minuta*, H. Adams, Proc. Zool. Soc., 1872, p. 11, pl. iii., fig. 10).

C. brazieri, Pilsbry, Man. Conch., xv., 1893, p. 315 (*nom. mut.*)

Utriculus amphizostus, Watson, Chall. Rep., Zool., xv., 1886, p. 652, pl. xlviii., fig. 11.

CYLICHNA GRANOSA, *Brazier.*

Mnestia granosa, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 81.
Cylichna reticulata, Watson, Chall. Rept., Zool., xv., 1886, p. 667, pl. l., fig. 2.

ATYS DECORA, *Brazier.*

(Plate xvii., fig. 38).

Haminea decora, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 83.

The example drawn is 6 mm. long, and from Cape York. Judging from the Thesaurus Conchyliorum,[16] size seems the only difference between this and *Atys succisa*, Ehrenberg.

SCAPHANDER MULTISTRIATUS, *Brazier.*

Scaphander multistriata, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 84; *ibid.*, Hedley, Proc. Linn. Soc. N.S.W., xxv., 1900, p. 510, pl. xxvi., fig. 12.

I am now inclined to refer this species to Bellandi's genus *Sabatia*.

ATYS DARNLEYENSIS, *Brazier.*

(Plate xvii., fig. 39).

Atys darnleyensis, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 85.

The example figured is 13 mm. in length, and from Darnley Island. The young shells are of a different contour, and I consider that *Atys hyalina*, Watson, was based upon an immature *A. darnleyensis*.

ATYS CHEVERTI, *Brazier.*

(Pl. xvii., fig. 40).

Atys cheverti, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 85.

The specimen figured is from Darnley Island, and 5 mm. in length.

CYLICHNA PULCHRA, *Brazier.*

Atys pulchra, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 86.
Cylichna subreticulvta, Watson, Chall. Rep., Zool., xv., 1886, p. 668, pl. l., fig. 3.

The difference between these two descriptions appears to me to be the difference between old and young shells.

CYLICHNA DENSA, *Brazier.*

Atys densa, Brazier, Proc. Linn. Soc. N.S.W., ii., 1877, p. 86.

No example found.

CYLICHNA DUBIOSA, *Brazier.*

Atys dubiosa, Brazier, Proc. Linn. Soc. N.S.W., ii, 1877, p. 86.
Cylichna labiata, Watson, Chall. Rep., Zool., xv., 1886, p. 669, pl. l., fig. 4.

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[16] A. Adams—Thes. Conch., ii., 1855, pl. cxxv, fig: 116.

A DESCRIPTION OF *MACROPUS ISABELLINUS*, GOULD.[1]

By Edgar R. Waite, F.L.S., Zoologist.

(Plates xviii.–xix.)

The subject of the following description was obtained by Mr. J. T. Tunney at Barrow Island, North-western Australia, on the 16th November, 1900. The prepared skin, together with the skull and leg bones, was forwarded to the Trustees by Mr. B. H. Woodward, Curator of the Western Australian Museum. It represents an adult male, and, as ascertained by an examination of the skull, the animal was what Mr. Thomas[2] calls "aged," the fourth molar tooth being in place.

Description.

Size medium, form stout and heavy. Fur of moderate length, very soft, fine, and nearly straight, coarser on the head and neck; muzzle with a large naked rhinarium, the hair encroaching on its hinder border, much as in *M. robustus.* General colour buffish-red, paler on the flanks, where it merges into the white of the belly; browner on the head. Ears, brown without, darker towards the tips, and white within. Snout, grey above, margin of upper lip white; throat white; a large oval dark-grey patch on the chin. Upper arm and chest white, belly tinged with yellow, top of hip and middle of leg grey. Lower forearm brown above, becoming darker towards the fingers, on which the hair is dark brown. Feet similarly coloured, the hair on the middle toes black with brown tips; that of the other toes golden-brown. Central hind claws short, with a groove along each side; the hair projects far beyond all the claws. Tail uniformly yellowish-buff above and below, with the exception of its basal portion, the upper part being coloured like the body, and the lower part white.

The hair of the face and head is inclined in opposite directions, meeting behind the eyes, where a transverse crest is formed; a central ridge passes thence between the ears and some way down

1 Gould—Proc. Zool. Soc., ix., 1841, p. 81.
2 Thomas—Brit. Mus. Cat., Marsupialia, 1888, p. 7.

the nape, on which the hair has a downward direction. On the chest the hair passes upwards and outwards, and forms a ridge where it meets the hair from the nape; this ridge thus forms the dividing line between the red and white fur, the two colours being sharply defined. A similar but larger ridge is formed between the hind limb and butt of the tail; this does not, however, separate the colours.

Dimensions.	mm.
Head and body	1020
Tail	815
Hind foot	235
Ear	75
Limb bones—	
Humerus	112
Radius	135
Ulna	168
Femur	200
Tibia	300
Metatarsus	165

Skull.—Massive, with a short facial portion; muzzle broad and inflated, the nasal chamber wider than deep; nasals moderate, their greatest combined width 2·5 and their central width 3·1 times in their length. Ascending process of premaxilla greatly expanded above, the naso-premaxillary suture one-half longer than the naso-maxillary. Interorbital region not inflated, the supra-orbital edges very pronounced, with a well marked concavity between them. Inter-temporal constriction great, the least transverse breadth equal to the posterior breadth of one of the nasals. Opening of lacrymal canal bounded in front by the maxillary. Palatal foramina slightly longer than M^1, they extend backwards to the maxillo-premaxillary suture, the maxillary forming their posterior border. Anterior palate not very broad, its least width 2·5 in the diastema, its edges marked but not acute. Palate very complete, the invariable foramina on the palato-maxillary suture and two or three small holes in the palatine excepted. Rami of mandible short, deep, and thick; the horizontal and ascending portions of each form almost a right-angle.

Teeth.—The incisor series are relatively shorter than in *M. giganteus.* There is an external notch in I^3, and faint trace of one anterior to it. This tooth is almost as long as I^1 and I^2 combined. The molar series are markedly bent inwards anteriorly; each tooth has a small anterior ledge, in the fourth molar it is connected with the first main ledge by a short bridge; this bridge is scarcely traceable in the other teeth; the usual transverse ledges are well developed, as are also the connecting ridges. Anterior cheek teeth deciduous. The lower incisors are below the average length; the molar series are parallel; the anterior pair have passed out of action, are deflected downwards, much produced forwards, and blackened by disuse.

Dimensions of Skull.	mm.
Basal length	144·0
Greatest breadth	90·0
Nasals, length	59·0
„ breadth	23·3
„ central breadth	19·2
Constriction	14·3
Palate, length	93·0
„ outside M^2...	46·5
„ inside M^2...	28·3
Palatal foramina	10·5
Diastema	38·3
Basi-cranial axis	42·5
Basi-facial axis	105·0
Facial Index	247
Teeth,[3] length of I^3	8·4
Teeth, length of $Ms^{1\text{-}3}$	26·5

The aggregate characters of this animal indicate what may be its habit in life. A stunted kangaroo, inhabiting a bleak island, it is of stout and heavy build, ill adapted to life on the plains, but well fitted for rough country: this may be adduced from its stout short limbs, the hind ones especially, and the thick, long hair of the feet entirely concealing the claws, as in the typical rock wallabies *(Petrogale)* and, in a lesser degree, the wallaroo (*M. robustus*) of the mountains. Its characters are so marked that it fails to satisfy the conditions of Mr. Thomas' synopsis,[4] for, while the size of its skull well admits it as a kangaroo, the shortness of its hind feet classes it as a wallaby. The skull also is peculiar, and exhibits a higher cranial index than any other kangaroo. In some of the wallabies, however, the cranial index is much higher than in *M. isabellinus*.

All the previously published descriptions of this species are based upon the type specimen in the British Museum; this "consists merely of a flat skin, without head, arms below elbows, legs, or tip of tail."

From such imperfect material Thomas ventured the opinion that it is most nearly allied to *M. rufus*. In colour and the general appearance of the fur this is so, but when taken in its entirety it is more akin to *M. robustus*. Judging from our single

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3 In the British Museum Catalogue, *loc. cit.*, p. 29, I^3 is misprinted I^1, and apparently also on p. 13 in connection with *M. magnus*.

4 Thomas—*Loc. cit.*, pp. 11, *et. seq.*

specimen it is inferior in size to either of these species. Thomas concluded its dimensions were about the same as those of *M. rufus*. Gould considered it as about equal to *M. bennettii*.

The skull differs widely from that of *M. rufus*; in this species the facial region is proportionately greater than in any other kangaroo, and the nasals are correspondingly long and narrow. In *M. isabellinus*, as already mentioned, the facial region is the shortest of all the kangaroos, and is, in this respect, nearest allied to *M. robustus*, in which also the nasals are short and broad.

As *M. isabellinus* was known only from a skin, and *M. magnus*, Owen, from a skull, there was, as suggested by Thomas, a possibility that the two were identical. The study of a skull of the former shows that the species are quite distinct. In *M. magnus* the opening of the lacrymal canal is entirely in the lacrymal bone, the palatal foramina are very long, extending some way into the maxilla, and the posterior palate is very incomplete.

NOTES ON THE ARCHITECTURE, NESTING-HABITS, AND LIFE-HISTORIES OF AUSTRALIAN ARANEIDÆ, BASED ON SPECIMENS IN THE AUSTRALIAN MUSEUM.

By W. J. Rainbow, F.L.S., Entomologist.

Part II.—THE CRIBELLATÆ.

Simon, in his work, "Histoire Naturelle des Araignées" (second edition), divides Spiders into two sub-orders, namely, Araneæ theraphosæ and Aranæ veræ. Of these, the former was dealt with in my last paper. The latter, which now claims our attention, is again divided into two sections—Cribellatæ and Ecribellatæ, these terms signifying that those of the first section have what is known technically as a *cribellum* and *calamistrum*, whilst those constituting the second section are not so provided.

All the Spiders of the sub-order under consideration may be distinguished from the Territelariæ by their falces, which, instead of being strongly porrected, as in the Araneæ theraphosæ, are directed vertically or obliquely from their base; moreover, their fangs strike sideways, the falces moving in a horizontal or oblique direction, whilst those of the Trap-door Spiders are directed downwards, and move vertically parallel to one another.

The Araneæ veræ cribellatæ are divided into eight families, namely: Hypochilidæ, Uloboridæ, Psechridæ, Zoropidæ, Dictynidæ, Œcobiidæ, Eresidæ, and Filistatidæ; and of these the second, fifth, and eighth are represented in Australia.

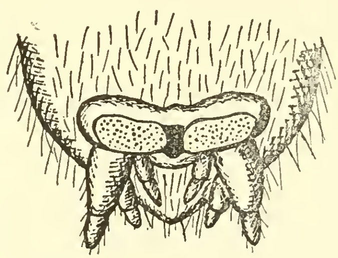

Fig. 15.—The Cribellum.

The cribellum is an additional silk-spinning organ, and is situated between and at the base of the first pair of spinners; it consists of a slightly elevated, transverse plate, divided above into two parts, but united at the base throughout their entire length. These parts consist of a single joint each, the apices of which are truncated, compressed, and concave. The surfaces of these joints are minutely and numerously punctured, and emit a quantity of fine, flocculent silk, which is used in the construction of webs.

The calamistrum or comb is situated upon the upper side of the metatarsus of each of the fourth pair of legs, and consists of two parallel rows of short stiff bristles or spines. This organ is used for combing or carding the flocculent silk emitted by the cribellum.

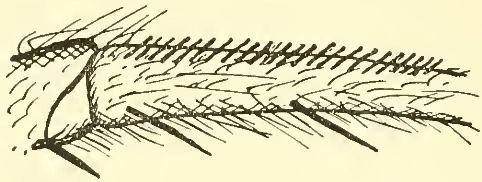

Fig. 16.—The Calamistrum.

The cribellum and calamistrum are always present in the female. Young males are also provided with them, but towards maturity they become in some cases atrophied, and in others disappear altogether.

Cribellate Spiders are of sedentary habits, and are therefore dependent upon their webs for the capture of prey. These snares vary according to the habits of the species, some being of an orb-like or geometrical construction, with rays and concentric circles, and others of an irregular design. Some of the Spiders of this section are arboreal, living amongst coarse herbage, the leaves of shrubs and trees, or upon bark; others lurk within crevices, fissures of rocks, and inside buildings; whilst others disfigure the outer walls with their untidy, dirty-looking webs. Indeed more serious annoyances occur at times, owing to the habit of these and other Spiders of attaching their webs to telegraph wires and poles, thus interfering with the transmission of messages. Railway telegraphs have been interfered with in this and other countries, and the authorities put to considerable trouble and expense to keep the wires clean and free.

Snares are composed of two kinds of silk—the one strong and tough, the other soft and flocculent. The former is used in the construction of the framework, whether the lines be those of an orb or an irregular web, and is discharged from the ordinary spinnerets; the flocculent silk is voided by the cribellum, and is attached to the lines forming the framework. But before being attached, it has to pass through the process of combing, and the method by which this is accomplished is interesting. One of the posterior limbs is held up and passed just under the cribellum, and as the silk is emitted, worked rapidly backwards and forwards. When one limb becomes wearied, the other relieves it, and so on until the completion of the snare.

This muscular action has the effect of entangling the silk as it is voided, and giving to the snare, when completed, a somewhat untidy appearance. It is nevertheless very effective in the capture of prey, for the silk clings tenaciously to whatever touches it.

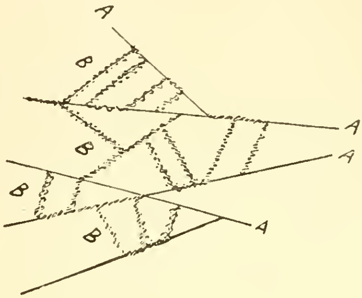

Fig. 17.—Diagram illustrating radial lines and flocculent silk. A, radial lines; B, flocculent silk, produced by cribellum.

Family ULOBORIDÆ.

This family is divided by Simon into four sub-families, namely, Dinopinæ, Uloborinæ, Miagrammopinæ, and Æbutininæ. The three first-named are represented in Australia.

The Dinopinæ consists of two genera—*Dinopis*, Macleay, and *Menneus*, E. Simon. Of these, the former is distributed as follows: "Africa tropica occid.; Nova-Hollandia et Nova-Caledonia."[1]

Nothing is known of the nesting-habits or architecture of these interesting Spiders. I have on several occasions captured specimens of the genus *Dinopsis* around Sydney when out collecting. Usually they are found running over long grass or low shrubs. I have never found a web made by one of these Spiders, although I have searched for them diligently. Owing to their long, attenuated bodies and legs, together with their colouration, it is not easy to detect them unless they are moving, and when they seek shelter by dropping down amongst the long, thick grasses, searching is frequently in vain.

Simon, who has spent much time in the field, and captured many species of *Dinopsis*, has never been so fortunate as to observe their architecture. Mr. H. B. Bradley, a Trustee of this Museum, some years ago, personally collected numerous species of Australian Araneidæ. Many of these were figured and described in Koch's Monograph, "Die Arachniden Australiens," and amongst them are several species of *Dinopsis*. At the foot of the description of

[1] Simon—Hist. Nat. Araignées (2nd edit.), i., 1892, p. 210.

D. subrufus, L. K., there is a note to the effect that specimens had been taken at Bowen and Brisbane, and were then in the Godeffroy Museum; there was also an example from Boude [? Bondi] in Mr. Bradley's collection, which that gentleman had found on the 3rd of June running about amongst grass.[2] *D. ravidus*, L. K., was taken by Herr Daemel, under dry leaves, at Gayndah;[3] *D. fasciatus*, L. K., was collected by him at Bowen and Gayndah, under leaves;[4] *D. bicornis*, L. K., was described from a male example collected by Mr. Bradley, at Sydney, where it had been found living amongst the grass, but there was no web.[5] Doleschall records, briefly, a species of *Dinopsis*, in Amboina, that constructs a large, irregular snare, in the centre of which it rests, with its anterior feet extended in a line with its body.[6]

The second sub-family, Uloborinæ, also includes only two genera, namely, *Uloborus*, Latr., and *Sybota*, E. Sim. The latter does not occur in Australia. *Uloborus* is distributed as follows:—"Europa et Regio mediterranea; Africa; ins. Atlanticæ; Madagascar; Asia, centr., merid. et orient; Malaisia; Papuasia et Oceania; America septr., centr., merid. et antilliana."[7]

Five species of *Uloborus* have been recorded from Australia, namely, *U. barbipes*, L. K., from Port Mackay; *U. canus*, Macl., collected during King's survey of the intertropical and western coast of Australia, but no specific locality given; *U. variabilis*, Keys., Rockhampton, Peak Downs, Gayndah, and Sydney; *U. spinitarsis*, Keys., Sydney; and *U. pantherimus*, Keys., Sydney.

The webs of *Uloborus* are obicular, and are usually spread horizontally. They consist of rays and concentric circles, the meshes being supported and strengthened by numerous outer lines or guys, the latter being directed in an irregular manner, and at every conceivable angle. The spiders of this genus are mostly small, and so are their webs. The number of rays and concentric rings, as far as I have been able to gather from observation of Uloborid snares around Sydney, vary slightly. Usually there are twenty-four of the former and fourteen of the latter, sometimes more and sometimes less. The silk employed in the construction of the outer lines and rays is discharged from the mammiform spinnerets, and is tough and strong; that of which the spirals is composed is voided by the cribellum, and carded by the calamistrum, and is soft, dry, and flocculent. In this respect the spirals of an Uloborid web differ widely from those constructed

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[2] L. Koch—Die Arach. Austr., ii., 1871, p. 1041.

[3] L. Koch—*Loc. cit.*, p. 1043.

[4] L. Koch—*Loc. cit.*, p. 1047.

[5] L. Koch—*Loc. cit.*, p. 1051.

[6] Doleschall—Tweede Bijdr. Kennis. Arach., v., d. Ind. Arach., 1859, p. 11.

[7] Simon—Hist. Nat. Araignées (2nd edit.), i., 1892, p. 215.

by the Argiopidæ, the latter being studded with numerous beads of a sticky nature.

Again, the architecture of these spiders differs in another essential feature from that of the Argiopidæ. No nest or retreat is made by them, but their nests are always furnished with what Simon terms a *stabilimentum*, a closely woven silken plate, which acts as a support. These supports are usually placed diagonally, and occupy a space between an upper and a lower ray; they are, as Simon expresses it, " dilated to each of the intersections of the circles, and produce a series of small triangles." The cocoon is attached to the rays of mesh, and over this the mother mounts guard until the young have hatched out. In appearance and colour the cocoon closely resembles withered leaves.

The species occurring around Sydney are of solitary habits. Some exotic species, however, live together in large communities, each individual reposing in the centre of its own snare, but each snare being attached to its neighbour, thus united forming a mesh of huge dimensions. Simon described and figured such a mesh as the one referred to, together with the architects, *U. republicanus*, E. Sim., from Brazil.[8]

The same author has also recorded the singular fact that *U. servalus*, E. Sim., from Venezuela, is parasitic upon the large snares of *Cyrtophora*. It establishes its small orbicular snare at the centre of the network, which surmounts that of *Cyrtophora*.[9]

The sub-family Miagrammopinæ, like the preceeding, is comprised of only two genera, namely, *Hyptiotes*, Walck., and *Miagrammopes*, Camb., and of these the last-named only occurs in Australia. It has a wide geographical range, which Simon has defined as follows:—" Africa tropica orient et occid.; Madagascar; India septentr.; Taprobane; Indo-China; Nova-Hollandia; Antilliæ et America meridionalis."[10] Two species occur in Australia, one *M. caudata*, Keys., from Peak Downs, and the other *M. bradleyi*, Camb., from N. Australia.

Nothing is known of the architecture of the spiders of this genus, although a number of species have been described. It is not at all unlikely, however, as Cambridge suggests, that their snares will be found to be similar to those constructed by *Uloborus*.[11]

Family DICTYNIDÆ.

This family is much more numerous than the Uloboridæ, both in point of genera and species. Altogether there are sixteen genera, and of these, three—namely, *Amaurobius*, C. K., *Badumna*, Thor., and *Lathys*, E. Sim.—are represented in Australia.

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8 Simon—Ann. Soc. Ent. France, lx, 1891, pp. 8 and 12, pls. iii. and iv.

9 Simon—Hist. Nat. Araignées (2nd edit., i., 1892, p. 213.

10 Simon—*Loc cit.*, p. 220.

11 Cambridge—Journ. Linn. Soc., Zool., x., 1870, p. 399.

Amaurobius is one of those genera that have a wide geographical range. It is as follows:—"Europa et regio mediterranea; Sibiria; Malaisia; ins. Amboina; Nova-Hollandia et Nova-Zealandia; Polynesia; America septentr.; America merid. (præsertim in montibus): Colombia, Uruguay, et Chili.[12] *Badumna*, Thor., occurs in Malaisia (Java) et Nova-Hollandia;[13] and *Lathys*, E. Sim., "Europa et regio mediterranea; insulæ. Maderæ et Canariæ; Nova-Hollandia; Sibiria orient.; America septr."[14]

The Spiders of the three genera here quoted may be sought for upon shrubs or trees (sometimes under bark), under stones or dead leaves, and other forest *débris*, fissures of rocks, the interior of caves, the outer and inner walls of buildings. The webs are frequently large, consisting of indefinite rays or irregular lines of strong silk, produced by the ordinary spinnerets, and the flocculent cobweb voided by the cribellum. Sometimes a rude tubular retreat is made, wherein the Spider patiently rests until the vibration of the web announces the capture of some unwary insect. By gently agitating one of these snares with a bit of straw, or stiff grass, the Spider may frequently be enticed out, but upon discovering its mistake, will quickly betake itself to its den. Some species are exceedingly courageous, attacking not only large but exceedingly aggressive insects, such as wasps. The cocoons of such species as occur upon plants are lenticular, and securely attached to the web by numerous threads; in respect of those living under bark the ova-sac is flat, round, cushion-like, and composed of two discs, an upper and a lower. The outer covering of the cocoons is usually white, and exceedingly tough, thus affording admirable protection to the enclosed eggs. Sometimes, however, the walls of cocoons of these and other Spiders are pierced by some minute species of Ichneumonidæ, with the result that when the eggs of the latter hatch out, the Hymenopterous larvæ feed upon the Arachnid ova.

Family FILISTATIDÆ.

This family, although composed of only one genus, *Filistata*, Latr., is widely distributed, its range being:—"Regio mediterranea; ins. Atlanticæ; Africa occid. et orient.; Arabia merid.; Asia centr.; ins. Nikobaricæ; ins. Philippinæ; Nova-Hollandia; America septentr., centr., et merid.; Antilliæ."[15]

One species only of this genus occurs in Australia, namely, *Filistata australis*, L. K.; and this was originally recorded from Rockhampton, but without, however, any note in reference to its architecture. The snares fabricated by those species that have

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12 Simon—Hist. Nat. Araignées (2nd. edit.), i., 1892, p. 238.

13 Simon—*Loc. cit.*, p. 238.

14 Simon—*Loc. cit.*, p. 240.

15 Simon—*Loc. cit.*, p. 258.

been observed, take the form of an irregular mesh, and have an ill-defined tube. The cocoon, which is flat and flocculent, is attached to the centre of the web, like those of *Amaurobius.*

Hints on Collecting Araneidæ.—From time to time friends of the Museum are good enough to forward to the Trustees, by way of donations, specimens of Araneidæ. It frequently happens that those who do so would take a greater interest in collecting if they had some little knowledge to guide them :—What to do, and where to look. It will therefore serve a useful purpose if a few hints, indicating the best means to be adopted when collecting, are published. With this object in view, the following directions have been drawn up to assist those who may be willing and anxious to help, but who lack the necessary knowledge.

In the first place, Spiders may be sought for in every conceivable position—on the ground, under logs, stones, and *débris*, in crevices and fissures of rocks, amongst herbage, upon plants, shrubs, and trees, under bark, in dark and light situations, and near water-courses ; indeed it would be hard to say where they are not to be found. But in making a collection, it is of equally great importance to obtain specimens of architecture or industry, as to collect the animals themselves, and where convenient both should be taken, and notes upon the surroundings made.

With a little practice, Spiders may be easily collected. Let the collector provide himself with a conveniently-sized bottle, having a large mouth, and containing some spirit, some chip or glass-topped pill-boxes of assorted sizes, a piece of card, pair of fine-pointed forceps, a camel-hair brush, a net, and a lead pencil. The bottle should be attached to the waist by a piece of string, so as to allow the hands to remain free, and the cork should be large enough to allow of its being tied to the neck of the bottle. This precaution will prevent the cork being mislaid, and so avoid not only vexation but waste of time in searching for it when the collector should be busy hunting for specimens. Always take the bottle when collecting, but do not be a slave to it by placing everything obtained therein. For instance, when a Spider is discovered that has a particularly interesting web, one of the boxes should be used, and a brief note written on the bottom. By abbreviating words, a great deal of useful information may be cramped into a very small space. Thus, for instance, "Irreg. w., tub. ret., coc. susp." might be neatly written, and would mean "irregular web, tubular retreat, cocoon suspended ;" "U. bark, coc. attach. tree" would read, "Under bark, cocoon attached to trunk of tree ;" "Orb. hor." or "Orb. perp." would indicate that the web was a round, orbicular one, and that it was suspended either horizontally or perpendicularly as the case may be. Other abreviations will suggest themselves as the necessity for employing them arises. If the spider and cocoon can be placed in one box, well and good; if not, then two should be used, one for the animal and the other for the cocoon or nest, but care must be taken to put a corresponding number upon each. Do not put two living specimens together in one box; spiders are cannibals. Some spiders may be taken by holding either the spirit bottle or chip box underneath; when this method is adopted the Arachnid should be gently touched with the finger or a light stick, whereupon it will drop into whatever receptacle is held below. Quick running spiders (and some are very active) may be taken by clapping a chip box over them, and insinuating the card beneath, after which the animal may be finally secured by placing the lid on top of the card, and then deftly withdrawing the latter and adjusting the lid. The Spider resting in its web, may be easily captured by taking the lid of a chip-box in one hand and the bottom in the other, and then bringing the two parts together sharply, so as to encompass the animal. Shaking branches into a net or inverted umbrella will be found very profitable. The larger specimens may be lifted with the forceps, and the smaller ones by dipping the camel-hair brush in spirit. Sweeping the long herbage will bring to light a lot more. At first, doubtless, many a prize will be lost, but practice and experience will soon remedy that.

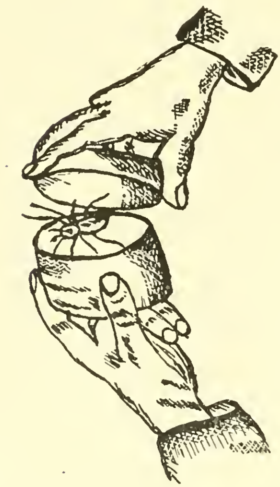

Fig. 18.—Capturing a Spider from the Web.

When transmitting specimens through the post, be careful to pack firmly and lightly, and write the address upon a tag. If specimens of architecture are sent in company with the spider, the latter should be in spirit, then both may be packed in the one box. Sometimes living specimens, with their nest or cocoons, may be sent through the post. The mere fact of being carried from place to place, even openly, will not disturb the architect, providing its cocoons are conveyed with it.

OCCASIONAL NOTES.

III.—*LIMNORIA LIGNORUM*, RATHKE—A WOOD-BORER—ITS OCCURRENCE IN SYDNEY HARBOUR.

In January 1900, the Trustees received a block of wood from Mr. C. W. Darley, late Chief Engineer to the Harbour and Rivers Department. The wood was taken from the old floating jetty at the foot of Phillip-street, Circular Quay. The timber has the appearance of pine and was originally two and a half inches in thickness, fully a third of which had been eaten away, and the remaining two-thirds were more or less reduced to a condition resembling very small-celled honeycomb. Upon examination the holes in the timber were found to be occupied by a small Isopodous Crustacean, which proved to be the much dreaded "Gribble," *Limnoria lignorum*, Rathke, of European and American seas. It has probably been introduced from England or from the United States by timber laden vessels. A few months ago another specimen of similarly infested timber was received from Captain J. Edie, Superintendent of Navigation, who stated that it had been taken from a ferry steamer plying in Sydney Harbour.

From the above remarks it will be seen that this very destructive pest has obtained a foothold, and if allowed to proceed without check may involve the destruction of our jetties, and perhaps render some of the harbour vessels unsafe. It is highly important that the presence of this pest in our waters should be made known to the owners of vessels and wharves, and some action taken to ascertain its distribution, whether it has already spread throughout the harbour or if it is still confined to the place where it was first introduced. Prompt attention to this most destructive pest might arrest its spreading, and it is hoped lead to its ultimate extermination.

THOMAS WHITELEGGE.

IV.—*URONYCTERIS CEPHALOTES*, PALLAS.

On the mainland of Australia this peculiar and unmistakeable Bat has been recorded only from Cape York, and the evidence of its occurrence on the Continent rests apparently on a specimen in the British Museum. It is pleasing therefore to record further examples, one from Queensland, received from Mr. George Hislop, who secured it on the Bloomfield River, near Cooktown, in 1897, and another within the limits of our own State, which was obtained under rather curious circumstances. On the 6th April last Mr. Henry R. Elvery forwarded the Bat from Alstonville on the Richmond River, remarking that he had never observed anything like it before, and that it was taken by Mr. A. O. Ponton who caught it on a barbed wire fence.

In his catalogue, Dobson[1] used the name *Harpyia*, Illiger (1811), for this genus, but Ogilby[2] pointed out that it had been bestowed by Ochsenheimer, the preceding year, in Insecta; he therefore reverted to *Uronycteris*, Gray (1862). Two years ago Trouessart[3] again used *Harpyia*, but later[4] adopted *Cephalotes*, Geoff. (1810), preoccupied by Dumeril in Fishes (1806). I do not see that any name other than *Uronycteris* can be used for this bat.

EDGAR R. WAITE.

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1 Dobson—Brit. Mus. Cat., Chiroptera, 1878, p. 41.

2 Ogilby—Aust. Mus. Cat., xvi., Mam., 1892, p. 81.

3 Trouessart—Cat. Mam., I., 1898, p. 87.

4 Trouessart—*Loc. cit.*, II., 1898, p. 1277.

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RECORDS

OF THE

AUSTRALIAN MUSEUM

EDITED BY THE CURATOR

Vol. IV., No. 4.

PRINTED BY ORDER OF THE TRUSTEES.

R. ETHERIDGE, Junr., J.P.,

Curator.

SYDNEY, 28th AUGUST, 1901.

F. W. WHITE, PRINTER, MARKET STREET WEST.

OCT 1 1901

REPORT FOR THE YEAR 1900.

By R. Etheridge, Junr., Curator.

The following Report treats of the work performed in the Australian Museum during 1900, and of the condition of the Collections therein.

General Condition and Care of Collections.

It is with much satisfaction that I have to report that the whole of the Collections, both exhibited and in store, are in an excellent state of preservation. Nothing has been left undone by the Assistants-in-Charge of the various Sections to render the Collections as complete as the space available will permit. Wherever possible, old or inferior specimens were replaced by more perfect ones, many hitherto unrepresented forms were added, and particular attention was directed to replacing the old manuscript labels by printed ones, and wherever possible these were made of a descriptive nature. The almost entire absence of insect pests, and the cleanly state of the specimens and case interiors is due to the unremitting care of the Assistant-Taxidermist (Mr. R. Grant) and the Articulators (Messrs. H. Barnes, Junr., and A. R. Taylor). Experience has taught us that the perfect condition of Museum specimens, even in a warm climate, is not so much brought about by the lavish scattering of disinfectants, as by constant and careful examination and cleaning. To effect this, it is absolutely necessary to have at least one officer constantly employed in duties of this nature.

It is gratifying to state that, through the perfect sanitary condition in which the Museum premises are always kept, the Staff was quite unaffected by the epidemic of supposed bubonic plague, which raged in Australia during 1899-1900.

Attendance of Public.

The total attendance of visitors during 1900 amounted to 116,927, showing a decrease from the preceding year. The average attendance was 325 on week-days, and 600 on Sunday afternoons. The largest number passing through the turnstile in any one day, and indeed the largest on record, was 2291, on Monday, October 1st ("Eight-hour day"). The decrease in the number of visitors is to be attributed to the plague scare, and this was particularly noticeable during the months of April and May.

Commonwealth Festivities.

Our modest endeavour, at the close of the year, towards the Commonwealth Celebration in the beginning of 1901, was carried to a successful conclusion. This will be fully dealt with in my Report for 1901.

Museum Staff.

One change took place in the *personnel* of the Museum Staff, and one addition was made. The Messenger (S. W. Griffith) resigned on November 10th, and was succeeded by R. C. Park in the same capacity.

Funds having been provided by Parliament for the employment of an additional Attendant, I recommended Mr. W. Thorpe for appointment; this was effected in November. To fill the vacancy caused by the latter's promotion, I suggested the engagement of a young man (J. C. Cullen) who had been favourably recommended to me, and this proposition was also approved and carried out in the same month.

The services of Dr. Thomas Cooksey, B.Sc., Lond., were also retained as Consulting Mineralogist, pending the appointment of a permanent officer. To me, personally, this was particularly gratifying, as it delayed the official severance of our relations with a gentleman who has done much to promote the interests of the Institution, and with whom our intercourse has been of the most cordial nature.

Mr. Allan McCulloch continued his volunteer assistance to Mr. E. R. Waite, and I gladly endorse the sentiments of high esteem in which the latter speaks of the assiduity and ability of his helper.

Structural Details.

In my Report for 1899 I referred to the commencement, in August of that year, of two galleries forming a portion of the new South Wing of the Museum, contracted for by Mr. John Howie, of Parramatta. Steady progress was made with this work throughout 1900, although some delay was occasioned by the non-delivery at the proper time of portions of the iron-work, but for this the contractor was in no way responsible. As a step towards the further completion of this wing, an application was made to the Department of Public Works to expend the balance of the voted money in excavating a portion of the ground to receive the foundations of the remainder of the building; this request was complied with, and the work carried out by the same contractor. It is anticipated that the structure of the two half-galleries will be completed within the contract time, and in my Report for 1901, I shall give a brief description of the building, which has been erected over the workshops, the latter forming the basement. When handed over to the Trustees, the first requirement will be to erect cases, and then to remove the Ethnological Collection from its present quarters. As soon as possible after this, it is proposed to have the present Ethnological Hall pulled down, and the now existing portion of the South Wing connected with the main Museum building. The upper gallery is destined to contain the Anthropological and Ethnological specimens, and the ground floor will be utilised for the extension of the Mammalia and Osteology.

With the aim of providing a detailed plan of the various drainage, water, and gas-supply pipes throughout the premises, I was engaged for some time with the Clerk of Works (Mr. E. H. W. Rumsey) in tracing them out. In consequence of the various demolitions, alterations, and additions of new services during recent years, this proved by no means an easy task, but was ultimately accomplished.

At the annual inspection of floors, roofs, sub-floor spaces, and ventilation air-ways, no trace of further ravages by Termites was discovered, and all structures were found to be perfectly dry and well ventilated. The special preparation with which the under-surface of the floor and joists of the Ethnological Hall was coated at my suggestion, four years ago, was found to be quite fresh, and appeared to have saturated the wood perfectly.

During the progress of arranging the new Fish Gallery, a little consideration convinced Mr. Waite and myself that certain structural additions were requisite to prevent any chance of accident should the gallery ever be overcrowded. It must not be forgotten that this gallery, has never before been used for public purposes. The iron ballustrade appeared to be too low and slight, and to remedy this it is proposed to stiffen it with additional standards, raise the hand-rail, and fill in the open iron-work with strong wire guards. A representation was accordingly made to the Department of Public Works, and it is hoped that these additions will be carried out early in 1901.

Messrs. Hocking Bros., contractors, having completed their contract for the erection of the ornamental stone wall along College-street, it became necessary to cut down and regrade the grass plot facing thereto. The same firm also erected a flagstaff over the private entrance to the Museum.

Fire Appliances.

The charge of these appliances, as in the past, still continues in the hands of the Metropolitan Fire Brigade. Three lengths of new fifty-foot hose were supplied to take the place of a similar quantity condemned, tested and placed in position ready for use. The two new half galleries of the South Wing were also supplied with hydrants and hose. As an additional precaution, four small emergency hoses were placed in the private portion of the building, one in the basement, and one on each of the three floors; these are attached to the main fire service.

New Cases.

In my Report for 1899, I referred to the urgent necessity of providing new cases for the Conchology around the ballustrade of the Invertebrate Gallery. The first half of these was made in the latter part of 1900, and will be placed in position early in 1901. An additional shelf was also fitted to the wall cases of the Fish Gallery.

The following additional closed cabinets were also supplied for use in the Assistants' studies:—A Conchological Cabinet of forty drawers, an Arachnid cabinet of eighteen drawers, a Lepidoptera cabinet of thirty-five drawers, and one for the Zurich Bibliographical Council's Card Reference Catalogue for general use.

Two glass cases were also provided for the Ribbon or Oar-fishes (*Regalecus glesne*, Asc., and *Trachypterus jacksoniensis*, Ramsay).

Collecting and Field Work.

I regret that steps have not yet been taken to supply the services of a trained Collector. The collection of specimens still remains almost dependent on the voluntary efforts of members of the Staff and friends who are willing to devote some portion of their time to it. By this means 1742 specimens were added.

General collections of marine organisms were made at Lord Howe Island, for the Trustees, by Mr. Frank Farnell, Hon. Visiting Magistrate, and by the following residents:—Mrs. T. Nicholls, and Messrs. W. S. Thompson, and J. B. Waterhouse.

Mr. A. J. North continued his field researches on Saturday afternoons and public holidays, thereby adding many nests and eggs to the collection, and facts appertaining to nidification of our birds to his note-book.

Mr. E. R. Waite obtained a few Marsupials on the Hawkesbury River.

Mr. C. Hedley made a very successful trip to Muddy Creek, in Victoria, during his vacation, and obtained a large series of the Eocene and Miocene fossils of that locality. He also visited Twofold Bay and Newcastle, and collected some interesting Mollusca. At the latter place he also secured some very remarkable fossil plants, that will be more particularly referred to in next year's Report.

By far the most interesting "find" of the year, however, was the discovery by Mr. T. Whitelegge, along the neighbouring sea-board, of an aboriginal manufactory of stone implements that has quite shed a new light on some of the habits of the blacks of the metropolitan area.

When at Tarana, during vacation, Mr. J. A. Thorpe was able to replenish our Avian and Reptilian stores to some extent.

In March I visited that part of the South Coast lying between Gerringong and the Shoalhaven River, and took the opportunity of examining the historic locality of Black Head. From the Upper Marine Series of our Permo-Carboniferous Formation, so highly developed there, I obtained a fairly representative collection of fossils. During two visits to Tamworth on official business, I devoted a short time on each occasion, in company with Mr. D. A. Porter, to collecting at Moore Creek and Nundle Road, where the Devonian Limestones are so highly developed. On the second occasion I was ably assisted by a member of the Museum Staff (Mr. B. Lucas).

The following is a statement of the specimens collected:—

Mammalia	1
Aves	73
Reptilia	23
Pisces	76
Skeletons (specimens for)	6
Mollusca	860
Insecta, etc.	154
Other Invertebrata	193
Fossils	305
Minerals	7
Ethnological specimens[1]...	44
Total	1742

PRESENTATIONS.

The specimens presented during 1900 were in excess of those during the preceding year—7089 as against 6058.

The most important donations, more fully referred to in their respective places, were:—

1. Kava-root, in gift form, from Tonga—by *Mr. J. Green.*
2. Aboriginal pigments from N.E. Australia—by *Dr. W. E. Roth.*
3. The Clarke and Prize Medals of the Royal Society of New South Wales—by *The Council.*
4. Co-types of his species of Pleurotomidæ from Lifu—by the late *Rev. J. Hervier.*
5. Electrotype of the Copley Medal, presented to Capt. James Cook, R.N., F.R.S., by the Royal Society of London—by *The Council.*
6. Palæo-Neolithic Implements from Denmark—by *Mr. E. Hansen.*

[1] Irrespective of Mr. Whitelegge's collection of Aboriginal chips.

7. Cuirass and Armlet from the Gilbert Islands—by *Mr. P. G. Black.*
8. Wolfram, from Noble Island—by *Mr. W. Troup.*
9. Nest of a supposed *Gymnorhina*, based on a mass of entangled fence lacing-wire—by *Mr. W. Loder.*
10. Type of *Eremiornis carteri*, North—by *Mr. T. Carter.*
11. Large collection of Queensland Lower Cretaceous Fossils—by *Mr. H. W. Blomfield.*
12. Micro-slides of Sponge spicules—by *Prof. A. Dendy.*
13. A Child's Doll, from Mallicollo—by *Miss C. Robertson.*
14. Palæo-Neolithic Implements from the Western Egyptian Desert—by *Mr. H. W. Seton-Karr.*
15. Nest and Eggs (with Birds) of the Black-breasted Lark (*Cincloramphus cruralis*, Vig. & Hors.)—by *Mr. A. Payten.*
16. Dromedary (*Camelus dromedarius*, Linn.)
17. Japanese Macaque (*Macacus fuscatus*, Blyth.)
18. Two Collared Peccaries (*Dicotyles tajacu*, Linn.)—Nos. 16–18 by *The Council, Zoological Society of New South Wales.*

The following is a full statement of the specimens presented:—

Mammalia	48
Aves	202
Reptilia	244
Pisces	73
Skeletons (specimens for)	33
Mollusca	3784
Insecta	1070
Other Invertebrata	175
Fossils	720
Minerals	161
Ethnological specimens	498
Historical	12
Coins, etc...	46
Miscellaneous	23
Total	7089

Exchanges.

A very marked falling off, in the number of specimens acquired by Exchange, took place in 1900. In 1899, 3436 specimens were so obtained, but last year only 580. The principal acquisitions were :—

1. Japanese Butterflies—from *Prof. Yasuski Nawa, Commissioner for Agriculture, Tokio.*
2. Ceylon Land-shells—from *Mr. O. Collett.*
3. Brachiopoda—from *Prof. C. E. Beecher.*
4. Scaphopoda—from *Mr. W. T. Bednall.*
5. Crustacea—from the *Rev. T. R. R. Stebbing.*
6. Polyzoa—from *Prof. F. S. Harmer.*

7. Palæozoic Corals—from *The Geological Survey of Queensland.*
8. Italian Mesozoic and Tertiary Fossils—from *Mr. G. Podenzaga.*
9. Bird-skins and Fish—from the *Western Australian Museum, Perth.*
10. Victorian Ethnological specimens—from the *Warnambool Museum, Victoria.*

The following is a statement of the specimens received:—

Aves	10
Pisces	2
Mollusca	61
Insecta, etc.	142
Other Invertebrata	1
Fossils	299
Minerals	25
Ethnological specimens	23
Numismatic specimens	6
Casts	2
Miscellaneous	9
	580

PURCHASES.

Our purchasing power was largely increased over the previous year 1645, specimens having been acquired in 1900, as against 301 in 1899, without taking into account the large Porter Collection of Minerals.

The more important purchases comprised weapons and implements from the Solomon Islands, New Guinea, Fiji, New Caledonia, and various parts of North-east and Eastern Australia.

The following is a full return:—

Mammalia	4
Aves	108
Reptilia	236
Pisces	24
Skeletons...	1
Insecta, etc.	25
Other Invertebrata	395
Fossils	503
Minerals[2]	54
Ethnological specimens	216
Numismatic specimens	76
Casts	2
Miscellaneous	1
Total	1645

[2] Irrespective of the Porter Collection.

PUBLICATIONS.

The second part of Memoir iv., dealing with the results of the "Thetis Trawling Expedition," containing the first portion of the Crustacea, by Mr. T. Whitelegge, was published on 23rd May. It comprised descriptions of the Brachyura, Anomura, Macrura, and Stomatopoda, drawn up with that minuteness and care that characterises all Mr. Whitelegge's work.

Part 10 of Memoir iii., dealing with the Atoll of Funafuti, was issued on May 16th, so completing the volume.

Of our "Records," Parts 7 and 8 of Volume iii., were issued on June 15th, and December 1st, respectively, again completing the volume. Several interesting papers here appeared, which will be further referred to in their proper places.

The preparation of the new edition of Mr. A. J. North's "Descriptive Catalogue of the Nests and Eggs of Birds found breeding in Australia and Tasmania," progressed satisfactorily: nearly all the plates are now prepared. The first part of the MS. was handed to the printer at the end of the year, and should be issued to subscribers early in 1901.

A list of "Duplicate Books and Pamphlets," available for exchange, was prepared by Mr. S. Sinclair, printed, and distributed. This has been the means of negociating some advantageous exchanges.

The scientific papers, official and unofficial, prepared by the Museum Staff, and published during 1900, are as follows:—

ETHERIDGE, R., Junr.

1. Spears with Incised Ornament.
   Aust. Mus. Rec., iii., 7, 1900, pp. 176 - 177.
2. Little-known and Undescribed Permo Carboniferous Pelecypoda in the Australian Museum.
   Aust. Mus. Rec., iii , 7, 1900, pp. 178-187, pl. xxxi.-xxxiii.
3. Occasional Notes—
   VII. *Phyllotheca* and *Cingularia*.
   Aust. Mus. Rec., iii., 7, 1900, p 220.
4. Corals from the Coral Limestones of Lion Creek, Stanwell, near Rockhampton.
   Bull. Geol. Surv. Queensland, 12, 1900, pp. 5-24, pls. i. and ii.

HEDLEY, CHARLES.

1. Studies on Australian Mollusca, Parts I. and II.
   Proc. Linn. Soc. N.S.W., xxv., 1, 1900, pp. 87 - 100, pls. iii. - iv.; 3, 1900, pp. 495 - 513, pls. xxv.-xxvi.
2. Occasional Notes—
   V. *Turricula scalariformis*, Ten-Woods: Its occurrence in New South Wales.
   VI. *Scala revoluta*, Hedley: Its occurrence in Fiji.
   Aust. Mus. Rec., iii., 7, 1900, p. 219.

North, Alfred J.

1. Description of a New Bird from North-western Australia.
   Vict. Nat., xvii., 4, 1900, pp. 78 - 79.
2. Description of a New Parakeet from the Bourke District, North Queensland.
   Vict. Nat., xvii., 5, 1900, pp. 91 - 93.
3. Additional Notes on Carter's Desert bird (*Eremiornis carteri*, North).
   Vict. Nat., xvii., 5, 1900, p. 93.
4. Additional Notes on Macgillivray's Parakeet (*Platycercus macgillivrayi*, North.
   Vict. Nat , xvii., 6, 1900, pp. 113 - 114.
5. Description of the Nest and Eggs of the Painted Honey-eater (*Entomophila picta*, Gould).
   Vict. Nat., xvii., 7, 1900, p. 127.

Rainbow, W. J.

1. Two New Thomisids.
   Aust. Mus. Rec., iii., 7, 1900, pp. 169 - 175, pl. xxx.
2. Descriptions of some New Araneidæ of New South Wales. No. 9.
   Proc. Linn. Soc. N.S.W., xxv., 3, 1900, pp. 483 - 494, pls. xxiii. - xxiv.

Waite, Edgar R.

1. Recurrence of *Megaderma gigas*, Dobson.
   Aust. Mus. Rec., iii., 7, 1900, pp. 188 - 189.
2. An extended description of *Mus fuscipes*, Waterhouse.
   Aust. Mus. Rec., iii , 7, 1900, pp 190 - 193.
3. Additions to the Fish-fauna of Lord Howe Island.
   Aust. Mus. Rec , iii., 7, 1900, pp. 193 - 209, pls. xxxiv.- xxxvi.
4. Notes on Fishes from Western Australia, and Description of a New Species.
   Aust Mus. Rec , iii., 7, 1900, pp. 210 - 216, pl. xxxvii.
5. The Card-Catalogue System adapted to Museum requirements.
   Aust. Mus. Rec., iii., 7, 1900, pp. 217 - 218.
6. Occasional Notes—
   VIII. Note on *Lygosoma fragile*, Günther.
   Aust. Mus. Rec., iii., 7, 1900, p. 220.

Whitelegge, Thomas.

1. Scientific Results of the Trawling Expedition of H.M.C.S. "Thetis." Crustacea, Part i.—Decapoda and Stomatopoda.
   Aust. Mus. Mem., iv., 2, 1900, pp. 135 - 199, pls. xxxii.- xxxv.

Information Disseminated.

Information supplied to the public, either in writing, or by word of mouth, forms by no means the least important item in the year's work on the part of the Secretary, Scientific Staff, and myself.

Parcels of Fish and Crustaceans were from time to time received from the Commissioners for Fisheries, and either systematically determined for that body, or examined pathologically and reported on.

Determinations were made, and information supplied to the Department of Agriculture, Technical College, Geological Surveys of New South Wales, Queensland, and South Australia, and the Sydney *Town and Country Journal.*

The more important items of information supplied to the public were :—

1. Mr. C. A. Benbow—Habits and economy of the Eland.
2. Mr. H. C. Curl—References to literature bearing on the Australian Aborigines.
3. Rev. G. Glover—Life-history and architecture of Termites.
4. Dr. W. Marshall—Determination of Coins.
5. Dr. Camac Wilkinson—Information *re* Mosquitos.
6. Miss Bahlsen, Bedford College—Determination of Minerals and Fossils.
7. Capt. Farquhar, R.N.—Determination of Birds' eggs.
8. Mr. J. Kershaw, National Museum, Melbourne—Methods of Museum Arrangement.
9. Mr. G. D. Stead—Determination of Lizards.

Transfer of Specimens.

It has been the practice for some years past to assist other Educational Institutions, by transferring to them either duplicates (when possible), or specimens coming more appropriately within their sphere of action.

The more important transfers of this nature were the following:

1. Public Library of New South Wales—Old Colonial and British Newspapers.
2. Geological Laboratory, Sydney University—Nine hundred and twenty-eight mineral oddments for the use of students.
3. Technical College, Newcastle—A similar large collection.
4. Technical College, Bathurst—A similar collection.
5. Technological Museum, Sydney—Metallurgical and Furnace products of economic importance.
6. Girls' Institute, Albury (Mrs. A. Hunter)—Mollusca and Minerals for teaching purposes.

Spirit Collections.

The specimens in spirit, both exhibited and in store were maintained in good order. The store collection was slightly added to by the incorporation of Snakes and Lizards included in the purchase of the Porter Collection of Minerals.

The Fish in store were again somewhat reduced by the further transfer of specimens to the cases of the new Fish Gallery.

Twenty-four gallons of used spirit were redistilled during 1900.

Taxidermists.

(Messrs. J. A. Thorpe and R. Grant.)

During the early part of the year the Taxidermist was engaged in completing the remounting of the Australian Psittacidæ, and remounting the Cuckoos and Orioles. His attention was then devoted to preparing illustrative groups of Frogs and Lizards. The latter part of the year was devoted to an entire remounting of the remainder of the Australian Birds, and at the close of the year he had completed the Cranes, Herons, and Bitterns. An interesting group of European Sky-larks with nest, now well acclimatised in New South Wales, was prepared. This work was supplemented by the entire remounting of three large groups of Trogons, Paradisea, and Macaws.

Much of the current work was performed by the Assistant Taxidermist, who also is answerable for the preservation and cleanliness of the exhibited and store skin collections. This duty Mr. Grant most efficiently performed. Three large Sharks were also thoroughly restored, packed, and forwarded to the Royal Zoological Museum at Florence.

The following is a record of the work performed in the workshop:—

Mammal skins prepared and made up ...	42
Bird skins prepared and made up ...	86
Reptile skins prepared and made up ...	1
Birds mounted	40
Bird Groups mounted	97
Bird Nest Groups mounted	5
Reptiles and Batrachia mounted ...	77
Reptilian or Batrachian Groups mounted	24
Fish mounted	10
Crustacea mounted	1
Total... ...	383

ARTICULATORS.

(Messrs. H. Barnes, Junr., and A. R. Taylor.)

In addition to the fleshing, maceration, and mounting of the more important of the year's acquisitions, the Articulators rendered good service by thoroughly cleaning a number of store skeletons. A commencement was also made towards disarticulating, cleaning, and rearticulating some of the existing older preparations.

During the year 462 specimens were handled, as follows:—

Mammalian skeletons cleaned for mounting ...	28
Mammalian skeletons mounted	10
Bird skeletons cleaned for mounting	21
Bird skeletons mounted	18
Skeletons cleaned and rearticulated	10
Disarticulated bones cleaned for the Comparative Series...	375
Total... ...	462

FORMATORI.

(Messrs. H. Barnes, Junr., and A. R. Taylor.)

Two casts were obtained by exchange, and two by purchase. Seven new moulds were prepared, twenty-five casts taken, and seventeen coloured, chiefly Fossils and Minerals.

PHOTOGRAPHER.

(Mr. H. Barnes, Junr.)

Photographic work was somewhat interfered with by the partial demolition of the Studio and its transfer to another site, consequent on excavation work in connection with the building of the South Wing.

The following is a return of the work performed:—

New negatives taken	31
Prints prepared	120
Prints mounted	180
Total... ...	331

Seven additional nest groups were photographed for the "Catalogue of Nest and Eggs."

ARTIFICERS (INCLUDING CARPENTERY AND SMITH'S-WORK.)

(Messrs. R. Barnes and B. Lucas.)

So varied are the duties of a Museum carpenter that it is difficult to epitomise them. In an Institution, such as the Australian Museum, where no work that can possibly be performed inside is put out, it follows that of all the mechanical assistance, the Carpenter's, which with us really signifies Artificer, is one of the most important. I cannot speak too highly of the assistance I have always received from Messrs. Barnes and Lucas, indeed I have been on many occasions indebted to them for various useful suggestions.

Amongst some of the more important work may be mentioned :—

1. Alterations to Mineral store cabinets and addition of drawers.
2. Two large cupboards for chemical and photographic stores.
3. Two cabinets for microscopic slides.
4. A large coin cabinet.
5. Glazed wooden and metal frames for large photographs, documents, and museum notices, in all ninety-six.
6. Stands for specimens, one hundred and ninety-two.
7. Miscellaneous iron and metal work.

Compositor and Printer.

(Mr. J. W. Woodhead.)

The exigencies of our Label-printing necessitated an increase in the quantity of type, and to a slight extent of plant also.

During the year 10,487 separate labels were composed, printed, and distributed as follows :—

Mammalia	9
Reptilia	72
Aves	156
Pisces	743
Skeletons...	95
Insecta, etc.	2054
Conchology	79
Other Invertebrata	1235
Ethnology	329
Mineralogy	468
Palæontology	29
Numismatics	629
Historical	48
Library	1327
General	3214
Total... ...	10487

An "Index List to Periodicals" for use in the Library was also printed. A new industry, which I hope will increase as years go on, was inaugurated last year, that of book-binding. A commencement was made by binding official forms and records used in the Museum, and a few books. The inception of this work is entirely due to Mr. Woodhead.

MAMMALIA.

(Mr. E. R. WAITE, *Assistant-in-Charge.*)

Mr. Waite reports that "both the exhibited and duplicate collections are in admirable order. The local Zoological Society was again a most liberal donor. The principal animals received were a Dromedary *(Camelus dromedarius,* Linn.), two Collared Peccaries *(Dicotyles tajacu,* Linn.), and a Japanese Macaque *(Macacus fuscatus,* Blyth). Among other donors may be mentioned Messrs. E. G. W. Palmer, W. Hawken, A. M. N. Rose, J. Stein, and J. Stringer. Two small objects only were added to the exhibited collection, namely a peculiar nest of a House Mouse *(Mus musculus,* Linn.), and a thick-tailed Pouched Mouse *(Sminthopsis crassicaudata,* Gould, sp.). The latter was presented by Mr. R. Grant.

The Mouse nest in question (Plate xx., fig. 1) is a very interesting piece of architecture. It is oval in shape, and composed of bits of gnawed wood. The aperture is small and round and opens into a most comfortable habitation. It was presented by Mr. Waite.

A very much brighter day is dawning for our Mammalian Collection. It is my intention to utilize the lower hall of the new South Wing, when completed, in conjunction with the space already occupied in the main building, from which the former will open, wholly for the display of Mammalian and Osteological specimens. This will afford ample room for some years to come, and enable me to exhibit with advantage the rich stores at present existing in the Museum, and put an end to the unavoidable overcrowding from which the specimens now suffer.

To the kindness of Mr. J. Hogan we owe an example of the Great Blood-sucking Bat *(Megaderma gigas,* Dobson) from North-west Australia. This appears to be the first recurrence of this interesting Bat, since its description by Dobson, twenty years ago.[3]

In addition to the gifts already enumerated by Mr. Waite, the Council of the Zoological Society of New South Wales added to the collection two Sambur Deer *(Cervus unicolor,* Smith), an Egyptian Mungoose *(Herpestes ichneumon,* Linn.), an Indian Wild Boar *(Sus cristata,* Wagner), a Mungoose Lemur *(Lemur mongoz,* Linn.), a Jackall *(Canis aureus,* Linn.), a Puma *(Felis unicolor,* Linn.), a Langur Monkey *(Semnopithecus cephalopterus,* Zimm.), and a Dorcas Gazelle *(Gazella dorcas,* Linn.).

I would ask our country friends and correspondents to note one of our chief desiderata, examples of indigenous Rats. Last year Mr. E. G. W. Palmer, J.P., of Lawson, presented examples of *Mus fuscipes,* Waterhouse, which enabled Mr. Waite to prepare[4] a more extended description than any yet published.

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[3] Waite—Recurrence of *Megaderma gigas,* Dobson.—Rec. Austr. Mus., iii., 7, 1900, pp. 188-189.

[4] Waite—An extended Description of *Mus fuscipes,* Waterhouse—*Ibid.,* pp. 190-193.

Fifty-three specimens in all were received in this Section, forty-eight by donation, four by purchase, and one by collection.

AVES.

(Mr. A. J. NORTH, *Assistant-in-Charge*).

Mr. North reports that he was "chiefly occupied in the preparation of the MS. of Part I. of the second edition of the 'Catalogue of Nests and Eggs of Birds found breeding in Australia and Tasmania.' No inconsiderable amount of time was devoted to preliminary work in connection with the process blocks for the illustration of the whole, and in supervising the colouring of the plates of eggs. Towards the end of the year I visited Melbourne and Adelaide, and through the courtesy of the Directors of the National Museum in the former city, and South Australian Museum in the latter, I was enabled to examine the cabinet collections in those Institutions. Opportunity was also taken of inspecting many of the private collections. In addition to ordinary routine work, assistance was afforded to the artist of the Department of Agriculture in the preparation of two plates to illustrate the remainder of the long delayed paper on the 'Insectivorous Birds of New South Wales.'[5] A collection of Australian Birds'-eggs was determined for Capt. Farquhar, R.N., and other small collections for different persons."

We were fortunate enough, through the good offices of Mr. W. Loder, to acquire another *Gymnorhina* nest, formed of a mass of fence lacing wire (Plate xx., fig. 2). This consists of fragments of galvanised wire used in the lacing together of wire-netting used in Rabbit-proof fencing. Such pieces are casually thrown on the ground, and gathered up by the bird for the purpose in question. The cavity is lined with small twigs, then a layer of frayed bark, followed by a thin lining of hair, leaving a concavity hardly large enough for a "Magpie." The general mass of the wire is also interlaced with twigs and small pieces of creeper. The whole structure is fifteen inches in diameter by nine and a half inches in height.

In his Report, Mr. North further states that "our series of types was enriched by the addition of that of Carter's Desert-bird (*Eremiornis carteri*, North), presented by Mr. T. Carter, and the type of *Platycercus macgillivrayi*, North, donated by Dr. W. Macgillivray. Worthy of note amongst many contributions received from Mr. H. Newcombe, were specimens of the Short-toed Sandpiper (*Totanus brevipes*, Vieill.)"

Of the two birds previously mentioned, *Eremiornis carteri*, and *Platycercus macgillivray*, one is a new genus and both are new species described by Mr. North.[6]

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5 The former parts were published in the *N. S. W. Agricultural Gazette*, vii., 1897, and viii., 1898.

6 North—Vict. Nat., xvii., 4, 1900, pp. 73-80; 5, pp. 91-93; and 6, p. 113.

"Dr. George Hurst and Mr. J. Gabriel donated nests, Mr. George Savidge nests and eggs, and Mr. R. Grant the curious tracheas of *Manucodia comrii*, Scl., and *Phonygama gouldi*, Gray. An example of *Paradisea intermedia*, De Vis, not previously existing in our collection, was obtained by exchange with Mr. Wallace Russell."

The Nest Groups were increased by the addition, more particularly, of the nest and eggs (with birds) of the Black-breasted Lark *(Cinclorhamphus cruralis*, V. & H.), from near Goulburn, donated by Mr. A. Payten. Other important groups illustrative of the life-histories of Australian Birds, added to the series were those of Lambert's Wren *(Malurus lamberti*, V. & H.), the Diamond Bird *(Pardalotus punctatus*, Temm.), and the acclimatised Skylark *(Alauda arvensis*, Linn.)

By donation, two hundred and two specimens were received; by exchange, ten; by purchase, one hundred and eight; and by collection, seventy-three.

Reptilia and Batrachia.

(Mr. E. R. Waite, *Assistant-in-Charge*).

Mr. Waite reports that "the acquisitions were unusually numerous, five hundred and fifty entries are contained in the Register, a figure produced largely by the purchase of a miscellaneous collection. The donations of West Australian Reptilia by Mr. W. D. Campbell were also many, other donors to be specially mentioned being Messrs. E. N. Atkin, H. Richards, and the Rev. C. W. Abel."

The exhibited collection remains in good order and excellent condition. Nineteen groups of Amphibia were mounted, and placed in the cases, inclusive of seventeen groups of Frogs and Toads, and two of Newts. Amongst the former were three of the large Solomon Islands forms, viz.:—*Rana opisthodon*, Boul., *R. bufoniformis*, Boul., *R. guppyi*, Boul.

Two hundred and forty-four specimens were received through donation, two hundred and thirty-six by purchase, and twenty-three by collection.

Pisces.

(Mr. E. R. Waite, *Assistant in-Charge.*)

In this Section, the Assistant-in-Charge reports that his energies during 1900, "were devoted chiefly to the Fish Gallery. Four hundred and seventy species were selected, determined, and mounted, the total number in the cases now being seven hundred and twenty. The whole of the Fishes exhibited were fully catalogued, and labels for about half of them printed. All the Sharks were labelled anew. So far as I can at present judge, the gallery will be in a sufficiently advanced state by the middle of 1901 to be thrown open to the public. By the kindness of Mr. J. A. Brodie, J.P., Chief Inspector of Fisheries, we were enabled to purchase, on very reasonable terms, some excellent examples of our local food fishes.

Our knowledge of the Fish fauna of Lord Howe Island was materially advanced in 1900, for Mr. Waite was able to largely increase the number of species frequenting the shores of the "Madeira of the Pacific," chiefly through collections made by Mr. T. R. Icely, late Visiting Magistrate, Mrs. T. Nicholls, and others. Descriptions of these will be found in our 'Records.'[7] Thirty-two species were recorded, one new genus, *Euchilomycterus*, and a new generic name, *Acanthocaulus* (= *Prionurus*, Lacép.) proposed, and the former defined.

Valuable additions were made to our pre-existing specimens through a friendly arrangement with Mr. B. H. Woodward, Curator of the Western Australian Museum, in Perth, advantageous to both Institutions. Our series, previous to this, was not rich in examples from the western waters of the Continent. A paper, descriptive of the more important of these additions has already appeared in the same publication.[8] Sixteen specimens are recorded, of which one is new—*Hoplegnathus woodwardi*, accompanied by some interesting historical notes on the genus *Hoplegnathus*.

By donations seventy-three specimens were obtained; by exchange two; by purchase twenty-four; and by collection seventy-six.

Osteology.

(Mr. E. R. Waite, *Assistant-in-Charge*).

Little can be done to increase this interesting and instructive Section pending the acquisition of additional space. Some room was made by removing Bird-skeletons to cases in the Upper Main Hall, contiguous to the mounted Birds; this can, however, be only regarded as a temporary arrangement.

Twenty-eight skeletons were added, chiefly those of Birds, and ten existing preparations were repaired, or disarticulated, cleaned, and remounted. The Comparative Series was increased by the addition of three hundred and seventy-five bones.

The additions by donation numbered thirty-three; by purchase one; and by collection six.

Insecta, Myriapoda, and Arachnida.

(Mr. W. J. Rainbow, *Assistant-in Charge*).

Mr. Rainbow reports :—"The work of remounting and registering the exhibited collection of Australian Coleoptera was completed, and a few specimens now only remain to be relabelled. The task

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7 Waite—Additions to the Fish Fauna of Lord Howe Island.—Rec. Aust. Mus., iii., 7, 1900, pp. 190 - 209, pls. xxxv. - xxxvii.

8 Waite—Notes on Fishes from Western Australia, and Description of a New Species.—Rec. Aust. Mus., iii., 7, 1900, pp. 210 - 216, pl. xxxvii.

of revising, registering, and rearranging the cabinet series of Australian Heterocera was also completed, and a commencement made with the cabinet collection of Australian Coleoptera. The total number of registrations under this head was nine hundred and forty-five. During the year there were many calls upon my time by students of Australian Entomology, and much assistance was given both in the matter of naming specimens and of imparting instruction as to the preservation of collections."

"The donations were fairly numerous, and these included a number of important additions. Our principal contributions were from Mr. C. French, Government Entomologist, Victoria, to whom we were indebted for specimens of Coleoptera and Lepidoptera, some of which were not only rare but desiderata. The Rev. T. Watt Leggatt, of Alua, Mallicollo, New Hebrides, principally contributed Arachnida; Mr. G. A. Waterhouse, local Butterflies; and Messrs. J. J. Walker, R.N., and W. D. Campbell, miscellaneous collections, the latter from Western Australia."

The most important exchange was with Prof. Yasuski Nawa, Commissioner for Agriculture, Tokio.

Mr. Rainbow contributed an interesting paper to our official publication[9] on "Two New Thomisids," the Crab or Flower Spiders. Here are described *Misumena tristani*, and *Saccodomus formivorus*, the genus of the latter form being a new one. "It is remarkable," says Mr. Rainbow, "not alone on account of its form, but also for the reason that, contrary to all previously recorded facts based upon accurate observations of the habits of the Thomisidæ, it constructs a bag-like nest."

One thousand and seventy specimens were received by donation; one hundred and forty-two by exchange; twenty-five by purchase; and one hundred and fifty-four by collection.

Conchology.

(Mr. C. Hedley, *Assistant-in-Charge.*)

Mr. Hedley reports that his attention was, during 1900, chiefly directed to classifying the store collection of Mollusca. "During many years past, parcels of shells, obtained by donation, collection, or purchase were received, and packed away untouched. To put in order this huge accumulation of named and nameless shells eight months of 1900 were spent. I also devoted seven weeks to sorting the collection of Mollusca in alcohol. One day in each week was reserved for the care of the collections in cabinets and gallery. Fourteen hundred and fifty tablets of shells were added to the former. An Ethno-Conchological series of shells from North Queensland, presented by Dr. W. E. Roth, Northern Protector of Aborigines, Queensland, was determined and the results communicated to him."

[9] Rainbow—Rec. Aust. Mus., iii., 7, 1900, pp. 169 - 175, pl. xxx.

A very valuable addition was made through the presentation by the late Rev. J. Hervier, shortly before his death, of co-types of his *Pleurotomiæ* from Lifu, numbering five hundred and fifty-seven specimens, and comprising one hundred and seventy-five species. An equally interesting general series of shells from New Caledonia was given by the Rev. Pére Lambert. Mr. Hedley, adds :—" Other presentations of importance were—Marine shells from Victoria, by Mr. J. H. Gatliff; similar molluscs from Tasmania, by the Rev. H. D. Atkinson ; land shells from the New Hebribes, obtained during the cruise of H.M.S. 'Ringarooma,' by Mr. J. J. Walker, R.N., etc."

Three thousand seven hundred and eight-four specimens were donated; sixty-one received in exchange; and eight hundred and sixty collected.

INVERTEBRATA (OTHER THAN INSECTA, ETC., AND MOLLUSCA.)

(Mr. T. WHITELEGGE, *Assistant-in-Charge.*)

"The principal portion of my time," reports Mr. Whitelegge, "during the past year, was occupied with the Crustacea of the 'Thetis' Expedition, and in working out a large collection of Sponges received from the Commissioners of Fisheries, consisting of over six hundred specimens, and representing about seventy species. Part I. of the 'Thetis' Crustacea (Brachyura, Anomura, Macrura, Stomatopoda, etc.),[10] was completed early in the year, and Part II. (Isopoda), was almost ready for publication at its close. A named set of Caprellidæ was returned by Prof. P. Meyer, of Naples, which formed part of a collection forwarded to him by order of the Trustees, in December, 1899. During the year, printed labels were attached to the exhibited Foraminifera models, Echinoderms, and the remainder of the Sponges."

Mr. Whitelegge further states that "the most valuable donation was a series of microscopic slides of Sponge sections, from Prof. A. Dendy, D.Sc., of Canterbury, N.Z., representing seventy-four species. Many of the sections are co-types, and were used by him in the preparation of his 'Catalogue of Non-Calcareous Sponges.'"[11]

In addition to the microscopic slides already mentioned, Prof. Dendy was so kind as to forward for Mr. Whitelegge's assistance two hundred and twenty-four Sponge cuttings (for microscopic purposes), of types and species described by the late Mr. H. J Carter, the specimens themselves being now in the Natural History Branch of the British Museum. From these two hundred and thirty sections were prepared by Mr. Whitelegge, and proved of the greatest service to him.

[10] Whitelegge—Aust. Mus. Mem., iv., 1900, Scientific Results of the Trawling Expedition of H.M.C.S. 'Thetis,' etc. : Crustacea, Parts i. and ii., pp. 133 - 199, pls. xxxii. - xxxv.

[11] Dendy—Proc. Roy. Soc. Vict., (n.s.) vii., 1895.

The collection of Sponges received from the Commissioners of Fisheries, was forwarded to us with the view of ascertaining more particularly what proportion, if any, was likely to be of commercial value. These sponges were at once placed in Mr. Whitelegge's hands, and I look forward with much interest to his elaboration of the material.

By donation, one hundred and seventy-five specimens were received; by exchange, one only; by purchase, three hundred and ninety-five; and by collection, one hundred and ninety-three.

Ethnology.

(Mr. A. J. North, *Assistant-in-Charge*).

"My time," reports Mr. North, in this section, "was solely devoted to the registration of specimens, in which you afforded me substantial help. The further administration and care of the specimens entirely devolved on yourself, or was carried out under your personal supervision."

In the previous year's Report, I referred to the all-but completed examination of the Ethnological stores. This I sytematically continued in the early part of 1900, as before with the assistance of Mr. R. Grant, and completed it. All that now remains is to select from these stores as complete a series as possible for the new Ethnological Gallery.

Our collection of Pottery was enriched by the addition of another cooking pot from Santo, New Hebrides, presented by the Rev. A. H. Robertson. It is a fine specimen of its kind (Plate xxi.), eight inches high, ten inches diameter (across the mouth), weight five pounds eleven ounces, has a capacity of one and a half gallons, and is highly ornate. Under the somewhat flat circumferential margin, is a series of oblique nicks, with below a wide panel, bounded by a raised border, top and bottom. This panel carries vertical rows of prominent nodules, and below the lower raised border is again a circle of oblique nicks.

The series of Pigments that I have for some time been endeavouring to form was enriched by a number of specimens of red earths derived from the decomposition of both Limonite and Hematite, Ochres, and Kaolin from Northern Queensland, presented by Dr. W. E. Roth, Northern Protector of Aborigines, Queensland. These are in use by the following tribes—Wapa-Bara of Keppel Island, Koko-Ngodi of Princess Charlotte Bay, Koko-Minni of the Middle Palmer River, Koko-Yimidir of the McIvor River, Ng-Gerikudi of the Batavia River, and the Workai of the Georgina River, in South-east Queensland.

We acquired another example of the Coconut-fibre "Armour," or Corselet, and accompanying sleeves, used by the Gilbert or Kingsmill Islanders, by presentation from Mr. P. G. Black. The knitting (for want of a better term) of the corselet is close and regular, and produces a hard stiff and inflexible envelope for the body-trunk, two feet seven inches in height, with a girth of about four feet. The front of the ventro-thoracic shield is ornamented by a median and vertical line of black diamond-shaped figures, with three similar lines on the inside and outside of the tergal shield. Edge-Partington figures[12] a similar corselet with three rows on the ventro-thoracic shield. The tergal shield is high and upstanding, without any trace of a continuous circular collar as represented by Schmeltz and Krause,[13] in another corselet from the same islands: the latter is, however, similarly ornamented to that presented by Mr. Black. The overlap is at the left side, and the envelope appears to be kept in place simply by its own rigidity and curvature, without the aid of the lacing in front sometimes met with in these investitures.[14] The sleeves, separate from the corselet, are in one, with a double neck piece, through which the head is protruded. Each sleeve is terminated by a guard for the back of the hand, and this is retained in position by a thumb-loop. The knitting is large and loose, rendering the sleeves pliable, quite different from the rigid condition of the corselet. The entire length of the whole is five feet, the sleeves at about the elbows are six and three-quarter inches wide, and the neck pieces eight inches wide.

Another corselet (Plate xxii.), presented by Mr. E. Twynam, is more elabcrate in every way. The ventro-thoracic shield bears two cross bars, a clavicular and thoracic, with between them a row of five elongated diamond-shaped figures, and below the thoracic bar, the venter carries two similar rows one above the other. The inside of the tergal shield is transversely divided by four cross-bars into five panels or spaces, the three upper panels containing seven diamond-shaped figures in each, the central narrow panel bears nine such, and the lumbar or bottom broad space contains three transverse rows of nine similar figures; the outside of the tergal shield, which is of the high square shape without collar, is similarly ornamented. From the arm-holes downwards the cuirass is open at both sides, with an overlap of the tergal shield forwards over the ventro-thoracic, the margins of the former having a coir loop through which pass similar strings made fast on the centre of the venter. This is precisely as seen in Webster's illustration already quoted. The height is two feet ten inches, and the girth four feet.

A very remarkable discovery was made by Mr. T. Whitelegge in the early part of the year, along the local sea-board. A series of heavy gales displaced the sand hummocks at Bondi and Maroubra

12 Edge-Partington—Ethnol. Album, 1st Series, pt. 1, pl. clxx.

13 Schmeltz and Krause—Eth.-Anthrop. Abth. Mus. Godeffroy, 1881, pl. xxviii., f. 2.

14 Webster—Illus. Cat., 1897, 14, p. 12, f. 139.

Bays, Dee-Why Lagoon, etc., exposing what appeared to be the old land surface. On the latter Mr. Whitelegge found revealed, what we had never before imagined to exist, a series of Aboriginal "workshops," where for generations the Blacks of the Port Jackson District must have manufactured chips, splinters, and points for insertion along the distal margins of their spears and other purposes. The old land surface at Bondi, as I saw it, in company with the discoverer, was covered with thousands of these chips, some of them exquisitely made, with core pieces, chippers and rubbers, The lithological character of the material used was very varied, from pure white crystalline quartz, opaque amorphous quartz, every variety of chert, and quartzite to rocks of a metamorphic character. It is quite clear that the siliceous material was derived in a great measure from the surrounding Hawkesbury Sandstone, but the others were probably obtained from distant sources. I regard this as one of the most important Ethnological discoveries made in New South Wales for many years.

The presentation of Cáva (Ava, Kava, or Yaquona) as a gift is referred to by Mariner[15] in his interesting account of the ceremonious preparation of this beverage by the Tongans. The same practice seems to have existed in Fiji, for Seemann says,[16] "Roots of Yaquona are presented to visitors as tokens of good will, and to the temple as offerings." To Mr. James Green, of Tonga, we are indebted for an example of the root of *Piper methysticum*, Forst., in gift or presentation form (Plate xxiii., fig. 1). It consists of the leaf-stem of a narrow-leafed palm of which the mid-ribs of the pinnules are retained, and the wings stripped off. These mid-ribs then stand out as a series of skewers, and on them the pieces of Cáva root, cut into convenient sizes, are strung, each piece having a hole bored through it. The skewer-like mid-ribs are then pressed up parallel to the leafstem, and wound round with a tape of the inner bark of the *Hibiscus*. The entire length of this pleasing object is five and three-quarter feet.

Our admirable collection of Canoes received an addition from the Solomon Islands at the hands of a valued benefactor, already mentioned, Mr. P. G. Black. The Canoe is fourteen feet nine inches in length, with a beam of eighteen inches at the centre, and a remarkably flat bottom, except immediately fore and aft. It is built of rather narrow boards, stitched together with rattan, and the seams served with some kind of gum cement. The short fore and aft prows are decorated each with two tufts of feathers, the upper tufts apparently composed of those of the Frigate-bird, and the lower of Cockatoos, white in colour. The locality is Ngela (New Florida) Island.

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15 Mariner—Acc. Natives Tonga Islands, ii., 1817, p. 201.

16 Seemann—Viti, 1862, p. 326.

Amongst the productions of our Continental Blacks, perhaps the most noticeable objects are two "Dancing-boards," from the neighbourhood of Boulder, Western Australia (Plate xxiii., fig. 2), presented by Mr. W. D. Campbell, of the Geological Survey of Western Australia. The larger of these is a remarkable object, being a flat board of hard dark wood, thirteen feet five inches long, eight inches wide throughout, and with an average thickness of half-an-inch. It is quite rigid and highly ornate. The sculpture is characteristically West Australian, consisting of wide grooves, transverse, longitudinal, or oblique, producing by their arrangement a series of more or less rhomboid, roughly hexagonal, or obliquely oblong figures. The grooving is more or less continuous throughout, from figure to figure, the junction of any two grooves from opposite directions forming a right-angle. According to the angle at which the light strikes the surface, the figures and the ground-work are in shadow or high-light. The ends of the board are rounded, both surfaces flat, and the back gouged, after the manner often seen on some old Boomerangs.

Mr. Campbell, in the course of correspondence, informs me that these boards vary in size from four feet long by three inches wide up to the dimensions already given. They are used when an extra important corroboree is held, in a dance which Mr. Campbell believes is called *Walma*, one kept very secret from women, accompanied by a special song emphasising the latter fact. Of the small boards, one is worn horizontally in front in the belt, and another is placed upright along the back. The large board is called *Oorloo-edma*, the first word meaning mysterious, and is held by a man at each end, horizontally, with another individual beyond holding a smaller board upright with one hand—or, sometimes a series of long boards are used, a short distance one behind the other. All the tribes inhabiting the interior, from Norseman northwards, use them, but not the coast blacks.

One of the subjects connected with Pacific Ethnology that has had least attention paid to it, is the matter of Children's Toys. One would hardly expect to find that the object represented by Plates xxiv. and xxv. was of this nature. Such, however, I am informed by Miss C. Robertson, who has presented it to the Trustees, to be the case. It is a Child's Doll, ten inches high, three and a half inches wide, and carved in stone, representing simply a human head and face. The circumferential groove, eyes, and V-shaped mouth show traces of blue colour, and the general surface of the face and the nostrils was painted a light vermilion. Neither hair nor ears are represented, but around the forehead margin is a series of short blue radii. We already possessed one of these faces at the time Miss Robertson presented the present example, but I had always been at a loss to account for its use. Miss Robertson's long residence at her father's (Rev. H. A. Robertson)

Mission Station at Dillon's Bay, on Erromanga, has enabled her to supply the deficiency in our knowledge. Edge-Partington figures two of these heads as "stone figures,"[17] one from Malo Island, the other without locality. The gift is from Mallicollo.

The last presentation that I need refer to in this Section is that of a series of Palæo-Neolithic Implements from the Egyptian Desert, given by Mr. H. W. Seton-Karr. The important discovery of these implements, and the workshops of the old fabricators, in the Wady el Sheikh, and Wady Sojoor, tributaries of the Nile, in the desert east of that mighty river, is graphically described by Dr. H. O. Forbes,[18] accompanied by some beautiful illustrations of the tools. The collection presented to us is from a spot ninety-seven miles south of Cairo, and from ten to twelve miles east of the Nile. The material of which the implements are made is either a yellowish, pale grey, or dark brown chert, showing evident signs of long weathering. The implements, many of which exhibit a high degree of finish, consist of hatchet or axe and chisel-like tools, cores, leaf-shaped flints, knife-like tools, many of them double-pointed, and large flakes with a curved outline.

The acquisitions for the year in this Section were as follows:—by donation, four hundred and ninety-eight; by exchange, twenty-three; by purchase, two hundred and sixteen; and by collection, forty-four.[19]

Historical.

(The Curator).

The registration of specimens in this Section was kept under by Mr. North, but in consequence of his attention having to be directed more to his especial duties I relieved him of further responsibility.

The objects added in 1900 were few in number, but of high importance historically. In 1894 the Trustees received from the Government of New South Wales, in trust, a number of objects, prints, and documents, generally known as the "Cook Relics," all of which were, at one time, there is every reason to believe, the property of the great circumnavigator, Capt. James Cook, R.N., F.R.S., and with whose name the earliest history of Australia is so intimately associated.

At the time these relics came to the Museum, certain of the documents were found to be missing,[20] having become mislaid, shortly after the arrival of the collection in Sydney. After much patient enquiry and searching, they were fortunately found, and

17 Edge-Partington—Ethnol. Album, 3rd series, pl. lix., figs. 4 and 5.

18 Forbes—Bull. Liverpool Museums, ii., 3 and 4, 1900, pp. 78-115, plates and map.

19 Besides the flint chips collected by Mr. Whitelegge, of which there were several hundreds.

20 Aust. Mus. Rep., 1894 (1895), p. 1, par. 3.

then passed into the Trustees' possession, to be placed with the general collection. On examination I found these documents to be of the greatest interest, and to consist of :—

1. Draft of a letter from Capt. Cook, to Phillip Stephens, Secretary to the Admiralty, informing the Lords Commissioners of his treatment at Rio by the Spanish Vice-Roy. It is undated, but the occurrences are given in 'Cook's Journal' between Nov. 14-28, 1768.[21]

Cook refers to his letter in his "Journal," under date, Dec. 2, 1768. He says :—"This morning sent a Packet for the Secretary of the Admiralty on board the Spanish Pacquet, containing copies of all the Memorials and Letters that have passed between the Vice-Roy and me, and likewise another Packet containing Duplicates thereof I left with the Vice-Roy to be forwarded to Lisbon."[22]

2. Draft of a letter from Capt. Cook, to the Lords Commissioners of the Admiralty, dated H.M.S. Bark "Endeavour," Rio Janeiro, 28th Nov., 1768, informing the Board that he had drawn on them for certain moneys for provisions, in favour of Messrs. Scott and Pringle.

3. Draft of "Rules to be observed by every person belonging to His Majesty's Bark the Endeavour for the better establishing a regular and uniform trade for Provisions, etc., with the Inhabitants of George's Island, and to prevent frauds and disputes as well on the one side as the other."[23]

4. Draft MS. of "Journal" of a portion of the occurrences between Oct. 9th, 1769, at Poverty Bay, to Nov. 27th, 1769, at Cape Brett, N.Z. (with omissions).[24] Much of this is written in a very disjointed manner, and is, evidently, only intended as a memorandum.

5. Names of the Islands surrounding Otaheite, with their bearings.

6. Draft of a letter to his Excellency Petrus Albertus van der Parra, Governor-General, "dated on board his Brittannic Majesty's Ship Endeavor, in Batavia Road, the 16th Octr., 1770," informing His Excellency that he was in want of funds.[25]

7. Draft of a letter to Phillip Stephens, Secretary to the Admiralty, reporting to the Lords Commissioners his proceedings in brief between leaving Rio, on Dec. 8th, 1768, to arrival at

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21 See Wharton—Capt. James Cook's Journal, 1893, pp. 18-22.

22 *Ibid*, p. 22.

23 *Ibid*, p. 61.

24 *Ibid*, pp. 131-163.

25 *Ibid*, p. 335.

Batavia, and the Observation of the Transit of Venus, 3rd June, 1769, dated "Endeavour Bark, at Onrust, near Batavia, the 23rd Oct., 1770."

This letter was sent with an Admiralty Packet mentioned by Admiral Wharton, under date, Oct. 25th, 1770. Cook says, in his "Journal:"—"In the evening I sent the Admiralty Packet on board the Kronenburg, Captain Fredrick Kelger, Commodore, who, together with another Ship, sails immediately for the Cape, where she waits for the remainder of the Fleet."[26]

8. Draft of a letter from Capt. Cook to the Royal Society of London, reporting the Observation of the Transit of Venus, 3rd June, 1769, dated "Endeavour Bark, Batavia, 23rd Oct., 1770."

9. An account of the Transit of Venus at Tahiti, 3rd June, 1769.[27]

10. Four leaves from the journal of the Second Voyage, giving an account of the inhabitants of Amsterdam Island,[28] under date October, 1773.[29]

11. "A Table for the Object-glass Micrometer apply[d] to the object end of Mr. Cooks Telescope of 18 inch focal length."

12. Admiral James Smith's letter to Edward Hawke Locker, Greenwich Hospital, Kent, dated Moreton Abbey, 8th Oct., 1780, informing the latter that Mrs. Cook did not then possess any of her husband's handwriting.

13. "Song composed by Thomas Perry," probably one of the crew of the "Resolution," during the Second Voyage, on leaving the South Polar region (in type).

During the year I succeeded in labelling and arranging the Cook Relics proper, with the assistance of Mr. B. Lucas. They were placed for temporary convenience at the south end of the Upper Main Hall.

A series of old MS. documents, possessed by the Trustees, was also labelled and arranged in two cases, placed on the landings of the private staircase.

Numismatics.

(Mr. A. J. North, *Assistant-in-Charge*).

The registration in this Section was kept down by Mr. North, but the general work was performed by myself. In former Reports I referred to my desire to form the nucleus of a National Numismatic Collection. During the latter part of 1899 this

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[26] *Ibid*, p. 357.

[27] *Ibid*, p. 76.

[28] Tongatabu or Tonga.

[29] Cook—Voy. towards S. Pole, etc., 3rd ed., i., 1779, p. 217.

desire took practical shape by my commencing the sorting and preliminary arrangement of such Coins as the Trustees possessed. A commencement was made with the Australian Tradesmen's Tokens, and the work continued in the early part of last year. Between February and the end of May, I succeeded in identifying, labelling, and permanently arranging three hundred and forty-one tokens, and preparing indication labels for a further series of three hundred and seventy tokens that are required to render our collection anything like complete. In so doing, I have to acknowledge valuable suggestions made by Dr. Mark Long, and Messrs. Basset Hull, and Coleman P. Hynam.

The Collection of Medals was enriched by the addition of original copies of the Clarke Memorial Medal, and the Prize Essay Medal, of the Royal Society of New South Wales, presented by the Council of the latter. The former derives its origin from a sum of money bequeathed by the late Rev. W. B. Clarke, M.A., to establish a medal in his memory "to be awarded from time to time for meritorious contributions to the Geology, Mineralogy, and Natural History of Australia."

An electrotype of the Copley Medal of the Royal Society of London, bestowed by the Council in 1776 on Capt. James Cook, R.N., F.R.S., in recognition of a paper read before the Society on March 7th, 1776, being an account of "The Method he had taken for preserving the Health of the Crew of His Majesty's Ship the Resolution during his late Voyage round the World." Cook was the fortieth recipient of the Copley Medal, "which has long been regarded as the highest scientific distinction that the Royal Society can bestow." It originated in a legacy of one hundred pounds from Sir Godfrey Copley, Bart., F.R.S., left in 1709, and is "awarded to the author of the most scientific discovery or contribution to science by discovery or otherwise" during any one year.

The Council of the Zoological Society of London presented two bronze replicas of its silver medal, which is awarded to those "who have done good service in the cause of Zoology."

We are also indebted to the Council of the Iron and Steel Institute for an electrotype of the obverse of the Bessemer Gold Medal, awarded annually "for exceptional eminence in connection with the manufacture of Iron and Steel."

By donation, forty-six coins were received; six were obtained by exchange; and seventy-six by purchase.

Mineralogy.

(Mr. T. Cooksey, Ph.D., B.Sc., *Consulting Assistant-in-Charge*).

Dr. Cooksey reports:—"The very large and valuable collection of Minerals, principally from New South Wales localities, purchased from Mr. D. A. Porter, of Tamworth, was sorted, prepared for registration, and temporarily stored. Many of these specimens will be available for display in the exhibition cases, filling gaps in our own collection, or else replacing poor representatives already in our possession; the remainder will then be ready for exchange. Many additional specimens in the cases received printed labels in place of the old written ones, and a number of large specimens was specially mounted for better display. The collection is gradually absorbing all the space allotted to it."

In connection with the Porter Collection, I paid two visits to Tamworth. The first occasion (January) was simply one of inspection. I found the collection to be undoubtedly a fine one, the number of foreign specimens comparatively small, whilst the majority of indigenous minerals is from the northern part of this State. It comprises crystallised minerals, ores, lode stones, alluvial washings, a limited number of free gold specimens, a very large number of gem-stones in the rough, some cut stones, a small collection of well shaped rocks, and a general series of fossils from the country around Tamworth. The finest portion consists of quartzes, tourmalines, tin-crystals, hornblendes, molybdenite, manganese ores, wolfram, topazes, orthoclase crystals, and some calcites. My second visit to Tamworth took place in March, on the completion of negotiations, to pack and remove the collection.

The collection of Fulgarites was increased by a number of good specimens, collected by Mr. T. Whitelegge amongst the sand-hills along the coast-line between Bondi and Maroubra.

Alluvial Tin deposits from a new discovery—Greenbushes Tinfield, Western Australia—were presented by Mr. A. H. Tayler and others. This was a discovery that did not realise the great expectations anticipated.

To Mr. W. Troup we were indebted for some remarkably fine examples of Wolfram from Noble Island. The lode from which these were taken is said to be traceable nearly across the island, from south-east to north-west, and for a distance of three hundred feet is well defined, with a width of from six to nine feet. The ore contains in unassorted samples 43% Tungstic-acid, selected samples reaching as high as 60 - 70%.

An opportunity occurred in February of acquiring fifteen finely executed glass models of the more celebrated historical Diamonds, viz., Kohinoor (2), Grand Mogul, Regent of France, Star of the South, Sancy, Orlow, Grand Duke of Tuscany, Pigot, Pasha of Egypt, Pole Star, Hope (blue), Imperatrice, Nassack, and Shah of Persia.

A very remarkable gold nugget (Plate xxvi.) was lent to me by Mr. Thomas Cahill, with permission to take a cast. This nugget in outline presents an extraordinary resemblance to the map of Australia, hence the name that has been given to it, "The Map of Australia Nugget." It weighs 23oz. 5dwts., and was found on

Ruby Plains Station, at the head of one of the branches of the Mary River, Northern Territory, forty miles from Hallick. The finder was Mr. R. Boulton.

It became necessary, through the overcrowding of the ballustrade cases around the Mineral Gallery, to remove the contents of certain devoted to a small series illustrating the Physical Features of Minerals. These I transferred to other cases on the landing leading from the main staircase to the Mineral Gallery door, so giving Dr. Cooksey the opportunity of expanding the general collection.

With the assistance of Mr. B. Lucas, I overhauled the whole of the Mineral stores, spending several weeks in the work. By this means I was able to distribute a large number of duplicate specimens, as already explained under "Transfer of Specimens."

Four hundred and sixty-eight printed labels were distributed throughout the cases.

One hundred and sixty-one specimens were acquired by donation; twenty-five by exchange; fifty-four (exclusive of the Porter Collection) by purchase; and seven by collecting.

PALÆONTOLOGY.

(The CURATOR).

Eighteen hundred and twenty-seven specimens were added to the Collection in 1900, chiefly Invertebrata. In the wall cases of the Geological Hall, reserved for large specimens, were placed some further Mesozoic Cephalopoda, and Marsupial remains, chiefly Macropodidæ. The more important general additions were a series of Devonian Corals from the Tamworth District, collected by myself and Mr. B. Lucas; Upper Marine Mollusca, also collected by myself at Gerringong; and a good series of Eocene and Miocene fossils, obtained by Mr. Charles Hedley, at Muddy Creek, Victoria. Through the presentation by Mr. H. W. Blomfield of a large series of Queensland Cretaceous fossils, our knowledge of the life of that period has been advanced. Prominent among these are portions of large Cephalopoda of the genera *Crioceras* and *Ancyloceras*, and especially a series of tree-trunk portions, probably Coniferous, riddled by a very large *Teredo*. The occurrence of this genus in our Cretaceous was previously known, but its presence in such numbers comes as a surprise. From Mr. John Dibbs we received some fine Moa remains from the alluvial deposits of the Clutha Valley, near Cromwell, Otago, N.Z., including the femora, tibiæ, tarso-metatarsi, and phalangeals, of *Dinornis maximus*, Owen. These have been set up, and when placed in natural position attain a height of six feet, the phalangeals showing a spread of fifteen inches.

Seven hundred and twenty specimens were acquired by donation; two hundred and ninety-nine by exchange; five hundred and three by purchase; and three hundred and five through collecting.

Library.

(Mr. S. Sinclair, *Librarian*).

A list of duplicate books was prepared by Mr. Sinclair, printed and circulated, with the result that numerous useful exchanges of books were negociated with other Institutions.

The new book-cases supplied in 1899, were fitted with blinds.

We have now adopted the formaline method of book disinfection by the use of a powder known as "Paraform."

The additions to the Library numbered two hundred and fifty-three works, irrespective of pamphlets and serials.

Office.

(Mr. S. Sinclair, *Secretary*).

The work of the Office, inclusive of correspondence, accounts, and general business was, as heretofore, conducted by the Secretary, assisted by the Clerk (Mr. F. T. Clark).

In conclusion, I have to express my sense of the willing help and assistance I received during the past year from all members of the Staff.

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RECORDS

OF THE

AUSTRALIAN MUSEUM

EDITED BY THE CURATOR

Vol. IV., No. 5.

PRINTED BY ORDER OF THE TRUSTEES.

R. ETHERIDGE, JUNR., J.P.,

Curator.

SYDNEY, 6TH JANUARY, 1902.

F. W. WHITE, PRINTER, MARKET STREET WEST.

FEB 1902

STUDIES IN AUSTRALIAN SHARKS, No. 2.

By Edgar R. Waite, F.L.S. Zoologist.

Galeus antarcticus, *Günther*.

(Fig. 19).

It was known to Aristotle, some 350 years B.C., that of two common "Hounds" of the Mediterranean, the embryos of one were developed by the medium of a placenta produced in the uterus, and that the embryos of the other were developed without such placenta. The condition in the former species, *Mustelus lævis*, is thus described by Balfour[1]:—"The vascular surface of the yolk-sack becomes raised into a number of folds, which fit into corresponding depressions in the vascular walls of the uterus. The yolk-sack becomes in this way firmly attached to the walls of the uterus, and the two together constitute a kind of placenta."

In 1882, the late Prof. T. J. Parker made the interesting discovery that the embryos of *Galeus antarcticus* do not lie freely in the uterine cavity, but are each confined in a separate compartment. I quote the following passage[2]:—"I was considerably surprised to find, on dissecting a gravid female of *M. antarcticus*, that the relations between the mother and the fœtus were nothing like so simple as I had expected, but that, just as the *Mustelus levis* [*lævis*] furnishes a sort of foreshadowing of the true placenta of mammals, so *M. antarcticus* is provided with membranes which, although formed from the maternal and not from the fœtal tissues, foreshadow in a remarkable manner the chorion and the amnion."

It was perhaps a careless reading of this passage which led me, in a recent work, to write as follows[3]:—"Parker has described how, in this species, the embryo is attached to the uterus with a placenta." This matter is again brought under my notice from the circumstance that on June 10th last, the Trustees received material which fell to my lot to examine.

On the previous day a man fishing in Maroubra Bay caught a Shark, and finding that it contained young, sent them, together with some viscera, to the Museum. I first picked out a young one for determination, and identified it as *Galeus antarcticus*. Turning to the other contents of the bottle, I saw that it included portions of the uteri, considerably torn. Each uterus is divided

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1 Balfour—Comp. Embryology, ii., 1881, p. 54.

2 Parker—Trans. N.Z. Inst., xv., 1883, p. 219.

3 Waite—Aust. Mus. Mem., iv., Fishes, 1899, p. 33.

into several compartments; some of the divisions had been ruptured, and one had furnished the example first examined. As far as could be ascertained, the uterus is exactly as described and figured by Parker, and to his description I need only add that the shell-glands are of unusual size and shape; each consists of a pair of lateral lobes 7·5 mm. in diameter, thickened distally and bent inwards, presenting the convex side to the body of the uterus; the whole forms a sub-reniform body, measuring 19 mm. in length, and 23 mm. in breadth. (Fig. 19).

Prof. W. A. Haswell suggested to me that the chitinous lining of the uterus may be the product of these glands; he now writes as follows:—"Mr. Thomas Steel has tested the membrane from the uterus of *Mustelus antarcticus* and finds that it consists of the same material as the egg-shell of Cestracion (and of other oviparous Elasmobranchs), namely keratin. This seems to support the view that the 'membrane' in question is not formed from the epithelium of the uterus, but is really a vestigial shell, or more accurately, several vestigial shells united together, their substance being secreted by the shell-gland."

Five young were sent to us, all in an equal state of development, one of the divisions contained a yolk-sac, fully charged, but no development had taken place. The following are the dimensions of a fœtus:—

	mm.
Total length	156
Length of head to 1st gill-slit... ...	30
Width of head	23
Snout to front margin of eye	11
Diameter of eye	9
Snout to spiracle	21
Snout to mouth	21
Width of mouth	11
Height of body...	14
Snout to vent	78
Snout to 1st dorsal fin...	50
Snout to 2nd dorsal fin...	95
Intradorsal space	31
Snout to pectoral fin	35
Snout to ventral fin	72
Snout to anal fin	103
Length of caudal fin	35

The colour when first received was pinkish, yellowish in parts, and white below. The back is crossed by nine dark purple bars; one between the eyes, one over the gill-slits, one at the origin and another at the posterior insertion of the first dorsal, two on the intradorsal space, two at the base of the second dorsal, and one on the caudal peduncle. The fins are yellower than the body, and the front edge of both the dorsals is black.

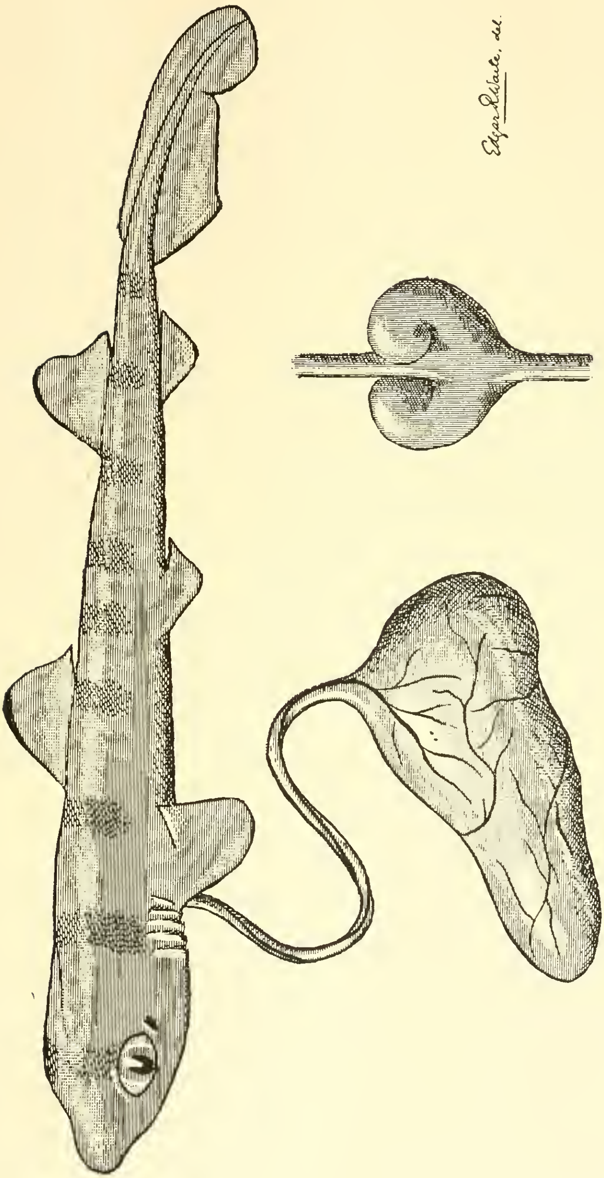

Fig. 19. *Galeus antarcticus*, Günther. Fœtus and shell-gland of adult, both natural size.

The most striking feature of the fœtus is the peculiar yolk-sac. It is not globular like the sac of all other forms I have seen, but greatly elongate, its length being more than twice its major diameter ; it is also larger at one end than the other. The entrance of the umbilical vessel is neither terminal nor median, but to the side of the larger end, its position being very similar to that of the œsophageal entrance at the cardiac end of the human stomach. The umbilical vessel is slender and of great length, its diameter is not more than 2 mm., while its length is 78 mm. or exactly half that of the total length of the fœtus. The colour of the yolk, seen through the investing membrane, is a bright orange, precisely similar to that of a fowl's egg.

The significance of the singular shape of the yolk-sac and the length of the umbilical cord, is not difficult to comprehend. When first formed, the sac fills its section in the uterus ; as the fœtus develops it becomes longer than the chamber, and the tail curves round. A space is thus formed, wider behind where the bend occurs, and narrower in front where the tail touches the body. This space is occupied by the yolk-sac, to which its shape exactly adapts it.

The umbilical cord, entering the yolk-sac at the larger or hinder end, requires to be of great relative length to reach the umbilicus of the fœtus. As the Shark still further increases in size, the umbilicus travels backwards (in relation to the chamber) and a shorter cord is therefore necessary. The shortening of the cord is also favoured by the shrinkage of the yolk-sac and the movements of the fœtus, until at birth, when the sac is smaller than a pea, the length of the cord is not remarkable.

NOTES ON FISHES FROM WESTERN AUSTRALIA, No. 2.

By Edgar R. Waite, F.L.S., Zoologist.

(Plates xxvii. - xxxi., and Fig. 20).

In continuation of the arrangement with Mr. B. H. Woodward, Curator of the Western Australian Museum, the Trustees have received a second collection of fishes from Western Australia. All the specimens are to be identified with described species, but many of them have not been previously recorded from the west coast. Of others already known to inhabit the western waters, precise or additional localities are supplied.

The following species, not previously illustrated, are now figured:—

Apogon rüppellii, Günther.
Hypoplectrodes armatus, Castelnau.
Pseudolabrus ruber, Castelnau.
Thalassoma aneitense, Günther.
Coris auricularis, Cuvier and Valenciennes.
Cichlops lineatus, Castelnau.

Velasia stenostomus, *Ogilby*.

Two lampreys of this species were taken in the Canning River (at the estuary of the Swan River) and off Pinjarrah respectively. Under the name *Geotria chilensis* it has been recorded from Swan River, but I publish these indisputable occurrences, as doubt has been cast on the West Australian habitat, as below:— "I have placed a note of interrogation against the West Australian distribution usually accorded to this species on the strength of the British Museum Catalogue, in which it is recorded from 'Swan River'; though without doubt the West Australian river is the most widely known, the name itself is so little distinctive that I am inclined to believe that some stream, possibly in Tasmania, where it has now been proved beyond question to occur, is intended."—Ogilby.[1]

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1 Ogilby—Proc. Linn. Soc. N. S. W., xxi., 1896, p. 419.

Hypnarce subnigra, *Duméril.*

Hypnos subnigrum, Dum., Rev. Zool., 1852, p. 279.

The name *Hypnos*, given by Duméril in 1852, is preoccupied in Lepidoptera, Hübner having used the form *Hypna* in 1816. I therefore propose *Hypnarce* for the genus.

Locality.—Rottnest Island.

Gymnothorax richardsonii, *Bleeker.*

Muræna richardsonii, Bleek., Nat. Tijds. Ned. Ind., iii., p. 296.

This species has been recognised from the Abrolhos, and I now record it from the mainland. The two examples received were taken at Fremantle.

Ophisurus serpens, *Linnæus.*

Though generally stated to be from Australia, this widely distributed species appears to have been definitely recorded for the Continent only from Port Jackson and Port Stephens on the east coast. We now have it from Pinjarrah and Australind, both south of Fremantle, on the west coast.

Atherina lacunosa, *Forster.*

Though recorded from South Australia, this widely distributed species does not appear to have been previously recognised from the west. The examples received are from Fremantle.

Upeneichthys porosus, *Cuvier and Valenciennes.*

The known range of this species, common on the eastern and southern shores as far as Adelaide, is now extended to Western Australia. The examples received were taken at Mandurah in 1897. *U. vlamingii* was recorded from the west by Castlenau.

Scomber colias, *Gmelin.*

The only character insisted upon for the separation of *S. colias*, Gmel., and *S. pneumatophorus*, De la Roche, is the number of spines in the first dorsal—seven for the former, and ten to twelve in the latter. It is now generally conceded that both are of the same species. In the Atlantic form, the posterior adipose eye-lid is described as crossing over the lower edge of the anterior lid; in ours, the anterior lid crosses the posterior one.

The examples from Western Australia, obtained at Fremantle, agree with *S. colias* in having but seven dorsal spines and with *S. pneumatophorus* in the constitution of the adipose eye-lids.

In recent descriptions, *S. colias* is stated to have nine dorsal spines.

POMATOMUS SALTATRIX, *Linnæus.*

This species, represented in the collection by examples from Fremantle, has not been recorded on the west coast northward of the Swan River.

APOGON RÜPPELLII, *Günther.*

(Plate xxvii.)

Apogon rüppellii, Günth., Brit. Mus. Cat. Fish., i., 1859, p. 236; Ogilby, Proc. Linn. Soc. N.S.W., xxiv., 1899, p. 165.

The two examples forwarded were obtained at Mandurah in 1897. The larger one forms the subject of the accompanying illustration.

In the paper above mentioned, Ogilby redescribes the species, but the following discrepancies are to be noted. The passage "spine of the second dorsal as long as, or a little shorter, than that of the first," should read:—"as long as, or a little shorter, than the fifth of the first dorsal." Again, for "second anal spine about as long as the fifth dorsal," read:—"sixth dorsal." These corrections have been verified with the larger of Mr. Ogilby's specimens, kindly lent me for the purpose of completing the tail in the drawing, this member being defective in Mr. Woodward's examples.

ENOPLOSUS ARMATUS, *White.*

Known from Queensland and common in New South Wales and Victorian waters, this species has not been recorded westward of St. Vincent's Gulf, South Australia. Examples obtained there by means of a trawl were recorded by Castelnau. Specimens taken at Fremantle in 1899, enable me to extend its known distribution, and add it to the published fauna of Western Australia.

HYPOPLECTRODES ARMATUS, *Castelnau.*

(Fig. 20).

Serranus armatus, Cast., Res. Fish. Aust., 1875, p. 7.

In 1875, under the name *Serranus? armatus*, Castelnau described a fish from the Swan River, Perth; he queried the genus on account of its dentition.

When dealing with the species in his Catalogue, Boulenger[2] placed it as a member of the genus *Gilbertia*, but denoted uncertainty.

A fine fish, sent by Mr. Woodward, I am able to identify with Castelnau's species, and am glad to support the conclusions as to

2 Boulenger—Brit. Mus. Cat. Fish., (2), i., 1895, p. 309.

its generic position. It proves to be rather an aberrant member of the genus *Hypoplectrodes (Gilbertia)*, differing from its allies mainly by its stronger dentition, by having its scales more numerous and furnished with scalelets, and an emarginate instead of truncate or rounded caudal. It attains to much greater dimensions, and while the other three members of the genus are remarkable for their bold black markings, this species is singularly devoid of ornamentation. While these various characters may be insufficient whereon to found a genus, they may be expressed in the sub-generic term *Gilbertella*. For the better recognition of the species, I furnish the following description and figure :—

D. x. 20; A. iii. 8; V. i. 5; P. 15; C. 15; L. lat. 70; L. tr. 11 + 36.

Length of head 3·0, height of body 2·7, caudal 5·2 in the length of the head and body. Snout with incomplete scales, its length twice the diameter of the eye, the latter round, 6·0 in the length of the head, and slightly less than the interorbital space, which is flat; supraorbital edges not prominent.

The upper profile of the head is quite straight, and from the nape curves backwards to the first spine which marks the highest point of the body; it reaches the caudal peduncle by a low curve, the ventral profile is much flatter. The lower jaw is the longer, and bears a prominent chin. The cleft of the mouth is large, protractile, and sub-horizontal. Maxillary naked, without supplemental bone, it extends beyond the hinder edge of the eye, its posterior margin is much rounded, and its distal breadth equal to the diameter of the eye. Posterior nostril vertically oval, one-third the ocular diameter in front of the eye; the anterior nostril has a low skinny rim, it lies near to and below the former. The preopercle is finely serrated behind, has a weak flat spine at the angle, and two small antrose ones below it. The opercle has a large flat spine at the angle, another below it, and a third further removed above.

Gill rakers of medium length, about half that of the gill-fringes, seven free ones on the lower limb of the first arch, preceded by indications of others, and a single one on the hinder limb, with four spiny bosses above it.

Teeth.—In the jaws the teeth are villiform and all depressible, those on the inner side somewhat larger. The upper jaw bears a pair of large widely-spaced canines; a similar pair in the lower jaw but much closer together. At each side of the mandible is a series of three canines, all close together and larger than those in front. Vomer and palatines with villiform teeth, tongue smooth.

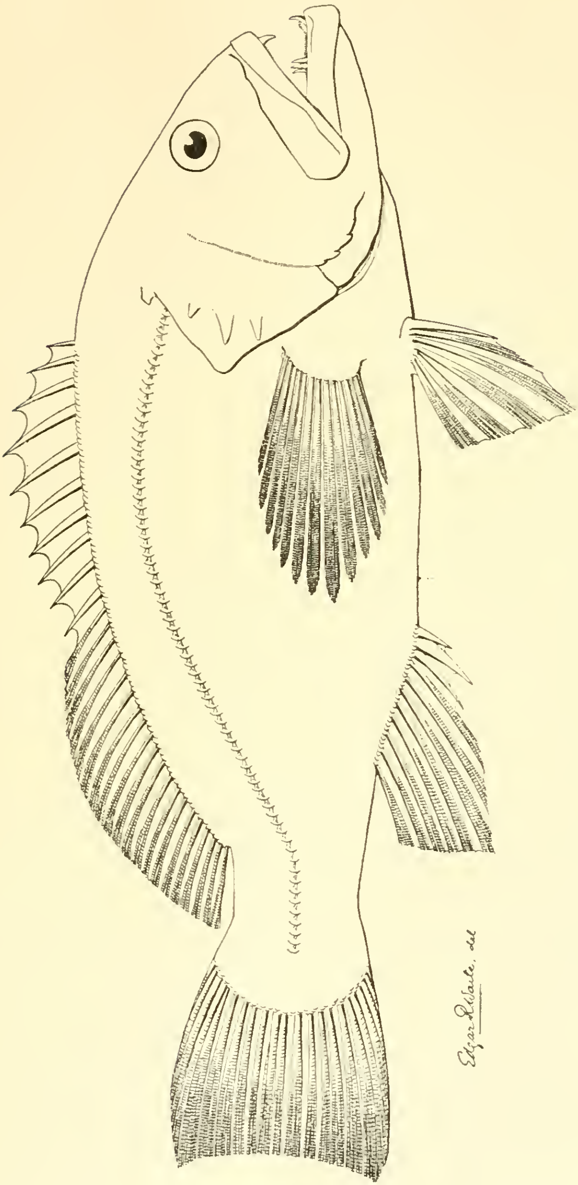

Fig. 20. *Hypoplectrodes armatus*, *Castelnau*. One-third natural size.

Fins.—The dorsal commences above the hinder edge of the opercle. The first spine is one-third the length of the fourth and fifth, which are the longest, subequal, 3·4 in the length of the head. The last spine is one-seventh shorter than the fourth. The soft portion is higher than the spines, the sixth ray being one-third longer than the fourth spine; it has a longer base, the proportion being 10 to 9. The anal commences beneath the second dorsal ray. The first spine is similar to the first dorsal, the second is very broad and strong, equal in length to the last dorsal, the third spine is weaker but longer. The rays are very long, the third being the longest and twice that of the fourth dorsal spine. The total length of the fin is half that of the soft dorsal. The pectoral is long, symmetrical, and rather pointed; the central rays are 1·3 in the length of the head, much dilated, and branched distally, the upper and lower rays less so. The fin has a broad base, nearly one-third its length. The ventral, situated below the pectoral, is shorter, being 1·6 in the length of the head; the spine is strong, equal to the fourth dorsal in length; the second ray forms the apex of the fin, which is pointed. The caudal is shorter than the ventral, and slightly emarginate, the depth of its peduncle 1·3 in the length of the fin.

Scales.—The scales on the body rather small, ciliate, but not spinose; each apparently bears at its base about seven scalelets, but they are in reality attached to a separate membrane, developed between the rows of scales. The scales of the head and chest are smaller than those on the body. The membrane of all the fins is scaly, at least for its basal half. The lateral line follows the arch of the back to below the last dorsal rays, thence passes along the middle of the caudal peduncle; the tubules are short, and for the most part simply bifurcate.

Colours.—After long immersion in spirits, the colour is a uniform yellow, the only mark now discernible is an elongate black patch in which the vent is situate.

Total length of specimen, 435 mm.

Locality.—Swan River, Western Australia, whence the type was taken. (Misprinted Suron River in the British Museum Catalogue).

COLPOGNATHUS DENTEX, *Cuvier and Valenciennes.*

In my previous paper[3] I stated that the specimens then examined were without markings; after prolonged soaking in water, however, the characteristic blue spots became discernable. Examples received are from the Abrolhos.

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[3] Waite—Rec. Aust. Mus., iii., 1900, p. 211.

THERAPON TRUTTACEUS, *Macleay.*

Specimens from the Lennard River, North-western Australia, do not appear to differ from those first described from the Endeavour River. The species was afterwards recognised by Zeitz from several streams in Central Australia.[4]

HELOTES SEXLINEATUS, *Cuvier and Valenciennes.*

The form from West Australia described by Jenyns as *Helotes octolineatus*[5] was regarded by Castelnau[6] as a variety of *H. sexlineatus.* The specimens before me, one from Mandurah and the other from Fremantle, support this view. The characters relied upon by Jenyns were seven anal rays instead of ten, eight body-lines in place of six; the soft dorsal and anal fins spotted, the nature of the striæ on the crown, and one or two other minor points. In our specimens there are eight longitudinal lines on the body, ten anal rays, no spots discernable on the fins, and the striæ on the crown as described in *H. octolineatus*, these specimens are therefore intermediate and show that the name must be sunk as a synonym.

PENTAPUS VITTA, *Cuvier and Valenciennes.*

Locality.—Mandurah.

GONIISTIUS VITTATUS, *Garrett.*

Examples from the Abrolhos islands in no way differ from those taken in Port Jackson and at Lord Howe Island; the species was first described from the Sandwich Islands.

PSEUDOLABRUS RUBER, *Castelnau.*

(Plate xxviii.)

Labrichthys rubra, Cast., Res. Fish. Aust., p. 37.

? *Labrichthys bleekeri*, McCoy, (*non* Cast.) Prod. Zool. Vict., Dec. xiv., pl. 134, 1887.

D. ix. 11; A. iii. 10; V. i. 5; P. 13; C. 12 + 2; L. lat. 26; L. tr. 3 + 8.

Length of head slightly less than the height of the body and 3·1 in the total length, caudal 4·7 in the same. The eye is one-sixth the length of the head, the interorbital space is rather flat and one-fourth more than the diameter of the eye, the length of the snout one-third more than the same. The upper profile of the head forms a low curve, the whole curve of the lower surface of the body is slightly more convex than that of the upper. The

4 Zeitz—Rep. Horn Sci. Exped., ii., 1896, p. 176.

5 Jenyns—Voy. Beagle, iii., 1842, p. 18.

6 Castelnau—Res. Fish. Aust., 1875, p. 9.

jaws are equal, the cleft of the mouth does not reach the line of the eye. The nostrils are nearer to the eye than to the lips, the posterior is an oval aperture, the anterior lies in a skinny tube. The gill rakers are short and stout, ten on the lower limb of the first arch.

Teeth.—A pair of canines anteriorly in each jaw, the lower biting between the upper; the lateral teeth, of which there are eleven in the upper and nine in the lower jaw on each side, are conical, and regularly decrease in size from before, backwards. One or two canines at the posterior angle of the upper jaw on each side.

Fins.—The dorsal fin commences above the skinny margin of the operculum; the spinous portion is low, its longest spine, the ninth, being one-fourth the length of the head; the rays are subequal in length, one-half longer than the last spine. Beneath this the anal commences, its rays are similar to those of the dorsal and it terminates evenly with them. The ventral, placed beneath the pectoral, is very short; the longest ray, the second, 2·4 in the length of the head, the pectoral is one-half longer than the ventral is rather pointed above and rounded below. The caudal is subtruncate or slightly rounded, the height of its peduncle equal to half the length of the head.

Scales.—Head granular and crowded with pores, naked with the exception of a row of incomplete scales at the border of the postorbital and three rows of large scales on the posterior part of the opercle. The scales of the body are large, those on the chest much smaller, there are no scales at the bases of the fins, but a row runs up the proximal half of the caudal membrane between each ray. With the exception of a very slight curve anteriorly, the lateral line runs straight along twenty scales, it drops two scales and passes obliquely upwards along the side of the tail.

Colours.—In spirits reddish-brown, around the eye is a series of irregular radiating black marks, which below and behind enclose yellow areas. On the interopercular membrane these yellow marks tend to form large bars, wider than the interspaces and not bounded by black. The markings on the body are equally irregular. Five broad brown blotches may be traced on the back passing down the sides. The row of scales below the lateral line and other scattered scales possess opalescent blotches, and the lowest four or five rows of scales of the body are almost wholly of this colour, those on the chest being especially brilliant. Most of the scales of the head, back, and sides have one or more black dots. The dorsal and anal fins have each an indistinct dark band at the base, and each ray bears two or three white spots. The dorsal membrane also is darker in the region of the dark body marks; the pectoral and the ventral are without markings, but the caudal is somewhat mottled and carries white spots.

Length of specimen described 285 mm. Two examples taken at Houtmann's Abrolhos in 1894. The type specimen was from Swan River.

It is very probable that the fish figured by McCoy *(loc. cit.)* under the name *Labrichthys bleekeri*, Cast., is referable to this species.

We cannot well compare the descriptions of these two species of Castelnau, for while that of *P. bleekeri* is fairly comprehensive, that of *P. ruber* is little more than a colour description; the following points are however dealt with in both. In *P. bleekeri* the lateral line is formed of twenty-five long carinated lines which expand into rather numerous but short arbuscules; in *P. ruber* the scales of the lateral line are covered by very large arbuscules, formed of a fan-like series of concentric lines. In the colour pattern of the former species there is no trace of spots or bands on the body, in the latter four or five indistinct transverse bands sometimes occur.

On comparing the foregoing description with that of *P. bleekeri* by Castelnau, further differences are found which indicate that the two species are distinct. If, as I have surmised, McCoy's figure really represents *P. ruber*, Victoria must be added to the habitat of the species.

THALASSOMA LUNARE, *Linnæus.*

Though unknown on the mainland of Australia, this species has been taken both at Norfolk and Lord Howe Islands off the east coast. It is now recorded from a similar situation on the west, the collection including two examples obtained at the Abrolhos Islands in 1894.

THALASSOMA ANEITENSE, *Günther.*

(Plate xxix.)

In a previous paper[7] I stated, on the authority of Günther, that this species has been recognised from North-eastern Australia. The locality for this habitat appears to be Cato Island in the Coral Sea, though the author quoted writes "north-east *coast* of Australia."[8]

On the east, the species is known from Cato Island, the New Hebrides (Aneiteum), Norfolk and Lord Howe Islands. We now have it from the west, the specimens being from the Abrolhos. The species is now figured for the first time.

D. viii. 13; A. iii. 10 – 11; V. i. 5; P. 15; C. 13 + 4; L. lat. 28; L. tr. 3 + 9.

Length of head (exclusive of opercular membrane) 3·4, height of body 2·9, caudal 4·0, in the length of the body. The eye is

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7 Waite—Rec. Aust. Mus., iii., 1900, p. 202.

8 Günther—Brit. Mus. Cat. Fish., iv., 1862, p. 183.

5·8 in the length of the head; the interorbital space is arched, equal to the length of the snout, or 3·2 in that of the head. The upper profile of the head forms an irregular low curve, somewhat tumid on the snout and nape. The ventral profile of the body is more convex than the dorsal one. The jaws are equal, very protractile, and the lips cover the prominent teeth. The cleft of the mouth reaches but half-way to the anterior margin of the eye. The posterior nostril is near the eye, a little below the level of its upper margin; the anterior nostril is lower, and further removed from the eye.

Teeth.—All the teeth are conical and strong, the anterior pair in each jaw long, the lateral ones decrease in size backwards; there are seven on each side in the upper and eleven in the lower jaw.

Fins.—The dorsal fin commences somewhat behind the angle of the operculum. The eighth spine is 3·9 in the length of the head; the soft portion is also low, the posterior shorter than the anterior rays, the latter one-half longer than the longest spine. The anal is similar to the soft dorsal and commences beneath its second ray; the first spine is minute, and its third equal to the sixth dorsal. The ventral is situated beneath the pectoral and its first ray is slightly produced; its length is contained 1·3 times in that of the pectoral; this latter fin has a falcate margin, its upper rays are contained 1·1 times in the length of the head and extend to the tenth scale of the lateral line. The caudal is equal to the pectoral in length, it is emarginate, and the outer rays produced; the least height of its peduncle is slightly more than half the length of the head. The lateral line runs almost straight along nineteen scales, it passes downwards two scales and attains the caudal along the centre of the peduncle.

Colours.—Head and anterior part of the body purplish; body olive, each scale with a vertical purple streak. Head with broad olive bars, narrowly margined with dark purple. One (sometimes indistinct) passes through the nostrils along the upper edge of the eye towards the lateral line; a second, from behind the eye and down the angle of the operculum; the third bar commences at the angle of the mouth, skirts the lower margin of the eye and passes backwards parallel to the second one; the last bar forms a horse-shoe, the legs directed backwards, one on the sub- the other on the interoperculum; a circle sometimes exists in the centre of the horse-shoe figure. On the throat a bar passes from the upper limb of the horse-shoe to the space between the pectoral and ventral fins; a less distinct line may be traced from the above-mentioned third bar to the base of the pectoral. All these markings will be better understood by reference to the plate. Dorsal greenish, with a black spot between the second and third spines, and a broad purple band along its whole length, occupying the lower half of the fin, it is margined above and below with a fine dark line. Anal similar in colour with a much narrower purple band situated on the basal fourth of the fin separated from the ground colour by a dark line. Pectoral greenish-yellow, with a black spot in the axil, and a broad oblique black band across its posterior portion; this band forms the margin of the fin above, but narrowing below leaves the hinder margin hyaline. Ventral colourless, except the first ray which darkens to the tip. Caudal with the outer rays somewhat darker than the median ones.

Length of specimen 250 mm.

Coris auricularis, *Cuvier and Valenciennes.*

(Plate xxx.)

Julis auricularis, Cuv. & Val., Hist. Nat des Poiss., xiii., 1839, p. 489.

Of two specimens received, one was taken at Mandurah on the mainland, the other at the Abrolhos. Both have lost the colour and only the markings remain: the tints, in life, have been described by Richardson from a drawing by Lieut. Emery,[9] but as this does not appear to have been published, I have prepared the accompanying illustration, accurate in form, and showing such markings as are traceable on our spirit-faded examples.

Siphonognathus argyrophanes, *Richardson.*

The type specimen was obtained in King George's Sound. Macleay recorded examples from South Australia, and we now have the species from Fremantle, the first record from the west coast.

Harpochirus punctatus, *Gmelin.*

Drepane punctata, Cuv. & Val., Hist. Nat. des Poiss., vii., 1831, p. 132.

For Australia the species has been recorded from Cape York and also the north west coast, but without more precise habitat; the specimens forwarded were taken at Broome.

Although Cantor clearly pointed out that *Drepane*, Cuv. & Val., was preoccupied (in Lepidoptera)[10] later writers have still used it.

Chætodon strigatus, *Cuvier and Valenciennes.*

The specimens received from Pinjarrah are identical with eastern examples. Although there can be no doubt that Castelnau's *Neochætodon vittatum*[11] is the same species, I cannot find the "bifid tooth on the palate" to which that writer refers. Later,[12] he identifies his genus and species from Port Jackson, and omits mention of the palatal tooth, relying on the operculum to distinguish his untenable species.

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9 Richardson—Ann. Mag. Nat. Hist., ii., 1843, p. 422.
10 Cantor—Cat. Malay Fish, 1850, p. 161.
11 Castelnau—Proc. Zool. Soc. Vict., ii., 1873, p. 130.
12 Castelnau—Proc. Linn. Soc. N.S.W., iii., 1879, p. 375.

TOXOTES *sp. ?*

Two examples are in the collection, one from Mandurah, the other from the Abrolhos. As neither is in good condition and as the species are so closely allied as to render determination, in the absence of authentic specimens, very problematical, I have preferred to leave them unnamed. Of the five species described, two have been recorded from Australia, namely—*T. jaculator*, Pallas and *T. carpentariensis*, Castelnau.

MONACANTHUS PERONII, *Hollard.*

Two specimens taken at Fremantle add the species to the fauna of West Australia. Previously it was known only from Victoria, (Port Phillip and Warnambool) and South Australia, (Georgetown).

ARACANA LENTICULARIS, *Richardson.*

Of two examples forwarded, one was taken at the Abrolhos in 1894, the other at Mandurah in 1897. The species has not been previously identified from the western coasts.

AMBLYRHYNCHOTUS OBLONGUS, *Bloch.*

Originally recorded in Australian waters from King George's Sound, and afterwards on the east coast, this species is now recognised from the western shores, the locality being Shark's Bay.

SILLAGO BASSENSIS, *Cuvier and Valenciennes.*

Sillago bassensis, Cuv. & Val., Hist. Nat. des Poiss., iii., 1829, p. 412; Quoy. & Gaim., Voy. l'Astrolabe, Zool., 1835, p. 672, pl. i., fig. 2.

Most writers who have dealt with the Australian Sillagos have followed Günther in placing *S. bassensis* as identical with *S. maculata*, Quoy and Gaimard. Ogilby however demurs and writes: "it seems to us unadvisable to consider *S. bassensis* as a proved synonym of *S. maculata*."[13] From Western Australia we have received five examples, of these three are without doubt referable to *S. maculata*, the others are evidently to be identified with *S. bassensis*. The question remains, how may the two be distinguished?

The radial formula of *S. maculata* is:—D. xi., i. 19; A. ii., 19-20, the lateral line 72. Some authors count but one spine in the anal; the second one is covered with scales which give the appearance of joints, if however the scales are cleared away, I find an undivided spine always revealed; it is necessary to clean the spine with caustic soda and examine under a microscope.

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13 Ogilby—Edib. Fish. of N.S.W., 1893, p. 99.

In our examples of *S. bassensis* the fin formula is D. xi., i. 21; A. ii., 18; Lateral line 69. In the original description of the species the figures have been transposed in some way, so that they cannot be considered. The following proportions may be compared with those rendered by Ogilby[14] of *S. maculata* :—

Length of head 3·4, of caudal fin 6·3, height of body 4·7 in the total length. Diameter of eye 5·0 in the length of the head and 2·3 in that of the snout. Opercle with one sharp point. Ventral not filamentous 1·6 in the distance between its origin and the vent and half the length of the head.

The colours also supply distinguishing features :—in *S. maculata* the back is sandy-brown, and the sides have seven or eight dark blotches (said to be sometimes absent) a dark spot always present at the base of the pectoral. In *S. bassensis* the back is reddish-brown, there are no dark blotches on the body and no dark spot at the base of the pectoral.

In the work quoted, Ogilby states that "*S. bassensis*, if a good species, inhabits Tasmanian waters only." Western Port, the locality of the type specimen is in Victoria; the examples now received are from Mandurah and the Abrolhos.

In his generic description of *Sillago*, Day[15] writes:—"Lateral-line not continued on to the caudal fin." I have no Indian species by me for the verification of this: it is not true of Australian species, however, though Ogilby in copying Day's paragraph has overlooked it. It is doubtless a misprint in the original, as in our examples of *S. maculata*, which Day includes, the lateral line is continued quite to the end of the caudal; McCoy has noticed this in *S. ciliata*.[16]

SILLAGO MACULATA, *Quoy and Gaimard.*

Sillago maculata, Quoy & Gaim., Voy. Freyc. Zool., 1824, p. 261, pl. liii., fig. 2.

Having a wide range this species has been recorded from eastern and (?) northern Australia, and has been seen but once in Victoria. It is possibly common on the western coasts, we have examples from Fremantle.

CICHLOPS LINEATUS, *Castelnau.*

Dampieria lineata, Cast., Res. Fish. Aust., 1875, p. 30.

Cichlops lineatus, Macl., Proc. Linn. Soc. N.S.W., v., 1881, p. 571.

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14 Ogilby—*Loc. cit.*, p. 100.

15 Day—Fishes India, 1878, p. 264, and Fauna Brit. Ind., Fish., ii., 1889, p. 222.

16 McCoy—Prod. Zool. Vict., ii., Dec. xix., 1889, p. 299.

(Plate xxxi.)

B. vi.; D. ii., 25; A. iii., 14; V. i., 5; P. 18; C. 15 + 4; L. lat. 60 + 21; L. tr. 4 + 17.

Length of head, to which the caudal fin is equal 3·2, height of body 3·0 in the total length (caudal excluded). The eye is rather small, 5·6 in the length of the head; the interorbital space is convex, one-fifth more than the eye diameter; the snout is longer than the eye, the proportion being as 5 to 3; exclusive of the maxilla it equals the eye in length. The upper profile of the head is flat with a marked tumidity on the snout, the dorsal curve is low, that of the ventral even less. The lower jaw is much the longer, the lips are very fleshy and a free flap of skin covers the maxillary and mandibulary bones. The cleft of the mouth approaches the vertical, and the maxilla scarcely reaches the vertical line of the eye; its length is 2·5 in that of the head, it is strongly curved and almost reaches the lower profile. The nostrils are placed high on the snout, the distance between each pair being slightly less than the interorbital space, the anterior aperture is in a tube whose skinny margin is produced backward, the posterior one has a complete but simple margin. The opercles have skinny margins and are unarmed. The junction of the opercle with the subopercle is incomplete, a deep notch being thus formed on the posterior border. Gill rakers rather short and club-shaped, the head of each being set with short spines, there are nine on the lower limb of the first arch. Pseudobranchiæ present, a slit behind the fourth gill.

Teeth.—The teeth are in a single series in each jaw, but form a small patch in front, they are stout, conical, and smaller posteriorly. On each side of the patch in the upper jaw is a strong grooved canine, similar teeth exist in the lower jaw, but two or more pairs are developed, each canine being separated by some of the conical ones. A patch of small teeth is found on the vomer but none on the palatines, or the tongue. A number of fleshy villi occur about the anterior teeth.

Fins.—The dorsal fin commences slightly before the line of the opercle, the two spines are distinguishable as such only by their non-articulated character; the membrane is not incised and quite continuous with that of the rays. The fin arises low, the second spine being about the length of the eye diameter; a rapid rise takes place to the fourth ray which is nearly half the length of the head; the elevation is then slight until the posterior rays are reached, these are greatly elongated the twenty-second being the longest, 1·1 in the length of the head and extending to half the length of the caudal. The anal commences beneath the tenth dorsal ray and is similar to the dorsal, terminating slightly in advance of it, and its longest rays a fifth shorter. The ventrals are close together and placed beneath the base of the pectoral;

the spine is short and weak, the third ray is the longest, and produced, just reaching the vent; it is slightly longer than the pectoral, this latter has a rounded margin, a broad base, and a length contained 1·3 times in that of the head. The caudal is acuminate tapering from beyond the middle, the central rays being equal to the head in length; the pedicle is greatly compressed and its depth half the length of the fin.

Scales.—Top of the snout and lips naked: the scales on the head are smaller than those on the body, there are eleven rows on the cheek, the upper ones being formed of larger scales; the bases of all the fins (the ventrals excepted) are scaly. The lateral line arises above the opercle, passes upwards to below the fourth dorsal ray and follows the profile to below the twentieth ray, occupying sixty scales. It recommences in the line of axis of the body beneath the fifteenth ray, and is continued along twenty-one scales to the caudal.

Colours.—In spirits, the general hue is a rich brownish-yellow. A blue line encircles all but the anterior fourth of the eye, and six or more similar lines run obliquely forward and downward on the cheek, broken lines also exist on the opercle. Each scale of the body has a dark spot at the base with a blue centre, a series of lines, about sixteen in number is thus formed, anteriorly they are very faint and thus appear to commence suddenly some distance behind the opercle, the scales of the lateral line are not spotted, it therefore seems more than usually distinct. The dorsal fin is ornamented with eight or nine wavy brown longitudinal lines equal in width to the interspaces, a black spot occurs between the second spine and first ray. The anal has lines similar to, but much fainter than those of the dorsal. On the caudal, lines pass obliquely from the upper and lower edges to the centre and if these edges were respectively joined to the dorsal and anal, the lines on these fins would be continuous with those of the caudal; the pectoral and ventral are without markings.

Length of specimen 232 mm.

A smaller example, 160 mm. in length differs by having the profile of the head more even, an indication of immaturity.

Both specimens were obtained in 1897 at Mandurah south of Fremantle, and there can be little doubt that they are specifically identical with the fish described by Castelnau as *Dampieria lineata.* Macleay recognised the identity of the new genus with *Cichlops.* The only important differences between Castelnau's description and our specimens, are the nature of the dentition and the character of the ventral fin. The author of the species states that this fin is composed of seven rays, he has apparently not recognised the first as a spine, and counted the rays as six instead of five. Our fishes do not exhibit the pavement-like teeth described, though the description of the conical series and the strong canines applies very well: I do not find teeth on the palatines as recorded by Castelnau. It is to be remarked that the type specimen was a dried skin, a circumstance which may well account for the discrepancies noticed. It was obtained at Dampier Archipelago in North-west Australia, and the species finds its nearest ally in *Cichlops melanotænia*, Bleeker,[17] an inhabitant of Macassar Strait.

I am unable to consult the original description of this species, and therefore refer to Günther's epitome[18] and Bleeker's figure.[19]

The profile of the head is not flattened as in *C. lineatus*, and the ventral fin has a much more posterior insertion. The membranes of the spines of the dorsal and anal fin are represented as different from that of the rays; in our specimens there is no such distinction. The markings of the fins are not the same, and the dark lines on the body in Bleeker's species are ten in number, while those of the Australian fish are sixteen. In *C. melanotænia* there are no blue marks illustrated on the opercle, and the central rays of the caudal are not produced as in *C. lineatus*.

It is not possible now to determine if the fins were edged with blue, as in *C. melanotænia*, but there are certainly blue marks on the opercle, a feature not illustrated by Bleeker.

In order that the two species may be the better compared, I have carefully figured the larger of the Mandurah examples. I have also supplied an independent description, Castelnau's 'Researches' having been published in a somewhat inaccessible work.[20]

BOLEOPTHALMUS VIRIDIS, *Hamilton Buchanan.*

The collection contains three examples of a *Boleopthalmus*. Two were taken at Broome, on the north-west coast, and the third in the Lennard River, flowing into King Sound, somewhat further to the north. After comparison with descriptions of all known species, I cannot see any reason for separating them specifically from *B. viridis*. The largest example measures 122 mm. in length, and all have the vertical body marks mentioned as occurring in some specimens.

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17 Bleeker—Celebes iii., p 765.

18 Günther—Brit. Mus. Cat. Fish., ii., 1860, p. 259.

19 Bleeker—Atlas Ichth., Pseudochrom, i., fig. 5.

20 Philadelphia Centennial Exhibition, 1876, Official Record, Melbourne, 1875.

A NEW PERMO-CARBONIFEROUS GENUS (*KEENEIA*) OF PLEUROTOMARIIDÆ, AND A *STRAPAROLLUS* IN NEW SOUTH WALES.

By R. Etheridge, Junr., Curator.

(Plates xxxii. – xxxiii.)

The Lower Marine Series of our Permo-Carboniferous in the Maitland District has yielded a fine Gasteropod, that I believe constitutes a new sub-genus of *Pleurotomaria*, or genus of Pleurotomariidæ, as the idiocyncracies of the reader may lead him to regard it. The characteristic univalve of the series mentioned is *Platyschisma oculus*, Sby., sp., but occurring side by side with this, and in some respects like it, is another much larger and more massive shell, quite undescribed with us, that I propose to designate as *Keeneia platyschismoides.* The generic name is given in honour of the late Mr. William Keene, for many years Examiner of Coal Fields for New South Wales, and whose researches, combined with those of the late Mr. C. S. Wilkinson, laid the foundation for our present knowledge and classification of the New South Wales Coal Measures. Mr. Keene's writings will be found in the early publications of the Department of Mines, Sydney, the Quarterly Journal of the Geological Society of London, and various Exhibition Catalogues and Reports referring to New South Wales.

Keeneia is an umbilicate Pleurotomaria, and hence need only be compared with those so-called sub-genera of the genus in chief possessing an umbilicus. The principal features in the so-far only known species, irrespective of its size and umbilicus are:—(*a*) visible presence of the band only on the body-whorl; (*b*) band in the same plane as the surface of the body-whorl, not raised or bordered by carinæ; (*c*) sutural and concealed position of the band on the other whorls; (*d*) absence of a keel surrounding the umbilicus.

The umbilicate "sub-genera" of *Pleurotomaria*, with which it is necessary to compare *Keeneia*, are:—*Mourlonia*, de Koninck; *Rhineoderma*, de Koninck; *Yvania*, Bayle; *Luciella*, de Koninck; *Leptomaria*, Deslonchamps, and others named below, but I omit from consideration *Talantodiscus*, Fischer; *Pyrgotrochus*, Fischer; *Entemnotrochus*, Fischer; and *Pleurotomaria* proper, as typified by *P. anglica*, Desh. The relation may be expressed in the following table:—

—	Keeneia platyschismoides.	Mourlonia, *De Kon.*	Rhineoderma, *De Kon.*	Yvania, *Boyle.*	Luciella, *De Kon.*	Leptomaria,[1] *Desl.*	Gyroma, *Œhlert.*
Shell ..	Turbinate.	Conical.	Turbinate.	Conical turriculate.	Trochiform (more or less).	Heliciform conical.	Turbinate.
Whorls ..	More or less rounded.	More or less rounded.	Depressed above, convex below.	Gradate.	Depressed lamellar	Rounded.	Rounded.
Base.. ..	Flattened more or less.	Convex.	Convex.	Convex.	Concave (more or less).	Convex.	Convex.
Umbilicus ..	Infundibuliform, deep.	Infundibuliform, deep.	More or less straight-walled, deep, and keeled.	Small and pit-like.	Infundibuliform and open.	Infundibuliform.	Small generally.
Band on body whorl ..	Flat, near centre of whorl.	Central and flat, or often bordered by keels.	Median and projecting.	Large, and on the more or less horizontal portion of each whorl.	Under the sharp peripheral edge.	Central and linear	Inframedian.
Band on upper-whorls	Concealed, sutural.	Immediately above suture, and not concealed.	Median and ill-defined.	Ditto.	Ditto.	Ditto.	Ditto.

[1] Type—*Pleurotomaria obesa*, Deslonchamps.

—	Stenoloron, *Œhlert.*	Platyloron, *Œhlert.*	Lophospira, *Whitfield.*	Liospira, *Ulrich and Scofield.*	Euconia, *Ulrich*	Eotomaria, *Ulrich & Scofield.*	Clathrospira, *Ulrich & Scofield.*	Seelya, *Ulrich.*
Shell ..	Discoid or arched (surbased)	Band infra- or submarginal, otherwise like *Stenoloron.*	Turrited, last whorl often disconnected.	Low, sublenticular.	Sub-trochiform	Depressed conical to sublenticular.	Band vertical, and on the periphery, otherwise like *Eotomaria.*	Turbinate.
Whorls ..	Rounded.		Convex gradate	Flat, or gently convex.	Sharply angular.	Turbinate.		Rounded, or ventricose.
Base.. ..	Convex.		—	Convex.	Nearly flat.	More or less convex.		Convex.
Umbllicus ..	Large, revealing the whorls.		Small.	Small, sometimes covered by a callosity.	Large.	Small or wanting.		Concave, inframedian.
Band on body whorl ..	Narrow, infra- or submedian.		Central, between keels.	Scarcely distinguishable; on narrow outer edge of whorls	On upper side of peripheral edge.	Conical; on apical side of periphery.		Central, and concave.
Band on upper-whorls	Ditto.		Median and ill-defined.	Ditto.	Ditto.	Ditto.		Concave, inframedian.

A glance at this table will indicate that the concealed sutural position of the band on the earlier whorls at once separates *Keeneia* from the other "sub-genera" named.

At first sight, ill-preserved examples of *K. platyschismoides* may be mistaken for *Platyschisma oculus*. In the latter, however, there is no band on the obtuse peripheral angle of the body-whorl. To be certain on this point, a very large number of *P. oculus* were carefully examined by Messrs. C. Hedley and W. S. Dun, irrespective of myself, and in no single instance did any shell that could satisfactorily be referred to *P. oculus*, present even the semblance of a band, but only a slight inflection, or curving backwards of the growth laminæ and striæ on passing over the obtuse periphery, and corresponding to the slight insinuation in the outer lip, when perfect, in accordance with the generic definition of *Platyschisma*, as given by McCoy.[2]

In *Keeneia platyschismoides*, on the other hand, there is a flattened band along the obtuse periphery of the body-whorl, defined by faint impressed encircling lines. The transverse sculpture, instead of passing over simply with a roll, as in *P. oculus*, is, on arriving at this band, deflected backwards; and on the opposite side of the band or base of the shell, directed forwards to pursue its regular course. On the band the striæ are deeply concave backwards. As before stated, this band is only visible on the body-whorl, for on arriving at the penultimate whorl it becomes sutural, and concealed by the overlap of the body-whorl. That such is the case is abundantly proved by examples in which the test of the body-whorl has been broken away, when the band is, as a rule, beautifully exposed on the penultimate whorl. On the other hand, if specimens of *P. oculus* in a like state of preservation are examined, no trace of a band whatever is observable.

As the facts now recorded have been tested through the medium of a number of specimens, it is legitimate to assume that we have here a shell entirely distinct generically and specifically from *Platyschisma oculus*.

Genus KEENEIA, *gen. nov.*

Gen. Char.—Shell turbinate or trochiform, umbilicate. Whorls few, more or less tumid and rounded. Mouth large, oblique; outer lip subacute, insinuated by a rather wide and shallow sinus; inner lip thickened but not reflected, or with a callosity. Band median or submedian on the body-whorl only, sutural and concealed on the others. Umbilicus infundibuliform, without keel.

Type.—Keeneia platyschismoides.

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2 McCoy—Synop. Carb. Lime. Foss. Ireland, 1844, p. 38.

KEENEIA PLATYSCHISMOIDES, *sp. nov.*

(Plate xxxii.; Plate xxxiii., figs. 3 – 5).

Sp. Char.—Shell very large, massive, turbinate, and the base to some extent flattened. Spire short, of five or six whorls, the apical whorls depressed, and displaying a great discrepancy in size as compared with the penultimate and body-whorl; sutures close and nonchanneled. Body and penultimate whorls with gently convex surfaces, or the latter at times inclined to become rather straight-walled, shoulder-like around the sutures, where the whorl surfaces are either flat, or slope somewhat inwards; periphery of the body-whorl obtusely-carinate. Band broad and flat, occupying the obtuse keel, and defined by two or more circumferential impressed lines. Mouth very large and obliquely quadrangular, transversely elongated; outer lip thickened in the region of the sinus, and judging by the lines of growth, the sinus was wide but not deep or slit-like; inner lip thickened. Umbilicus subinfundibuliform. Sculpture of rather coarse growth striæ directed obliquely backwards on the upper portion of the body-whorl, forming a sharp bend in the same direction at the band, resuming their course on the base in a faint sigmoidal curve forwards, and gathered in a puckered manner around the umbilicus, laminar and very pronounced contiguous to the outer lip, no cancellation; on the band, whether exposed or concealed, the striæ are strongly concave backwards. Height, 4″; breadth (across mouth), $4\frac{1}{2}$″; breadth (fore and aft) $4\frac{1}{2}$.″

Obs.—The relation of this shell to *Platyschisma oculus* proper has already been described, and need not be referred to further. Dana's illustration, however, of the latter[3] has every appearance of being a peculiarly drawn example of *Keeneia platyschismoides.* Previous to making the acquaintance of this fine Mollusc in its mature state, I had seen a young example that I mistook for an exceptionally well preserved and young individual of *P. oculus*,[4] but on receipt of the specimens now under description, the mistake I had made became manifest. In this young condition, not only the backwardly directed striæ of the band are visible, but also the shoulder around the suture on the body-whorl, the transversely elongated, oblique, rhomboidal mouth, and thickened inner lip.

Dana also described a second species of *Platyschisma* from the Lower Marine Series as *P. depressum*, Dana, sp.[5] Some imperfect individuals have come under my observation that may be this form, and if this surmise be correct, then possibly a second species of *Keeneia* exists. In such a case, a further

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3 Dana—Wilkie's U.S. Explor. Exped., Geology, x., 1849, pl. x., f. 1.

4 Etheridge, Junr.—Rec. Geol. Surv. N.S.W., v., pt. 4, 1898, pl. xix., f. 14 - 17.

5 Dana—*Loc. cit.*, pl. x., f. 2 *a* and *b*.

question arises: What are the generic relations of *Pleurotomaria carinata*, Etheridge[6] (*non* Sby.), from the Gympie Series?

So many of our Australian Permo-Carboniferous species were, through necessity, described from imperfect materials, that it becomes very difficult at times to identify more perfect specimens with them, in the absence of the types. The disappearance and loss through accident of many of the latter, has been a great blow to Australian Palæontology. Dana's collection was burnt, so was Clarke's third collection described by De Koninck, whilst Daintree's is, I believe, somewhere at the bottom of the sea.

Loc.—Allandale, near Harper's Hill, near West Maitland, New South Wales. Lower Marine Series.

Genus STRAPAROLLUS, *De Montfort*, 1810.

(Conch. Syst., ii., 1810, p. 174).

STRAPAROLLUS AMMONITIFORMIS, *sp. nov.*

(Plate xxxiii., figs. 1 and 2).

Sp. Char.—Shell (partial internal cast) subdiscoid, with the apex depressed, and the base deeply umblicated. Spire very short, of five or six whorls (as preserved); whorls non-overlapping, with a sub-circular section in the young condition becoming transversely oval in the more mature state, from a flattening of the sides; back round, no carinæ; each whorl on its upper side is somewhat straight-walled around the suture, defined by a faint angulation. Sculpture not preserved, but the surface showing traces of coarse undulations of growth towards the terminal end. Size—$2\frac{3}{4}'' \times 2\frac{1}{4}.''$

Obs.—The specimen is an internal cast wherever denuded of matrix; but where enveloped, with the test preserved and intervening. One more whorl certainly existed than those shown in the illustration (Plate xxxiii., fig. 1), as indicated by the line of junction running round both surfaces of the existing last whorl.

The shell is a *Straparollus* of the depressed section, illustrated by *S. æqualis*, Sby. It does not possess a plain keel on the upper surface only, as in *Euomphalus* proper, or on both aspects as in *Schizostoma*, or tuberculated keels on both aspects as in *Phymatifer*, nor is the coil open as in *Phanerotinus*. It is a decided addition to the lowest portion of the Permo-Carboniferous System in New South Wales.

S. ammonitiformis was presented to the Trustees by Mr. —. Thomas, through Mr. John Mitchell, Technical College, Newcastle.

Loc.—Duguid's Hill, near Harper's Hill, near West Maitland, New South Wales. Lower Marine Series.

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6 Etheridge—Quart. Journ. Geol. Soc., xxviii., 1872, p. 331, pl. xv., f. 6.

TWO UNDESCRIBED PELECYPODA FROM THE LOWER CRETACEOUS OF QUEENSLAND IN THE COLLECTION OF THE AUSTRALIAN MUSEUM.

By R. ETHERIDGE, Junr., Curator.

(Plates xxxiv. – xxxv., and Fig. 21).

1. FURTHER EVIDENCE OF *Teredo*.

THE presence of *Teredo*-like tubes in our Lower Cretaceous Series, has been known for some time, but until the specimens about to be described came under notice, the existence of this boring Mollusc was not thought to be as plentiful as now proves to be the case.

The first record of *Teredo* in Australian Mesozoic beds is due to the late Mr. Charles Moore, who described a shell, forming one of a colony, as *T. australis*,[1] from the Oolite of West Australia. This had been previously recorded by the late Rev. W. B. Clarke as a *Pholas*.[2] Some years subsequent to Moore's description, I recorded the presence of *Teredo* in limited quantity in both our Upper and Lower Cretaceous—impressions of tubes in the grit of the Croydon Goldfield,[3] and shelly tubes in limestone,[4] brought under my notice by the late Rev. J. E. T. Woods, with, in one instance, a portion of the valves remaining. *Teredo*-bored wood was also collected from the Rolling Downs Formation by Mr. G. Sweet,[5] at Hughenden and the Walsh River.

Amongst many other interesting Lower Cretaceous fossils collected and presented to the Trustees by Mr. W. H. Blomfield are fourteen blocks of variable size, either representing or forming parts of tree-trunks, riddled with the shelly tubes of *Teredo*, many of large size.

Some of the blocks represent portions of trunks preserved in the round, others divided longitudinally, and some in pieces only. The following measurements of the two former conditions were noted:—

	Length (direction of growth).	Breadth (right angles to direction of growth).	Circumference or girth.
a	1′ 3″	1′ 0″	2′ 5″
b	0 8	1 0½	2 10
c	0 9	0 11½	2 9
d	1 1	0 10	2 4

They indicate a fairly uniform size.

1 Moore—Quart. Journ. Geol. Soc., xxvi., 1870, pp. 230 and 253, pl. xii., f. 11.
2 Clarke—*Ibid.*, xxiii., 1867, p. 8.
3 Etheridge, Junr.—Geol. Pal. Queensland, etc., 1892, p. 572, pl. xliii., fig. 11.
4 Etheridge, Junr.—*Loc. cit.*, f. 12.
5 Etheridge, Junr.—*Loc. cit.*, p. 573.

The *Teredo* tubes penetrate the wood both parallel and at right angles to the direction of growth of the trees, and in either case are more or less parallel and contiguous to one another, or twisted and interlaced in a very confused manner, contorted and even returned on themselves, or crumpled in the form of the letter S. A similar variability in the direction of the tubes is described by Mr. J. Griffith in the great Sumatran *Kuphus*,[6] during life. In one instance, at least, where half the trunk is preserved transversely, the tubes extend to the very centre. According to the direction of penetration, the tubes are seen in transverse section, longitudinal section, or on the outsides of trunks in the round. The anterior closed ends of the tubes or caps are convex or round, and the diminution in diameter towards the posterior is very slow. The average diameter of the largest tubes at the anterior end is one inch, but a few have been measured as much as one and a quarter inches, and in a single instance the cross section was one and a half inches. These diameters dwindle at the posterior ends to two-eighths and five-sixteenths of an inch. The total length is unknown, but the longest portion measured was six inches. None of the tubes, so far as can be ascertained, are perfect, neither was I fortunate enough to discover in any of the natural sections the valves at the anterior ends, or the forking and septal lamellæ towards the posterior terminations.

The walls are very variable in thickness, some presenting a mere knife-like edge in cross-section, others being stout and thickened, up to as much as two millimetres.

The surface, where exposed in the round, seems to be quite devoid of sculpture. The tube walls are composed of calcedony, with here and there a calcite infilling. It follows that great alteration and replacement must have gone on subsequent to the original fossilisation; this is borne out by the condition of the wood, to be referred to later. The late Dr. Gwyn Jeffreys says[7] the sheath or tube of *Teredo* in the recent state is destitute of anything like true structure, and only composed of minute calcareous particles agglutinated together. In the great *Kuphus arenarius*, on the other hand, the sheath exhibits a prismatic crystalline structure, and in a figure given by Mr. J. Griffith[8] the prisms are seen to be arranged in concentric rings. Dr. G. Johnston says[9] the prisms are short and perpendicular to the surface.

Similar large *Teredo*-like tubes have been described from Cretaceous rocks. Stoliczka figures one, *T. crassula*,[10] from the Ootatoor

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6 Griffith—Phil. Trans. for 1806, pt 2, p. 270.

7 Jeffreys—Brit. Conchol., iii., 1865, p. 156.

8 Griffith—*Loc. cit.*, pl. x., fig. 4.

9 Johnston—Introd. to Conchol., 1850, p. 431.

10 Stoliczka—Pal. Indica: Cretaceous Fauna S. India, iii., pts. 1 - 4, 1870, p. 16, pl. i., f. 2.

Group, boring wood, but in this case the valves of the shell were discovered, an advantage I have not possessed.

Another species, larger than Stoliczka's *T. crassula* is the huge *T. pugetensis*, White,[11] from the Puget Group of Western America, probably of uppermost Cretaceous age. This was also found in wood, and although the valves were not seen, every probability exists that it is a true *Teredo*, closely akin to the Queensland form. The sheath diameter of the two is almost the same.

In an excellent article on *Teredo* and its work, by Mr. A. M. Snow,[12] the latter says, speaking of course of the living forms:—"The largest diameter ever noticed by the author measured $1\frac{1}{8}$ ins. . . . After the Teredo has penetrated the wood for a little distance, the diameter remains about constant." He adds that a large size indicates a warm climate.

The Queensland fossil may be known as *Teredo vastitas*.[13]

An examination of the wood by means of thin sections prepared for the microscope, has not yielded the satisfactory results expected. In the first place two facts are established—(1) The wood had clearly undergone long maceration in water previous to fossilisation, producing a half rotten condition; (2) the trunks also underwent considerable lateral pressure, as evinced by the broken up state of the tissues. The latter are impregnated with iron oxide and some silica. All that I can venture to affirm at present is the Coniferous nature of the wood, but whether Araucariform or Cupressiniform must remain for future and better material to decide. The evidence obtainable from transverse and tangential sections is sufficiently conclusive on the first point, but the radial sections do not afford sufficient data to warrant the drawing of a hard and fast conclusion on the second. In transverse sections, notwithstanding the disabilities already mentioned, the walls and cavities of the woody fibres are exhibited in regular quadrangular spaces, with a one-inch objective, also the medullary rays and some resin ducts. In tangential sections, the vertical walls and spaces of the woody fibres are quite apparent, and so are the transverse sections of groups of medullary rays, with the parenchymatous cells uniserial and variable in number in the different groups, the latter being very abundant. All my radial sections, and many have been made, are a failure from an anatomical point of view for reasons already given; all that can be distinguished is a mass of badly preserved and crushed woody fibre. So much depends on the radial section in the differentiation of Coniferous woods, that I am afraid I can do no more than suggest that, granting a Coniferous nature, this wood may be either Araucariform or

11 C. A. White—Bull. U.S. Geol. Survey (Powell's), No. 51, 1889, p. 62, pl. viii.

12 A. M. Snow—Trans. Am. Soc. Civil Engineers, xl., No. 837, 1898, p. 189.

13 *Vastitas*, an empty place, waste, or desert, in allusion to the locality.

Cupressiniform. I had hoped in connection therewith to have solved a problem that has been before me for some time. It is this:—In 1883, the late Baron F. v. Mueller[14] described wood from the auriferous Pliocene drifts of Haddon, Victoria, and assumed it to be that of his previously described fruits, *Spondylostrobus smythii*, simply because the latter were believed by him to be Cupressiniform, and found in the same deep-lead drifts as the wood in question. Subsequently Von Mueller seems to have forwarded to Leipzig, Cupressiniform wood from the auriferous drifts of Ballaarat.[15] This Schenk figured under the name of *Phyllocladus mülleri*. Now, are these woods one and the same? Schenk says that in *Phyllocladus* the large oval pores on the parenchyma cells of the medullary rays are inclined to the left, but in Von Mueller's figure of the supposed *Spondylostrobus* wood the same pores are represented as circular, but no special reference is made to them in the text. Have we one or two Cupressiniferous woods in our Pliocene or Miocene Gold-drifts? Neither of these woods has ever been traced to its original source *in situ*, with any degree of certainty. Still, there is the bare possibility, now that we know definitely of the existence of Coniferous wood in Lower Cretaceous times in Australia, that the logs found in the gold drifts of Upper Tertiary age may be a remnant of Cretaceous denudation.

Finally, it may not be amiss to offer a few conclusions that the discovery of these trunk blocks lead to:—(1) The existence of a vigorous growth ef Coniferous trees in Eastern Australia during Cretaceous times; (2) the existence of an arm of the sea with such trees flourishing on its shores, or a river or water-way down which they were floated; (3) immersion for a lengthened period under such conditions as would allow the necessary degree of salinity to exist in the water concomitant with the life of *Teredo*; (4) existence of a warm climate.[16]

Scattered pieces of wood have been found at different times throughout the Rolling Downs Formation, and recorded, whilst a fairly vigorous growth of vegetation may also be inferred from the occurrence at various localities of thin seams of coal—as for instance on the Upper Flinders River, near Hughenden; on Ayrshire Downs; at Winton; Malta, near Tambo; head of Bungeworgorai Creek, near Mitchell; and at Dulbydilla.[17] These are all localities in the Lower Cretaceous of Queensland.

The blocks were collected by Mr. W. H. Blomfield.

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14 Von Mueller—Geol. Survey Vict., Obs. Veg. Foss. Aurif. Drifts, Dec. ii., 1883, p. 22, pl. xx.

15 Schenk—Zittel's Handb. Pal., ii. Abth., Palæophytologie, pp. 872-874, f. 424-425 The usual havoc is played with our geography, for Ballaarat is said to be in New South Wales!

16 Snow says that a large size in *Teredo* is due to a warm climate (*loc. cit.*, p. 188).

17 R. L. Jack—Geol. Pal. Queensland, &c., 1892, pp. 392 and 406.

For the microscopic sections of the wood I am indebted to Messrs. P. Crawford and H. Gooch, of the Geological Laboratory, University of Sydney.

2. The Occurrence of *Pholadomya.*

Genus Pholadomya, *G. B. Sowerby*, 1823.
(Genera of Shells, No. 19).

Pholadomya terra-reginæ, *sp. nov.*

(Fig. 21).

Sp. Char.—Cast transversely elongate, oblique, inequilateral in the extreme, apparently equivalve, attenuating in thickness posteriorly. Cardinal margins straight, with a short circumscribed

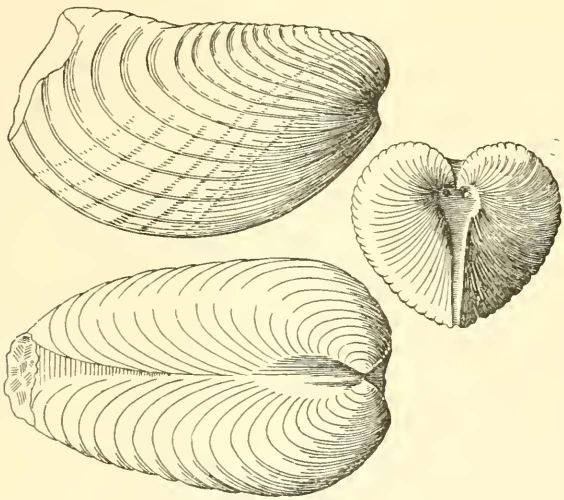

Fig. 21.

false area. Ventral margins obliquely rounded from beneath the umbones downwards, swelling out at a point slightly posterior to the middle. Anterior ends practically absent. Posterior ends (imperfect in specimen), but probably narrow and obtusely pointed, judging by the lines of growth; greatest convexity of the valves immediately posterior to the umbones; posterior slopes somewhat flattened; diagonal ridges rounded. Umbones absolutely anterior, terminal, incurved, contiguous, and depressed. Sculpture of concentric rugæ bearing finer parallel lines, the former separated by valleys of equal width, the valves crossed diagonally, in the centre only, from the umbones to the ventral margins by a few equal and regular costæ, the points of intersection with the rugæ showing signs of small tubercles or nodes.

Obs.—The previous occurrence of *Pholadomya* in our Continental Secondary rocks depends on the identification by the late Mr. Charles Moore[18] of a European species (*P. ovulum*, Ag.), in the Oolite of Western Australia, and a debatable form figured by Mr. R. Etheridge[19] from the Cretaceous of Gordon Downs, Queensland, without specific name.

The present species is of a very peculiar type, what with its transversely elongated outline, depressed beaks, straight cardinal margin, and want of an anterior end. The absence of an anterior end, strictly speaking, and the oblique antero-ventral outline are features seen in such *Pholadomyæ* as *P. læviuscula*, Ag., *P. decorata*, Ag., *P. cancellata*, Ag., and so on. Strange to say, although *P. terra-reginæ* is undoubtedly from our Cretaceous beds, the outline is far more like two Infra-Liassic species—*P. lagenalis*, Schafh , and *P. lariana*, Stop.,[20] than it is to the generality of Cretaceous forms. In the two species figured by Stoppani, the anterior end appears to be wanting, as in our fossil, but the valves are devoid of costæ. To some extent there is a likeness to *P. rostrata*, Matheron, as figured by Zittel,[21] from the Gosau series, and *P. depacta*, Hamlin,[22] from the Syrian Cretaceous, but in both instances an anterior end, more or less, exists, and the entire surface is costate. Dr. M. A. Blanckenhorn figures another Syrian species to which *P. terra-reginæ* is somewhat allied—*P. pedernalis*, Roemer,[23] in so far as the absence of an anterior end and the presence of nodulated costæ on the centre of the valves, but lacking the longitudinal extension of the valves seen in our species. In form and obliquity the British Lower Greensand species, *P. martini*, Forbes,[24] is allied, but again differs in the presence of an appreciable anterior end.

The cardinal or dorsal aspect of our specimen is worn, but I believe a circumscribed area of limited extent existed.

The specimen was collected and presented by Mr. W. H. Blomfield.

The sketches are by Mr. C. Hedley.

18 Moore—Quart. Journ. Geol. Soc., xxvi., 1870, pp. 231 - 232.

19 Etheridge—*Ibid.*, xxviii., 1872, p. 347, pl. xxv., f. 6.

20 Stoppani—Pal. Lombarde, 3e Série, p. 43, pl. iii., f. 1 - 3, and p. 44, pl. iii , f. 4 - 7.

21 Zittel—Bivalven Gosaugebilde Nordöst. Alpen, 1864, 1 Theil, pl. ii., f. 2 *a - c*.

22 Hamlin—Mem. Mus. Comp. Zool. Harvard, x., 3, 1884, pl. vi., f. 6 *a - b*; Blanckenhorn—Beiträge zur Geol. Syriens: Entwickelung Kreid. Mit.-Nord-Syrien, 1890, pl. v., f. 12 *a - b*.

23 Blanckenhorn—*Loc. cit.*, p. 94, pl. v., fig. 13.

24 E. Forbes—Quart. Journ. Geol Soc., i., 1845, p. 238, pl. ii., f. 3.

An ABORIGINAL KNIFE.

By R. Etheridge, Junr., Curator.

(Plate xxxvi.)

The subject of Plate xxxvi. has been figured as a "Shark's tooth flaying knife." Edge-Partington gives an illustration of one,[1] with this explanation, but without locality. His figure represents a wooden implement fourteen and a quarter inches long, oval in section, bearing five shark's teeth, set in gum-cement, along one edge at the distal end. The proximal end is wrapped with cord, doubtless, also, gum-cement fastened.

The knife now figured is smaller, and with smaller but more numerous teeth similarly set, and similarly bound at the proximal end with both sinew and string, the string in this instance being certainly kept in position by gum-cement. The teeth are those of a shark, probably *Carcharias lamia*, Risso, eighteen in number, occupying the superior edge for more than half the length of the implement, but the distal end tooth wanting; the implement is one foot long by one and three quarter inches wide, and the section oval. The string binding extends for two and a half inches along the knife, and both it and the cement hold in position a hand or wrist cord of beaten bark string. It is said to come from the Cooktown District, and I see no reason to doubt the statement.

Two types at least of these flaying or cutting knives appear to exist amongst our Aborigines. First, we have the West Australian form, long ago figured by Admiral P. P. King,[2] from King George's Sound. He states that it is called *taap*, and has a handle about twelve inches long, scraped to a proximal point, and at the other end bears three or four splinters of quartz stuck in gum. It is thus used by the Blacks—"After they have put within their teeth a sufficient mouthful of seal's flesh, the remainder is held in their left hand, and with the taap in the other, they saw through and separate the flesh."

The Rev. J. G. Woods also gives a figure,[3] but erroneously considers it as an implement to assist in climbing trees. He describes it as fourteen inches in length, thick as a man's finger, and with the quartz chips set in a groove, and held there by the cement.

1 Edge-Partington—Album, 3rd series, 1898, pl. cxxxix., f. 1.
2 King—Intertrop. and W. Coasts Australia, ii., 1829, p. 139.
3 Wood—Nat. Hist. Man., ii., p. 35.

A third illustration is given by Mr. R. B. Smyth[4] as a "meat cutter or native knife," and termed *dabba*. He likens the handle to a portion of a spear shaft, and states that the gum used as a cementing medium is that of the "Grass Tree" (*Xanthorrhœa*). Smyth sagely remarks that "it looks like a saw, but it is really a knife, and is employed by the natives to cut flesh." Three chips are shown in his figure.

A further figure of this implement is given by Edge-Partington[5] from a West Australian specimen in the Heape Collection, with five teeth, and twenty-one inches long. He says glass or quartz are used, and for the cementing medium "Black-boy" (*Xanthorrhœa*) gum.

The second type of knife is that now figured, the only other illustration known to me being the already quoted figure by Edge-Partington. In all probability it is used more for flaying than cutting, for when residing at Cape York, many years ago, Mr. J. A. Thorpe, Taxidermist to this Museum, saw a similar implement used for flaying wallaby by the Yardikin and Unduamo Tribes of that neighbourhood.

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4 Smyth—Aborigines of Victoria, i., 1878, p. 341, f. 151.

5 Edge-Partington—Album, 1st series, 1890, pl. cccxlviii., f. 4.

NOTE ON *MALURUS LEUCOPTERUS*, QUOY AND GAIMARD.

By ALFRED J. NORTH, C.M.Z.S., Ornithologist.

ON referring to the original description and figure of *Malurus leucopterus*, in the Zoology and Atlas of the "Voyage de l'Uranie,[1] I find that Gould had very good grounds for doubting if the bird figured and described by him under this name, in his "Birds of Australia,"[2] was not distinct from the species to which it had been originally applied by Quoy and Gaimard. Gould appears to have always entertained this doubt, for in his "Supplement to the Birds of Australia,"[3] published many years after, in his remarks on *M. leuconotus*, he there writes—"and *M. cyanotus*, if the bird discovered by Quoy and Gaimard in the 'Voyage de l'Uranie,' on Dirk Hartog's Island, should prove to be different from the species found in New South Wales, which I think probable."

The following is Quoy and Gaimard's diagnosis of *Malurus leucopterus*, "*Malurus, capite, collo, pectore-dorsoque cæruleo-nigricantibus; alis albis; caudâ subcæruleâ.*" In their description the general colour is given as being of so dark a blue that it appears black, with the frontal half of the wings white, and their extremities brown; the tail also dark blue, but less so than the body. Their figure, which is taken from a drawing made by M. Arago at the time of its discovery, and stated to be of the natural size, represents a bird agreeing in colour with their description, and measuring about four inches and a half in total length.

The above diagnosis and description clearly does not apply to the cobalt-blue bird from New South Wales, figured and described by Gould, and which in future will have to be distinguished under his name of *Malurus cyanotus*.[4]

Since writing the foregoing Mr. Bernard Woodward, Curator of the Western Australian Museum, Perth, has kindly forwarded, among other photographs, to the Curator of the Australian Museum, Sydney, one of three mounted specimens of

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1 Voyage de l'Uranie, Zool., 1824, p. 104, Atlas, pl. xxiii., fig. 2.
2 Gould—Bds. Austr., iii., fol., 1848, pl. xxv.
3 Gould—Bds. Austr. Suppl., 24, 1862, opp. pl. xxiv.
4 Gould—Handbk. Bds. Austr., i., 1865, p. 331.

a *Malurus*, recently described as new,[5] under the name of *M. edouardi.* Judging by the description and photograph, these birds are, in my opinion, the true *Malurus leucopterus* of Quoy and Gaimard, described seventy-seven years ago. They were procured in December, 1900, by Mr. J. T. Tunney, a collector of the Western Australian Museum, on Barrow Island, off the coast of North-western Australia. Barrow Island is about three hundred and fifty miles in a direct line to the N.N.E. of Dirk Hartog, where the type of this species was obtained by Quoy and Gaimard. The scapulars, upper wing-coverts, and innermost secondaries of the adult male, which are white, show that *M. leucopterus* is closely allied to the more recently described *M. cyanotus*, and differs only from the latter species in having the general colour of the upper and under surface bluish-black, instead of cobalt-blue.[6]

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5 Vict. Nat., xvii., 1901, p. 203.

6 The above note was sent last July to Melbourne for publication in the "Victorian Naturalist," but was temporarily withdrawn, pending an application to the Western Australian Museum, Perth, for the loan of the type.

SUPPLEMENTARY NOTES TO THE REPORT ON SPONGES FROM THE COASTAL BEACHES OF NEW SOUTH WALES.

By Thomas Whitelegge, Zoologist.

A considerable time after the Report was printed off, Professor Arthur Dendy offered to the Trustees of the Australian Museum the loan of a large collection of fragments of sponges, from which sections might be obtained. The specimens were selected and labelled by R. Kirkpatrick, of the British Museum, from examples acquired by that institution from Dr. R. von Lendenfeld. The collection embraces 478 specimens, representing 462 species. All —except about six—are from Australasian waters. A large percentage of the examples are species described as new by Dr. R. von Lendenfeld; the rest consist of species identified by him, and others which bear what I presume are manuscript names. These fragments add very largely to the Museum collection, and if the species prove valid, to the known fauna of New South Wales. By this donation, the Museum gains five species enumerated in the "Catalogue of Sponges," which have hitherto been wanting in the collection (two of these are therein described as new) and which practically complete the specimens as published in the Catalogue. Of the 295 species and varieties described in the latter work, 156 are represented in this collection. Some of these are evidently bits of the types now on exhibition in the Invertebrate Gallery.

In 1887, Dr. R. von Lendenfeld published a paper in the Zoologische Jahrbücher, under the title of "Die chalineen des Australischen Gebietes."[1] In this paper 183 species and varieties are described; 144 of these are represented in the collection presented by Professor Dendy.

It is highly probable that the greater part of these fragments are portions of the types; the localities in nearly every instance agree with the habitat given at the end of each description. Eight examples bear the word "type" on the label; these are, however, mostly calcareous sponges.

This extremely valuable collection affords material which explains some of the ill-defined species in the Lendenfeldian collection, and also adds largely to the number of uncertainties. With the latter I hope to deal in the near future, and the former are herein

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1 Lendenfeld—Zool. Jahrb., Bd. ii., 1887, pp. 723-828.

dealt with in so far as they bear on my paper. The collection contains eight species which have been more or less fully described in the report; of these, six were enumerated in the Catalogue as new species. There is also one species which, although well represented in the Fisheries donation, was omitted from the report on account of my inability to identify it.

The results obtained by the examination of the fragments from the British Museum, are confirmatory of the descriptions of the Lendenfeldian types as published in my report The species dealt with are as follows:—

Arenochalina mirabilis, Lendenfeld, from Torres Straits.—The spicules are styli, and occur in both the main and secondary fibres. A recently collected specimen from Port Jackson exhibits numerous similar styli in the ground substance.

A fragment of *Clathria (Plectispa) arborea*, Lendenfeld, appears under the name of *Thalassodendron reticulata*, Lendenfeld. The echinating spicules in this example are spined styli; the question as to what particular sponge was described under the above name still requires an answer, inasmuch as the fibres are described as being echinated by smooth styli.

A specimen labelled *Clathria macropora*, Lendenfeld, agrees with the type as redescribed in my paper. The same remarks also apply to a spirit specimen, bearing the name of *Echinonema levis*, Lendenfeld. *Echinonema rubra*, Lendenfeld, does not differ in its spicular characters from the two preceding; in this example the spicules in the fibres are oxea, and not styli as stated in the original diagnosis.

A specimen labelled *Euspongia officinalis*, var. *sertalis*, Lendenfeld, proves to be identical with *Euspongia pikei*, Hyatt. The first name is that used in the manuscript list, and also occurs on the label of the specimen described and figured in my report. An examination of the specimen from the British Museum confirms my description of the fibres. There are distinct threads of sand grains cemented in the interstices of the trellised fibres.

Euspongia officinalis, var. *dura*, Lendenfeld.—My surmise regarding this form proves to be correct. The British Museum piece corresponds in texture, surface, colour, and state of preserva tion with our named example. From Western Australia.

Stelospongia canalis, Lendenfeld.—A spirit specimen, bearing the name of *Cacospongia canalis*, Lendenfeld, is in the collection. The main fibres of this example contain an axial string of foreign spicules, thus confirming the account given in my report.

Thalassodendron viminalis, Lendenfeld.—When writing of this species I expressed the opinion that it did not agree with the description. The British Museum example agrees as to habit and dimensions, but not in its spicular characters. The specimen proves to be identical with an example exhibited in the cases as the type of *Ceraochalina multiformis*, var. *dura*, Lendenfeld, from Illawarra.

Arenochalina mirabilis, *Lendenfeld*.

The British Museum specimen from Torres Straits, and probably a bit of the type, confirms my identification of the examples from New South Wales, and also proves that the spicules are styli. The proper stylote spicules are not confined to the secondary fibres, as might be inferred from the diagnosis. There is a distinct axial core present in the main fibres at the apices, the number of spicules being at least equal to those in the secondaries. A longitudinal section through the apex of a branch, displays a series of main fibres which are gradually tapering, elongated, and pointed at the summit; about half or two-thirds of each fibre is cored by an axial string of closely placed styli. At a short distance below the apex, a few small distant sand grains are enclosed. As the base of the fibre is approached, the sand-grains become larger and closer together, with an occasional space in which the axial core of spicules can be seen intact. In the parts of the fibre occupied by sand grains the core is displaced, and is visible first on one side and then on the other, or is spread out so as to form an irregular sheath of spicules around the enclosed sand grains. The arrangement of the sand-grains, their unequal distribution and size, their absence from a considerable portion of the growing apices, suggest the question as to how the sand grains are taken in the fibres. Time will not permit of an extended search as to what is known on this point. I failed to find any reference to the question in the "Monograph of Horny Sponges."

Mr. E. A. Minchin,[2] in dealing with the matter, states that sand grains "become included in the fibres, apparently by adhering to the tip of the fibre at its growing point, where it is continuous, in all probability, with the external cuticle of the sponge."

After a careful study of the fibres of *Arenochalina mirabilis*, Lendenfeld, I have arrived at the conclusion that the main fibres do not take in the sand grains at their growing apices. In this species (and also in many others possessing sand grains) the growing apical portion of the fibre is attenuated and pointed, and if any sand grains are present they are remote from each other and often also from the apex. At a short distance from the summits of the fibres the enclosed sand grains are larger and closer, but rarely exceed the diameter of the fibre. Nearer the base they form one or two rows, and frequently some of the grains are five or six times greater in diameter than the fibre in its normal

2 Minchin—A Treatise on Zoology, 1900, Pt. ii., Porifera, p. 42.

condition. I have never observed any large sand grains in the fibres near the growing apex; and, further, I have failed to find any figures indicating the presence of sand grains exceeding the fibre in diameter. From the above data, I infer that the sand grains, large or small, are taken in by the fibres at any point of their surface, and at a distance below the growing apex.

THALASSODENDRON VIMINALIS, *Lendenfeld.*

For the sponge described under this title (No. 365) in my report I propose the name of *Echinoclathria intermedia*, sp. nov. The fragment of *T. viminalis* received from Prof. Dendy agrees with the description of the outward form, and is identical in every character with a specimen in the Museum collection labelled *Ceraochalina multiformis*, var. *dura*, Lendenfeld (No. 332.)

The specimen consists of a series of cylindrical branches, from 40 to 240 mm. in length, and from 3 to 5 mm. in thickness; the mode of branching is dichotomous, rarely alternate; in life the branches were probably arranged in a single plane. The example is somewhat waterworn; the surface is finely reticulate and is minutely porous, without any trace of vents. The texture firm, tough, and moderately elastic, and the colour brownish-yellow.

The skeleton, as revealed by the fragment from the British Museum, consists of an axial plexus of densely horny main fibres; the latter are cored with stylote spicules; there are generally four or five in a row, and their apices are often wide apart. The main column of trellised fibres gives off slender branches, which curve gracefully outwards and terminate at the surface; these are also cored with styli; there are two or three in a row; they are frequently divergent at their apices, and sometimes project beyond the fibre. The axial column and its radiating branches are joined together by slender, transverse connecting fibres; these are mostly aspiculous.

The main fibres measure from 0·1 to 0·15 mm. in diameter; the radiating branches are 0·5 to 0·07 mm. in diameter, and from 0·1 to 0·15 mm. apart. The transverse connecting fibres are 0·2 to 0·5 mm. in diameter, about 0·1 apart. The mesh in the central region is oval or elongate, and gradually becomes quadrangular as the surface is approached.

The original description states that the fibres are echinated by very scarce smooth styli 0·5 mm. long, and 0·005 mm. thick. I have not seen any styli that might be safely described as echinating; scattered spicules have been observed, and also some projecting out of the fibres, but these in many cases were enveloped in a sheath of pale spongin, and I regard them as incipient branches.

The Magascleres are as follows:—Straight or slightly curved smooth styli, tapering from the basal third to the base, and also to the acute apex. Size, from 0·12 to 0·2 mm. by 0·004 to 0·006 mm. A few very slender styli are present in the angles of the mesh, and here and there in the fibres.

Euplacella mollissima, *Lendenfeld.*

Euplacella mollissima, Lendenfeld, Zool. Jahrb., Bd. ii., 1887, p. 790, pl. xxi., fig. 37.

This extremely common sponge has been a mystery for a long time. Scarcely any donation from the coast is without one or more specimens. I have repeatedly attempted its identification, but without success. When about fifty specimens arrived in the Fisheries collection, I renewed my efforts to locate it, but failed, and finally it was left out of the report. The British Museum specimen explains the reason why the species could not be identified. In the original description it is stated to possess very small oxea, 0·04 mm. long, and 0·001 mm. thick. During the whole of my examination of this species, I have never seen the slightest trace of spicules in the fibres. In the section from the above mentioned example, I found two small patches of scattered oxeote spicules, under 0·05 mm. in length. These were only observed in one section, and consisted of ill-arranged spicules, disposed between the fibres without any trace of sarcode or horny matter. I therefore conclude that they are of foreign origin, and do not belong to the sponge. I have made many sections from two or three of the best preserved specimens, and failed to find any proper spicules in the fibres or ground substance, and I consider it highly probable that this species is destitute of spicules.

In order to render the identification of this species less difficult in the future, the following brief description is given:—

Sponge irregularly cup-shaped, generally growing on sea-weeds, and attached by flat root-like processes, rarely with a single peduncle. The inner surface of the cup in its lower two-thirds bears numerous closely placed vents from 0·5 to 1 mm. in diameter. The upper third is minutely porous. The outer surface is strongly and reticulately ridged or studded with compressed processes from 2 to 5 mm. or more in height. In some specimens large smooth areas are exhibited, with a few ridges or compressed papillæ scattered here and there. The walls of the cup vary from 1 to 8 mm. in thickness.

Texture close, fine and elastic. Colour yellowish stone. Height of largest example 100 mm. Diameter of cup 140 mm., diameter of main fibres 0·05 mm., distance apart 0·25 mm., diameter of secondary fibres, 0·02 mm. Mesh subquadrangular, very close and irregular.

From a scientific point of view it is much to be regretted that the author of the Catalogue of Sponges did not exercise more care in the description of the spicular characters, considering that they are in many cases the most reliable factors which determine the limits of genera and species. The carelessness displayed in the descriptions contained in the Catalogue vitiates the whole of the work done, and has created an intricate tangle, which will take years of patient investigation to unravel; further, no amount of study will rectify the wrong identifications based on such descriptions, or reduce the number of synonyms.

A scanty and superficial description is rightly characterised by Dr. Lendenfeld as "worthless." On the other hand, what term shall we apply to a description that is apparently full of detail, but which detail is opposed to the actual structure?

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JUN 28 1902

RECORDS

OF THE

AUSTRALIAN MUSEUM

EDITED BY THE CURATOR

Vol. IV., No. 6.

PRINTED BY ORDER OF THE TRUSTEES.

R. ETHERIDGE, JUNR, J.P.,

Curator.

SYDNEY, 31ST MAY, 1902.

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JN 28 1902

REPORT FOR THE YEAR 1901.

By R. Etheridge, Junr., Curator.

["There should be no halt in the work of the Institution.[1] . . . . The urgent needs of the National Museum are recommended to the favourable consideration of the Congress."—Roosevelt, *Presidential Messages to the U.S. Senate and House of Representatives.*]

The following Report treats of the work performed in the Australian Museum during 1901, and of the condition of the Collections therein.

It was decided last year to publish an account of the year's transactions as a Museum document pure and simple, rather than as a portion of the Statutory Report made by the Trustees under the Act of Incorporation (27 Vic., No. 2, 1853), to the State Governor. By issuing such a statement as a number of the Museum Records, it was felt that wider publicity would be given to the work of the year.

General Condition and Care of Collections.

The general condition of the Museum, as an Institution, remains in a very satisfactory state in all but its finances. It is useless to disguise the fact that the latter, as lately derived from the State funds, are not sufficiently liberal to conduct its affairs in a scientific and practical manner if it is to progress, maintain the high position attained amongst Colonial Museums, and not to stagnate. By rigid economy, and very careful management, income and expenditure have been balanced, but often at the expense of lost opportunities.

The whole of the Collections, both exhibited and in store, have been carefully watched, and are in excellent preservation.

The new Fish Gallery was opened to the public on 21st August, and has since been largely frequented by visitors.

Attendance of Public.

The Museum continued open to visitors during the usual hours, viz., from 2 to 5 p.m. on Sundays, and from 10 a.m. to 5 p.m. on all week-days except Mondays, which were reserved for cleaning purposes; but on Monday afternoons the collections were, as usual,

[1] The Smithsonian Institution at Washington.

accessible to students and schools for teaching purposes, on application being made to me. The total number of visitors recorded was 166,676, showing an increase of 48,749 for the year. The average was 469 (325 the previous year) on week-days, and 834 (601 the previous year) on Sundays. The largest attendance on any one day occurred during the Commonwealth celebrations, on the 2nd January, when 2,142 persons entered the building; and on the 28th May, during the visit of the T.R.H. the Duke and Duchess of Cornwall and York, 2,043 persons entered; but this is not equal to the number on Eight Hours' Day, 1st October, 1900, when 2,291 persons entered. The large increase mentioned was no doubt due to the influx of visitors during both of these holiday times.

Commonwealth Festivities.

On the occasion of the festivities at the beginning of the year, in connection with the inauguration of the Commonwealth of Australia, the Museum was entirely closed to the public on one day, during which the official procession passed the building. The Trustees offered the use of the ground attached to the private entrance to the Government for the erection of a grandstand. This offer was accepted, and the space was let by the Government to a contractor, the rent being afterwards repaid to the Trustees. The latter were accommodated with seats by the lessee, and the Museum officials and their friends were similarly provided on the large expanse of Museum roof. The arrangements made appeared to give general satisfaction, notwithstanding that upwards of nine hundred visitors were provided for, due in a great measure to the close attention paid to their duties by the Museum Special Constables, who were in charge of the proceedings. By the courtesy of the Government, a military band was placed within the enclosure and contributed to the general enjoyment. The building was illuminated at night during the entire festival week, when a portion of the Museum Fire Brigade was constantly on duty, under the control of a member of the Metropolitan Fire Brigade.

The Museum was again closed for a portion of the day on which T.R.H. The Duke and Duchess of Cornwall and York were welcomed to Sydney, the procession again passing the premises. An improvised stand for the Museum Staff and their friends was erected by our own mechanics.

Museum Staff.

Dr. Thomas Cooksey's term of service as Consulting Mineralogist having expired, it was determined to fill the vacancy by a direct appointment. The Trustees selected Mr. Charles Anderson, M.A., B.Sc. (*Edin.*), of Ben Nevis Observatory, from a large number of applicants, to take up the duties of Mineralogist and Chemist Mr. Anderson commenced his duties on 22nd July.

The Trustees having decided to fill a long-felt want by the appointment of a special Mechanical Assistant to the Curator, to relieve me of a large amount of necessary but tedious work, Mr. W. W. Thorpe, an Attendant in the Museum, was in February selected from amongst very many applicants, and it affords me much pleasure to report that the Trustees' choice has been fully justified by the cordial assistance I have received from him. To fill the vacancy thus caused amongst the Attendants, J. C. Cullen was promoted from the position of Labourer. This caused a further vacancy, and to fill it T. Corrigall, who possessed strong recommendations, was selected. It was, however, with feelings of unfeigned regret that it became my duty to report to the Trustees the death of Mr. Corrigall, on 8th July, from meningitis supervening on typhoid fever. Although occupying but a humble position in our service, Mr. Corrigall was worthy of far higher employment, and had he been spared I have not the slightest doubt he would have risen rapidly in the Trustees' service, for which he was qualifying himself by hard study, in fact his illness was intensified through this cause. The vacancy thus caused was immediately filled by the appointment of S. H. Minnis.

The necessary funds having been voted by Parliament for the employment of a second Mechanical Assistant, Mr. Allan R. McCulloch, who for the past two years had been voluntarily assisting Mr. E. R. Waite, was selected for appointment as soon as the funds should be available by the passing of the Appropriation Act.

Another volunteer Assistant (Mr. H. L. Kesteven) afforded very valuable and disinterested help throughout the year in the Conchological Section.

Structural Details.

The two half-galleries of the new South Wing, as anticipated in my 1900 report, were completed by Mr. J. Howie, Contractor, within the specified time, and were handed over to the Department of Public Works in March, and by the latter to the Trustees on the 17th April. These half-galleries are each eighty-eight feet long by forty-five feet wide, with an approximate height of twenty-five feet. The lower is lit by windows from the side, placed at such a height as to permit a clear run of wall cases to be erected beneath them without recourse to the pernicious system of bays. The upper gallery is lit from above on the lantern principle. The north and south walls are of "Sydney Sandstone," the east and west being merely temporary ends of brick. The first floor consists of eighteen inches of coke concrete on the back of traegerioellbleck iron, followed by encaustic tiles set in cement. The second floor is formed by filling in with terra-cotta lumber, eight inches thick, between rolled steel joists, the whole surmounted again by encaustic tiles set in cement. The staircase leading from one hall to the other is easily graded, and consists of a steel framework, filled in with coke concrete, rendered in Kean's cement, with slate treads on top, a cast-iron ornamental railing carrying a polished cedar hand-rail. There are four pillars along each side of the two halls, those of the lower with slightly ornate capitals. The ceiling is divided into large white panels, bordered around the steel joists with stamped steel mouldings (Wunderlich), delicately picked out and tinted in low-toned colours. In the upper hall the pillars, instead of possessing capitals, carry cast-iron scroll brackets, which assist in supporting the glass lantern. The lantern proper is composed of metal framing and plate-glass with louvres, the supplementary inner and horizontal portion of ground glass. The ceiling on each side of the lantern is horizontal in oblong panels surrounded by arched sides to the walls, the former broken up into small square panels; the whole composed of Wunderlich stamped steel, suitably tinted. The roof is built of oregon, covered with copper sheeting.

Fire Appliances.

The Metropolitan Fire Brigade still continues its supervision of the fire extinguishing appliances, as of old, and it is almost superfluous to say the latter are in good order, and ready for instant use.

Under the superintendence and instruction of a member of the Brigade (Fireman F. Brooks, of the Head Station), regular periodical drills of the whole Staff were held. Instruction is confined to the rapid and effectual use of what may be termed "first-aid" appliances, such as the building is supplied with, including ladder work. Each member is first taught separately, and then so many in a squad are instructed how to work together. Our Officers are all assigned stations throughout the Museum, so many to each hydrant, etc.; thus, on an alarm of fire, no loss of time would occur or confusion arise. A printed list of the stations, and the names of those assigned to each, is suspended in every office and workroom throughout the building.

New Cases.

Contract work of this nature, carried out during 1901, or to be put in hand through funds voted for that year, was as follows:—

The first instalment of the new Conchological cases was placed in position, as foreshadowed in my Report for 1900. It was decided after the passing of the 1901-2 Estimates, to provide an additional six cases of this nature, to be ready during the current year. Another wall case for the Geological Hall, and two additional cases for Fish, to be placed on stair landings near the entrance to the Fish Gallery were sanctioned. The casing of a portion of the two new half-galleries of the South Wing, was also taken into consideration, and it was decided to expend the special vote provided for this purpose, as far as it would go, by erecting wall cases in the upper of the two, for the reception of the Ethnological Collection, as suggested by me in various reports made to the Trustees.

The new case in the Geological Hall is destined to contain specimens of a strictly Geological rather than Palæontological nature.

The reference cards of the Zurich Catalogue of Scientific Papers having outgrown the receptacle allotted to them, an additional cabinet was ordered.

Collecting and Field Work.

In the words of last year's Report, "the collection of specimens remains almost dependent on the voluntary efforts of members of the Staff and friends who are willing to devote some portion of their time to it." By this means 489 specimens were added, as against 1,742 in 1900, showing a decrease of 253 specimens.

Mr. W. S. Thompson, of Lord Howe Island, continued his efforts to supply our wants from that rich collecting ground, by forwarding Insects, Fishes. and Crustacea.

Messrs. F. Danvers Power and A. E. Stephen, who visited Ocean and Pleasant Islands on behalf of the Pacific Islsnds Company, were permitted by the Directors to give considerable attention to collecting for the Museum. Through their efforts, 428 Crustacea, 10 Echinoderms, 64 Fishes, 5 Birds, 6 Reptiles, and 24 Insects and Arachnids were secured.

Dr. E. P. Ramsay devoted much time to the collection of Insects, on the Trustees' behalf, in the neighbourhood of Sydney, and was very successful.

Mr. A. J. North continued his avifaunian researches in the home district as time would permit, and at Ourimbah, and secured not only numerous specimens but also valuable life-history data.

Both Mr. T. Whitelegge and Mr. W. J. Rainbow rendered valuable help in their respective sections. The former took advantage of some heavy gales and storms that visited this part of the Australian coast in July, to visit the ocean beaches, and was fortunate in securing several Sponges new to our Collection.

The Taxidermist (Mr. J. A. Thorpe) visited Tarana during his vacation, and applied his well-known collecting abilities in replenishing our duplicate Bird series, as well as obtaining some valuable nests and eggs. The Assistant Taxidermist (Mr. R. Grant) also collected in the immediate neighbourhood of Sydney.

Mr. B. Lucas visited the Bellinger River, and obtained Birds and fœtal Marsupials.

The following is a statement of the specimens collected:—

Mammalia	2
Aves	131
Reptilia	6
Pisces	85
Mollusca	1
Insecta, etc.	190
Other Invertebrata	74
Total	489

Presentations.

The specimens presented during 1901 were very numerous and valuable, 14,954, as against 7,089 in 1900, or an increase of 7,865 specimens.

The more important donations were:—

1. Marine and land animals from New Britain—by *Dr. J. F. Flashman.*
2. Skull of a fine Babirusa *(B. babirusa)* from Celebes—by *Mr. E. V. Bensusan.*
3. A Native Companion *(Grus australasianus,* Gould), with ossified tendons—by *The Council, Zoological Society of New South Wales.*
4. The Pelagic fish known as the Luvaru *(Luvarus imperialis,* Raf.)—by *Fishery Commissioners of N. S. Wales.*
5. Numerous Marsupials—by *Messrs. F. C. Jansen and J. Stringer.*
6. One hundred and forty-five Australian, American, and European Fishes—by *Mr. J. D. Ogilby.*
7. A fine Sawfish *(Pristis zysron,* Bleek.)—by *Mr. J. E. Chinnery.*
8. A remarkably fine collection of marine organisms from the Barrier Reef waters, including Fish, Sponges, Actinozoa, Echinodermata, and Crustacea, in all 273 specimens, accompanied by 6,462 Mollusca—by *Mr. C. Hedley.*
9. A Basking Shark *(Cetorhinus maximus,* Gunner.), and a number of other fish from Twofold Bay—by *Mr. J. A. Boyd.*
10. Five hundred and seventy-eight Sponges from our own coast —by *Fishery Commissioners of N. S. Wales.*

11. Four hundred and seventy-eight Sponges (portions of types) —by *Prof. A. Dendy*, D.Sc.
12. Five hundred and thirteen Spiders from Jenolan—by *Mr. J. C. Wiburd.*
13. One hundred and eighty Spiders from the Pacific Islands—by *Mr. J. J. Walker*, R.N.
14. One hundred and seventy-one Beetles from the Weddin Mountains—by *Mr. H. W. Cox.*
15. One hundred and six Beetles from around Sydney and the Blue Mountains—by *Mr. H. J. Carter*, M.A.
16. One hundred and ten New Hebridean Butterflies—by *Rev. Dr. Annand.*
17. Valuable collection of Mosquitos, from N.W. India—by *Major G. M. Giles*, I.M.S.
18. One thousand and sixty-eight Mollusca, from Geraldton, W.A. —by *Mr. A. U.* and the *Rev. P. U. Henn.*
19. Seventeen hundred and ninety-eight Mollusca, from Australian and South Pacific localities—by *Mr. C. Hedley.*
20. Ceremonial and Signal "Drum," from Mallicollo—by *Rev. F. Paton.*
21. Shell Money in process of manufacture, from New Britain—by *Mrs. E. E. Kolbe.*
22. Skull trophy and carrying bag, from British New Guinea—by *Mr. P. G. Black.*
23. Four large Nardoo stones—by *Mr. J. S. Jackson.*
24. Ethnological objects from Ocean and Pleasant Islands—by *Directors, Pacific Islands Co.*
25. Kopi Widow's Cap—by *Mr. G. Officer.*
26. Bronze Medal, commemorating the equipment and departure of the "City Imperial Volunteers" to the Boer War—by *Corporation, City of London.*
27. Bronze Medal, "To the Memory of those who gave their lives for Queen and Country" (Boer War)—by *Mr. Emil Fuchs.*
28. Bronze Medal, "In Memory of Queen Victoria"—by *Mr. Emil Fuchs.*
29. Gold, Silver, and Bronze Medals, struck by the State Government of N. S. Wales in 1900—by *State Premier (Hon. J. See*, M.L.A.)
30. Gilt Medal, struck by the State Government of Victoria to commemorate the opening of the Commonwealth Parliament in 1900—by *State Premier, Victoria.*

31. Gilt Medal, struck by the State Government of Queensland to commemorate the establishment of Australian Federation—by *State Premier, Queensland.*

32. Four Medals of the Royal Geographical Society of London—by *The Council.*

33. Six Medals of the Society of Arts, London—by *The Council.*

34. Eight Medals of the Pharmaceutical Society of Great Britain—by *The Council.*

35. Eight Medals of the Institute of Civil Engineers, London—by *The Council.*

36. Carved Cheval Glass, two Umbrellas, and a Standard, from Pekin—by *State Premier (Hon. J. See, M.L.A.)*

37. Eight Boer Rifles—by *Major-Gen. Pretyman.*

The following is a full statement of the specimens received:—

Mammalia	41
Aves	449
Reptilia	71
Pisces	299
Skeletons (specimens for)	32
Mollusca	9,966
Insecta, etc.	1,745
Other Invertebrata	1,362
Fossils	296
Minerals	219
Ethnological specimens	346
Historical specimens	27
Numismatical specimens	66
Miscellaneous	35
Total	14,954

EXCHANGES.

In 1900, only 580 specimens were acquired by exchange. Last year 686 were so received, showing an increase of 106. The principal acquisitions were:—

1. Birds—from *South Australian Museum, Adelaide.*

2. Reproduction of the Boogaldie Meteorite—from *Technological Museum, Sydney.*

3. Reproduction of the Rhine Valley Meteorite—from *School of Mines and Industries of South Australia, Adelaide.*

4. American Insects—from *Mr. E. K. Harvey.*

5. Bowls, Poi-board, etc.—from *Bernice Pauahi Bishop Museum, Honolulu.*

6. Coins (various)—from *Mr. Coleman P. Hynam.*
7. Rare Australian Insects—from *Mr. C. French.*
8. Shoulder Girdles of Birds—from *Mr. E. R. Waite.*
9. American Spiders—from *Dr. G. W. Peckham.*
10. Phallic Grave-stone—from *Mr. P. Williams.*

The following is a statement of the specimens received:—

Mammals...	8
Aves	21
Pisces	42
Mollusca ...	61
Insecta, etc.	381
Other Invertebrata	34
Fossils	104
Minerals ...	4
Ethnological specimens ...	8
Numismatical specimens	17
Miscellaneous	6
Total	686

PURCHASES.

Our purchasing power was again much less during last year, 690 specimens having been acquired in 1901, as against 1,645 in 1900, showing a decrease of 955 specimens.

The more important specimens obtained by this means were:—

1. Human Crania, from New Caledonia, one of great dental interest.
2. Fine Club, believed to be from the New Britain Archipelago.
3. Coil of Santa Cruz feather "money."
4. Rare North Queensland Lepidoptera.
5. Commercial Sponges for comparative purposes.
6. Crystals of Chiastolite from South Australia.
7. Fine Bison's head.
8. Five-year old Lion.
9. Fine Turtle-shell Mask, from Torres Strait.
10. Large number of Ethnological specimens from Australia and the Pacific Islands, many of them rare and interesting.
11. Series of Medaletes struck in Australia to commemorate the consummation of Australian Federation.
12. Series of Medaletes struck in Australia to commemorate the death of H.M.G.M. Queen Victoria.

The following is a full return of purchases:—

Mammals...	2
Aves	12
Reptilia ...	1
Pisces	16
Skeletons (specimens for)	2
Conchology	6
Insecta, etc.	58
Other Invertebrata	24
Fossils	78
Minerals ...	98
Ethnological specimens ...	329
Numismatical specimens	57
Miscellaneous	7
Total	690

Publications.

The third part of Memoir IV., dealing with the "Scientific Results of the Trawling Expedition of H.M.C.S. 'Thetis,' 1898," was published on 26th February. This part contains the Crustacea, Part 2, comprising the Isopoda, Part 1, by Mr. T. Whitelegge.

Of our "Records," Parts 1 – 4 of Vol. IV., were published as follows:—

Part 1, on 29th March.
,, 2, on 20th December.
,, 3, on 29th July.
,, 4, on 28th August.

The fourth part was devoted to the Curator's Annual Report for 1900. The papers comprising the other parts will be noticed in their proper places.

After a good deal of trouble, chiefly owing to the difficulty of obtaining suitable paper, Part I. of Mr. A. J. North's "Special Catalogue of the Nests and Eggs of Birds found breeding in Australia and Tasmania," was published on 11th June. The excellence of this work, both in matter and style of production, speaks for itself, and hardly needs comment from me.

The scientific papers, official and unofficial, prepared by the Museum Staff, and published during 1901, are as follows:—

Etheridge, R., Junr.

1. Cone-like Stroboli, attached to a *Phyllotheca*-like foliage. *Aust. Mus. Rec.*, IV., 1, 1901, pp. 1 – 4, pls i. and ii.
2. *Ctenostreon pectiniformis*, Schlotheim, an Australian Fossil. *Aust. Mus. Rec.*, IV., 1, 1901, pp. 13 – 16, pl. iii.

3. Occasional Notes:—I. Aperture of *Conularia*.
   Aust. Mus. Rec., IV., 1, 1901, p. 52.
4. *Lingula* associated with *Lepidodendron*.
   Aust. Mus. Rec., IV., 3, 1901, pp. 119 – 120.
5. [Annual] Report [of the Curator] for the Year 1900.
   Aust. Mus. Rec., IV., 4, 1901, pp. 145 – 174, pls. xx.-xxvi. (Ethnological and Historical Notes, pp. 164 and 168).
6. Additional Notes on the Palæontology of Queensland, Part 2.
   Bull. Geol. Surv. Queensland, 13, 1901, pp. 37, pls. i.-iv.
7. Notes on Fossil Plants from the Saint Lucia Coalfield, Enseline River, Zululand.
   1st Ann. Report Geol. Survey Natal and Zululand (W. Anderson), 1901, pp. 67 – 76, pl. xiii.

HEDLEY, CHARLES.

1. Some New or Unfigured Australian Shells.
   Aust. Mus. Rec., IV., 1, 1901, pp. 22 – 27.
2. A Revision of the Types of the Marine Shells of the "Chevert" Expedition.
   Aust. Mus. Rec., IV., 3, 1901, pp. 121 – 130, pls. xvi-xvii.
3. Studies on Australian Mollusca, Parts III. and IV.
   Proc. Linn. Soc. N. S. W., XXV., 4, 1900, pp. 721 – 732, pl. xlviii.; XXVI., 1, 1901, pp. 16 – 25, pl. ii.
4. The Marine Woodborers of Australasia and their Work.
   Proc. Aust. Assoc. Adv. Sci., VIII., 1901, pp. 237 – 255, pls. vii.-x.

NORTH, A. J.

1. Nests and Eggs of Birds found breeding in Australia and Tasmania.
   Spec. Cat. Aust. Mus., I., 1, pp. 1 – 36, pls. i., ii.
2. Description of a New Species of Crow
   Vict. Nat., XVII., 9, 1901, p. 170.
3. Additions to the Geographical Distribution of Australian Birds.
   Vict. Nat., XVII., 10, 1901, pp. 187 – 188.
4. Description of a New Species of the Genus *Malurus*.
   Vict. Nat., XVIII., 2, 1901, pp. 29 – 30.
5. The Destruction of Native Birds in New South Wales.
   Aust. Mus. Rec., IV., 1, 1901, pp. 17 – 25.

RAINBOW, W. J.

1. Notes on the Architecture, Nesting-habits, and Life-histories of Australian Araneidæ, based on specimens in the Australian Museum. Parts I., II.
   Aust. Mus. Rec., IV., 1 and 3, 1901, pp. 5 – 12, 135 – 142.

WAITE, EDGAR R.

1. Studies in Australian Sharks, with Diagnosis of a New Family.
   Aust. Mus. Rec., IV., 1, 1901, pp. 28 – 35, pl. iv.
2. Additions to the Fish-fauna of Lord Howe Island, No. 2.
   Aust. Mus. Rec., IV., 1, 1901, pp. 36 – 47, pls. v.-viii.
3. A Description of *Macropus isabellinus*, Gould.
   Aust. Mus. Rec., IV., 3, 1901, pp. 131 – 134, pls. xviii.-xix.
4. Occasional Notes:—II. Fishes.
   Aust. Mus. Rec., IV., 1, 1901, pp. 53 – 54.
5. Occasional Notes:—IV. *Uronycteris cephalotes*, Pallas.
   Aust. Mus Rec., IV., 3, 1901, p. 144.

WHITELEGGE, THOMAS.

1. Description of a new Hermit Crab *(Calcinus imperialis)*, from Lord Howe Island.
   Aust. Mus. Rec., IV., 1, 1901, pp. 48 – 51, pl. ix.
2. Report on Sponges from the Coastal Beaches of N. S. Wales.
   Aust. Mus. Rec., IV., 2, 1901, pp. 55 – 118, pls. x -xv.
3. Occasional Notes:—III. *Limnoria lignorum*, Rathke—a Wood-borer: Its occurrence in Sydney Harbour.
   Aust. Must. Rec., IV., 3, 1901, p. 143.
4. Scientific Results of the Trawling Expedition of H.M.C.S. "Thetis." Crustacea, Part II: Isopoda, Part I.
   Aust. Mus. Mem., IV., 3, 1901, pp. 201 – 246.

INFORMATION DISSEMINATED.

Information of a scientific and practical nature was supplied to all members of the public who applied either in writing or person, and every facility was afforded to students and schools who chose to avail themselves of the afternoon in each week set apart for study.

The following Public Officers were supplied with information:—

1. Adjutant, R.A.A., Victoria Barracks—Examination and report on certain military stores (cartridge bags, etc.) destroyed by insects *(W. J. Rainbow)*.
2. Fishery Commissioners of N. S. Wales—(*a*) Examination of Oysters infested with *Polydora ciliata*, Johnston, and Report *(T. Whitelegge)*; (*b*) Identification of Fishes *(E. R. Waite)*.
3. Assistant Government Geologist, Launceston, Tasmania—Determination of Silurian fossils *(Curator)*.
4. Berry School of Arts Museum (T. R. Lewers, Hon. Curator)—Determination of local Permo-Carboniferous Fossils (*Curator*)
5. Board of Health, Sydney—(*a*) Determination of Ticks; (*b*) Determination of Parasitic Arachnoidea *(W. J. Rainbow)*.

6. Assistant Entomologist, Department of Agriculture, Sydney (E. Gurney)—*Re* Spiders of genus *Lycosa* destroying lawns by tunnelling *(W. J. Rainbow).*
7. Librarian, Geological Survey of Queensland, Brisbane (C. F. V. Jackson)—Instruction in Library work and arrangement *(Curator* and *Librarian).*
8. Government Veterinary Surgeon (J. D. Stewart)—*Re* Parasitic Arachnoidea *(W. J. Rainbow).*
9. Inspector of Stock, Glen Innes (J. St. Clair)—Points of distinction between pelts of Rabbits and Hares *(E. R. Waite).*
10. Secretary, Zoological Society of N S. Wales—Post-mortem on Lion *(Taxidermists, etc.)*
11. Veterinary Surgeon, Zoological Society of N. S. Wales (Capt. A. P. Gribben)—Microscopical and chemical examination of Lion's blood *(T. Whitelegge* and *C. Anderson).*
12. Lecturer in Geology and Palæontology, Adelaide University (Rev. W. Howchin)—Affinities of peculiar organisms from Cambrian of S. Australia *(Curator* and *T. Whitelegge).*
13. Director, California Academy of Science Museum, San Francisco (C. Keeler)—Explaining Museum Collections and our methods of management *(Staff).*
14. Editor, "Town and Country Journal," Sydney—Answers to correspondents' queries *(Staff).*
15. Editor, "Stock and Station Journal," Sydney—Generation of Marsuipials, and references to literature bearing thereon *(Curator and E. R. Waite).*
16. Curator, Tasmanian Museum, Hobart (A. Morton)—Identification of Permo-Carboniferous *Platyschismæ (Curator).*
17. Imperial Austro-Hungarian Consul (Dr. A. Scheidel)—Identification of Pacific Spears and Arrows *(Curator).*

The more important items of information supplied to members of the public were:—

1 Mr. F. Conway—Identification of Moths, and Notes on their habits *(W. J. Rainbow).*
2. Mr. J. H. Maiden—Information *re* Capt. James Cook, R.N. *(Curator).*
3. Mr. H. J. Carter, M.A.—Determination of Coleoptera *(W. J. Rainbow).*
4. Miss M. Lodder—Determination of Port Jackson Shells *(C. Hedley).*
5. Mr. G. Sweet, Melbourne—References to literature of Native Implement Quarries and Workshops *(Curator).*
6. Mr. F. G. Whibley, of Noutai, Ellice Group—Instruction in collecting and preserving *(Staff).*
7. Directors, Pacific Islands Co., Sydney—Commercial character of Sponges from Manihiki *(T. Whitelegge).*

Transfer of Specimens.

The only transfers of specimens to other public bodies within the State were:—

1. Technological Museum, Sydney—(*a*) Additional metallurgical specimens; (*b*) Building stone blocks, showing tooling; (*c*) Twenty-four glazed boxes, displaying alluvial gold-field deposits; (*d*) Large photographs of Mining Machinery.
2. Trustees, Art Gallery, Sydney—Portraits of Her late Majesty the Queen and the Prince Consort.
3. Public School, Moss Vale—Collection of miscellaneous Shells, to assist in forming a School Collection (458 specimens, comprising 108 genera and 200 species).

Spirit Collections.

The store collections are all in good order, and were carefully looked after. Two important alterations were effected. Our tanks have hitherto been of wood, and leaked, notwithstanding all precautions to the contrary. We are now trying the experiment of lining these wooden tanks with thin sheet lead, and coating the latter with a composition; it is, however, intended in the future to replace the whole by slate tanks, and one has already been made and taken into use as an experiment.

Twenty-four gallons of old spirit were redistilled during 1901. The still was also made use of in the preparation of distilled water for the Chemical Laboratory.

Taxidermists.

(Messrs. J. A. Thorpe and R. Grant.)

As in former years, the Taxidermists were charged with the supervision of the Skin Collections, both exhibited and in store. The Assistant Taxidermist also aided greatly in keeping clean the interior of the Palæontological and Mineralogical cases.

The re-mounting of the Australian Birds was continued from the previous year, under my personal supervision, as opportunity would permit; and by May the remainder of those displayed on the east side of the gallery, including the Ducks, Waders, Gulls, Petrels, Grebes, and Penguins, was completed, and a commencement was made with the Hawks on the west side.

A very fine series of Paradisea, comprising twenty birds, was set up for Mrs. E. E. Kolbe, of Rallum, New Britain, in our Taxidermists' best style. This work was performed in return for many valuable donations made by Mrs. Kolbe.

Two Sea Trout (*Salmo trutta*, Linn.), and a Sock-eye Salmon (*Onchorhynchus nerka*, Walb.), were mounted for the Fishery Commissioners of N. S. Wales, and gave every satisfaction to that body; and two examples of the latter fish were similarly treated for the Amateur Fisherman's Association of N. S. Wales.

An Isabelline Kangaroo (*Macropus isabellinus*, Gould), was mounted, and also a Chimæra (*Chimæra ogilbyi*, Waite). Both of these were additions to our collections. Some time was also given to the preparation of eighteen mounted Marsupials for exchange with the Zoological Museum of the Imperial Academy of St. Petersburg.

The following is a record of the work performed in the workshop during the year:—

Nature of Work.	Mammals	Birds.	Nest Groups.	Fish.	Reptiles.	Totals.
New skins prepared and made up......	98	161	...	17	...	276
New skins mounted for Museum cases	3	35	9	15	18	80
Old skins restored...	...	25	...	13	...	38
Old exhibited specimens restored ...	55	70	3	...	...	128
New groups mounted for Museum cases	...	40	...	...	...	40
Totals	156	331	12	45	18	562

Articulators.

(Messrs. H. Barnes, Junr., and A. R. Taylor).

The Articulators continued in charge of the Osteological cases for cleansing and disinfecting purposes.

The disarticulating, cleaning, and remounting of previously exhibited specimens was continued, eight being so treated. The disarticulated comparative series of bones was increased by one hundred and sixty-eight specimens.

Eighty-six bird sternums were cleaned and repaired, and eighty-three were mounted for exhibition, as the commencement of a "Structural Series."

The more important skeletons prepared and mounted, requiring more than ordinary care, were those of the Chimæra (*Chimæra ogilbyi*, Waite), a Native Companion (*Grus australasianus*, Gould), the Luvaru (*Luvarus imperialis*, Raf.), and a Death Adder (*Acanthopis antarctica*, Shaw). In consequence of the Luvaru arriving in a salted and half-dried state, thorough maceration could not be effected, necessitating far more manual work and dexterity than is usually the case. The skeleton of the Native Companion is a very fine piece of work, the extraordinary ossification that the tendons had undergone requiring very delicate treatment.

During the year 446 specimens were handled, as follows:—

Nature of Work.	Mammals	Birds.	Fishes.	Reptiles.	Totals.
New skeletons prepared	15	33	1	2	51
New skeletons mounted	3	10	1	1	15
Old exhibited skeletons remounted or cleaned	8	...	...	...	8
Disarticulated bones prepared	168	...	...	...	168
Disarticulated bones mounted	34	...	1	...	35
Shoulder girdles prepared ...	...	86	...	...	86
Shoulder girdles mounted ...	...	83	...	...	83
Totals	228	212	3	3	446

Formatori.

(Messrs. H. Barnes, Jun., and A. R. Taylor.)

After the renovation of the Workshops in connection with the building of the first half of the South Wing, our series of plaster moulds was replaced on the shelves of the Casting and Moulding Room in its former order.

At the request of the Government Geologist (Mr. E. F. Pittman, A.R.S.M.), reproductions of the Gilgoin Meteorites, Nos. 2 and 3, weighing respectively 55¼lbs. and 37lbs., were prepared for the Geological Survey Branch of the Department of Mines and Agriculture, and copies were secured for our cases. Copies of our Nocoleche Meteorite were also prepared and forwarded as exchanges to the School of Mines and Industries of South Australia, in Adelaide, and to the Technological Museum, Sydney.

I derived considerable assistance from the Formatori in the preparation of plaster and jelly reliefs of various natural impressions or "casts," of fossil organic remains.

The full return of work performed is as follows:—

Nature of Work.	Skeletons.	Fossils.	Minerals.	Ethnology.	Totals.
New moulds prepared	10	..	2	7	19
New casts made	10	5	7	7	29
Reproductions from old moulds	...	...	1	...	1
New casts coloured ...	10	...	3	5	18
Totals...	30	5	13	19	67

PHOTOGRAPHER.

(Mr. H. Barnes, Junr.)

We are now utilising in a very great measure our photographic appliances for the production of the plates of the Museum publications. It may not be out of place to mention that nearly all the negatives for the very fine illustrations of nests and eggs adorning Mr. A. J. North's 'Catalogue of the Nest and Eggs of Birds found breeding in Australia and Tasmania' were prepared either by Mr. North himself or by Mr. Barnes, in the field and studio respectively. The Trustees are particulafly fortunate in possessing as members of the staff no less than four accomplished photographers, Messrs. T. Whitelegge, A. J. North, E. R. Waite, and H. Barnes, Junr. The collection of negatives now amounts to upwards of 1,945.

Thirty-five prints were presented to the Trustees during 1901, chiefly of an Ethnological nature. Many of these represented scenes in Ocean and Pleasant Islands, taken and given by Mr. F. Danvers Power.

The following is a return of the work performed :—

Nature of Work.	Mammals.	Birds.	Nest Groups.	Fish.	Ethnology.	Fossils.	Minerals.	General.	Totals.
New negatives prepared..........	...	3	9	8	15	11	...	...	46
New prints prepared	5	9	56	16	26	23	...	...	135
Prints from old negatives	...	...	...	...	...	...	2	..	2
Prints mounted	4	4	14	5	28	8	...	35	98
Letter-press prints mounted ...	...	...	...	38	...	...	...	...	38
Totals	9	16	79	67	69	42	2	35	319

ARTIFICERS (INCLUDING CARPENTRY AND SMITH'S-WORK).

(Messrs. R. Barnes and B. Lucas.)

A large amount of varied work was carried out in the Artificer's workshop, both in wood and metal.

Under Mr. R. Barnes' superintendence, the magnificent Chinese Cheval-glass from Pekin, was safely erected, and now forms one of our most attractive exhibits.

Amongst some of the more important work may be mentioned :—

1. Cabinet for a collection of Chinese coins.
2. Fitting drawers of Numismatic table-cases with false bottoms.
3. Four Card-catalogue cabinets.

4. Twelve picture frames for explanatory drawings and photographs to accompany specimens.
5. Seventy-one wooden Fish family label frames.
6. Twelve metal label and notice frames for general purposes.
7. Twelve collecting tanks and metal mountings for same.
8. Brass edge bindings to Museum Registers.
9. Five hundred and eight stands of various sizes for specimens.
10. Twenty-three stands for large Mammalia repolished.
11. Galvanised iron and zinc trays for use of Articulators.
12. Additional shelving in workshops.
13. Additional step throughout wall cases of Fish gallery.
14. General locksmith work throughout Museum.
15. Repairs to printing machine.

Compositor and Printer.

(Mr. J. W. Woodhead.)

During 1901, 15,215 labels were prepared, composed and printed, showing an increase of 4,728 over those of 1900. These were distributed as follows :—

Mammalia	12
Reptilia...	16
Aves	126
Pisces	1,597
Skeletons	341
Insecta, etc.	255
Conchology	336
Other Invertebrata	82
Ethnology	40
Mineralogy	994
Palæontology	22
Numismatics	211
Historical	67
Library	680
General	10,436
	15,215

Binder.

(Mr. J. W. Woodhead.)

In my last year's Report I referred to the fact that a commencement had been made with book-binding on the premises, chiefly confined to official forms and records. This work has quietly and unostentatiously progressed, the following being some of the more important items :—

1. Three books, balance sheets and correspondence list.
2. One book, Annual Report (type-written) for presentation to His Excellency the State Governor.

3. Ten half-bound, and one quarter-bound books.
4. Five file-cases.
5. Three refil cases.
6. Fifteen scribbling blocks.
7. Sixteen portfolios.
8. Two hundred and ten Library catalogue cards, cut to pattern.
9. Four pamphlets, "Catalogue of Shells."
10. Five pamphlets, "List of N. S. Wales Sponges."
11. Three "Geographical Gazetteers," indexed.

Mammalia.

(Mr. E. R. Waite, *Assistant-in-Charge.)*

Mr. Waite reports that from an exhibition point of view nothing more can be effected, and pending the acquisition of additional space all that can be done is to keep the specimens in good order, and in a state of cleanliness. Two important additions were, however, made, a skin of *Macropus isabellinus*, Gould, obtained by exchange from the Perth Museum, and a fine head of a Bison *(Bos americanus*, Gmel.). The former was described in detail by Mr. Waite,[2] who showed that the supposed identity of the mutilated skin, all previously known of this Kangaroo, with the skull termed *Macropus magnus*, by Owen, is untenable. The greatest rarity amongst our indigenous fauna, obtained during the year, was a further specimen of *Sminthopsis crassicaudata*, Gould, presented by Mr. G. H. Doyle. Of the one hundred and four described species of Australian Marsupials, this Museum now possesses ninety-two, and examples of the whole of these are mounted and exhibited in the cases devoted to the Marsupialia. The range of a rare Bat *(Uronycteris cephalotes*, Pallas), hitherto only known from Cape York, was extended by Mr. Waite,[3] by specimens received from the Bloomfield River, near Cooktown, Queensland, and Alstonville, on the Richmond River, in this State.

As in past years, Messrs. J. C. Jansen and J. Stringer, Live Animal Dealers of this city, were most liberal in their donations of Marsupials, chiefly Wallabies. Again, the Council of the N. S. Wales Zoological Society, with its usual liberality, transferred to us animals that died in their Gardens, including a Leopard *(Felis pardus*, Linn.), a Grivet Monkey *(Cercopithecus sabæus*, Linn.), a Sacred Baboon *(Papio hamadryas*, Linn.), a Dusky Langur *(Semnopithecus obscurus*, Reid) and a Japanese Bear *(Ursus japonicus*, Schleg.). From the Council was also purchased a fine five-year old Lion, bred in the managerie, measuring nine feet nine inches from nose to tail-tip, or six feet nine inches from nose to tail-base.

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[2] A Description of *Macropus isabellinus*, Gould.—*Rec. Aust. Mus.*, iv., 3, 1901, pp. 131 – 134, pls. xviii. - xix.

[3] Waite—*Uronycteris cephalotes*, Pallas—*Rec. Aust. Mus.*, iv., 3, 1901, p. 144.

The dogs brought to Sydney *en route* for the German Antarctic Expedition, were of great interest to us; and through the courtesy of the Chief Inspector of Stock (Mr. Alex. Bruce), Mr. Waite and myself were afforded an opportunity of examining them. A dog dying during the stay of the pack in Sydney, the Chief Inspector was good enough to forward the carcass to the Museum, with the approval of the Expedition's Sydney agents, Messrs. Lohmann and Co.

The specimens received in this Section during 1901, were:—by donation, forty-one; exchange, eight; purchase, two; and collection two.

Aves.

(Mr. A. J. North, *Assistant-in-Charge*).

Mr. North reports as follows:—"Relieved of the duties appertaining to the registration of Ethnological, Numismatical, and Historical specimens, that I have performed for the past nine years, I was enabled to devote my time entirely to this Section. The acquisitions totalling one-third more than during the previous year, my attention was divided between the ordinary routine or administrative work—such as registration, determination, and labelling of specimens—and the preparation of MS. for the Special Catalogue, 'Nests and Eggs of Birds found breeding in Australia and Tasmania.' In the preparation of the latter work, I must here acknowledge the valuable assistance received by the loan of numerous specimens for comparison and examination from the Directors of the South Australian Museum, Adelaide, and the Queensland Museum, Brisbane. To a less degree, similar help was also received from Dr. A. M. Morgan, Dr. W. Macgillivray, Mr. E. Ashby, Mr. G. A. Keartland, and Mr. G. Savidge. After vexatious delays, through difficulty in obtaining suitable paper by the printer, a small part of the Catalogue was issued about the middle of June. The requisite paper for further printing was not received from London until towards the close of the year. Field work was paid more attention to than has been done for a long while past, with the result that numerous additions were made to the collection. Photographs of nests *in situ* were taken, and much useful information obtained of the life-histories of some of the rarer species. An ever increasing correspondence on ornithological subjects, exhibits the growing interest taken in our Australian avifauna. Small collections of birds and eggs were determined, and eighty-four species of birds' eggs were named for the Director of the Athens Museum. Among specially interested visitors and co-workers might be mentioned the late Mr. Lionel W. Wiglesworth, a former colleague of Dr. A. B. Meyer, of the Dresden Museum, and joint author with him of the 'Birds of Celebes.' Mr. Wiglesworth spent about a fortnight in Sydney, and was particularly interested in the collection of Polynesian bird-skins."

The Council of the New South Wales Zoological Society presented a number of specimens from their menagerie, amongst which may be mentioned a fine Blue and Yellow Macaw *(Ara ararauna*, Linn.), and a Ruddy Sheldrake *(Casarca rutila*, Pallas). Mr. G. Savidge, of Copmanhurst, who has been a long and constant contributor, forwarded Heine's Ground Thrush *(Geocichla heinii*, Cabanis), and two nestling Delicate Owls *(Strix delicatula*, Gould). Mr. Summerhays Jeboult presented several birds obtained about Randwick and Botany, including a Little Water Crake *(Porzana palustris*, Gould), and a Little Bittern (*Ardetta minuta*, Linn.). From Mr. T. F. Josephson we received a Pectoral Rail *(Hypotænidia philippensis*, Linn.); from Mr. S. Harvey, a beautiful White Goshawk *(Astur novæ-hollandiæ*, Gmel.); from Mr. E. J. Cook, a very fine example of the Wedge-tailed Eagle *(Aquila audax*, Lath.), from Jenolan; from Mr. F. H. Galbraith, a Red-necked Avocet *(Recurvirostra novæ-hollandiæ*, Vieill.); from Mr. J. Stein, a Powerful Owl *(Ninox strenua*, Gould). Our most constant and regular contributor, Mr. H. Newcombe, forwarded three Pectoral Rails, a White Ibis *(Ibis molucca*, Cuvier), and other birds. A rarity reached us, and a welcome addition to our Reference Collection, from Uralla, a Black-eared Cuckoo *(Misocalius palliolatus*, Lath.); and from Fiji, the White-breasted Wood Swallow *(Artamus mentalis*, Jard.), where it is said to feed on the Bot-fly. From the little-visited Nawado, or Pleasant Island, Messrs. F. Danvers Power and E. A. Stephen brought us Rehse's Reed Warbler *(Arcocephalus rehsei*, Finsch).

A very interesting addition to our series of nests of native birds, consisted of the nest and three nestlings in down of the Tawny-shouldered Frog Mouth *(Podargus strigoides*, Lath.), presented by Mr. R. Lennard; a nest of the Yellow-breasted Scrub Wren *(Sericornis citreogularis.* Gould), was forwarded by Mr. H. S. Mort; the nest and eggs of the White-fronted Epithianura *(E. albifrons*, J. & S.), by Mr. A. M. N. Rose; and from the far north, Mr. Bertie L. Jardine, of Cape York, sent the nest and two eggs of the Masked Bush Warbler *(Gerygone personata*, Gould). The largest contributors of nests, however, were Mr. E. H. Lane and Mr. North personally. The former forwarded seven from the neighbourhood of Orange, and the latter collected fifteen in the home district.

For some time past I have made strenuous efforts to obtain the nests and eggs of birds acclimatised in Australia. We so far possess those of the Sparrow *(Passer domesticus*, Linn.), the Indian Spotted Dove *(Turtur suratensis*, Gmel), the Starling *(Sturnus vulgaris*, Linn.), and the Greenfinch *(Fringilla chloris*, Linn.)

A most acceptable gift was received from Dr. P. Herbert Metcalfe, Resident Medical Officer at Norfolk Island, consisting of a collection of birds' eggs made there by him. On this series Mr. North reports:—"This collection, the result of over twenty-five years' labour, contains the eggs of all but two birds that are known to inhabit or frequent the island. It is particularly rich in sea-birds' eggs, the series of Sooty Terns *(Sterna fuliginosa,* Gmelin), alone numbering over one hundred distinct varieties. As each specimen is perfect, and its history known, the value of the collection is inestimable."

From Mr. H. F. Marr the eggs of the Comb-crested Parra *(Parra gallinacea,* Temm.), were received; and from Mr. G. Savidge, twenty-seven other sets from the Copmanhurst District.

A matter that requires urgent attention on the part of the State Governments is that of the wilful destruction of our native birds, not only the highly plumaged forms, but even the humbler and more sombre-hued of our feathered friends—the former for the sake of their brightly-coloured feathers in their commercial aspect, the latter, too often, from pure wantonness. On this subject Mr. North has lately published some observations[4] that are well worth perusal.

It was hoped that the passing of the "Birds' Protection Act of 1893," (56 Vict. No. 18), would have had a beneficial effect in preserving our birds, but it appears to have become a dead letter, indeed the appended schedules, as a means of legal bird identification, are far too indefinite. Quite recently an Amended Bill has passed the Legislature, the "Birds' Protection Act of 1901 (1 Edw. vii., No. 26), which will probably share the same fate.

The following suggestions are offered as a means of rendering the Act more operative:—

1. Instruct the police to prosecute all persons, who have not a permit, for shooting birds that are protected under the Act in the close season.
2. In the country districts let especial attention be paid to persons who shoot birds for profit, such as the Regent Bower-bird, the Rifle-bird, and Lyre-bird, and all game birds and waterfowl.
3. Near cities instruct the suburban police to prosecute all offenders against the Act. (The principal offenders are boys and youths, who shoot on Saturdays and holidays).
4. Let due notice be given in the newspapers, just prior to any holiday occurring in the close season, that persons shooting protected birds will be rigorously prosecuted.
5. Place in a conspicuous position on every railway-station, post-office, court-house, and school in the State, a large poster of the Birds' Protection Act.
6. Let teachers instruct the children in the public schools the harm they are doing in killing birds and robbing nests.

It may be interesting to note that of the seven hundred and sixty (approximately) known species of Australian birds, our collection contains six hundred and eighty-seven. Of the latter,

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[4] North—The Destruction of Native Birds in New South Wales.—*Aust. Mus. Rec.*, IV., 1, 1901, pp. 17-25.

five hundred and sixteen species are mounted and exhibited, and represented by eighteen hundred and forty-eight specimens. Of foreign birds (*i.e.*, those not actually indigenous), there are two thousand three hundred and fifty-one mounted and exhibited specimens, of which three hundred and fifty-four are frequenters of the South Pacific.

During 1901, four hundred and forty-nine birds were obtained by donation, twenty-one by exchange, twelve by purchase, and one hundred and thirty-one were collected.

Reptilia and Batrachia.

(Mr. E. R. Waite, *Assistant-in-Charge*).

Mr. Waite reports that owing to the transfer of the Sharks to the new Fish Gallery, a re-arrangement of the Reptiles became possible. This was effected by giving the Snakes a wall-case to themselves, and expanding the other groups over the space so vacated.

The most important presentation was a collection of Snakes and Lizards, from New Britain, by Dr. J. F. Flashman; other series were forwarded from West Australia, by Mr. W. D. Campbell; and Ocean and Pleasant Islands, by Messrs. F. Danvers Power and A. E. Stephen.

As a result of a change in the receptacles for storage in the Spirit House, a large number of old specimens were registered.

In the Reptilian cases, as exposed to public view, there are the following specimens:—

Group.	Australian.	Pacific.	Foreign.	Total.
Lizards	132	23	112	267
Snakes	74	4	19	97
Frogs, etc.	44	41	75	160
Crocodiles	17	...	...	17
Total	267	68	206	541

In this section, during 1901, seventy-one specimens were received by donation, one by purchase, and six were collected.

Pisces.

(Mr. E. R. Waite, *Assistant-in-Charge*).

"The chief work of the year," says Mr. Waite, in the sections under his control, "was effected amongst the Fishes, by continuing the mounting and placing of the specimens in the new Gallery, the preparation of labels, all of which were printed, including family labels, and the preparation of a card catalogue for working purposes. The Sharks were removed from the central vestibule of the upper Main Hall to the Fish Gallery. The *Regalecus glesne*, Asc., and *Trachypterus jacksoniensis*, Ramsay, were separately cased; coloured plaster reproductions of food fishes were arranged in a separate case on the stair landing outside the gallery entrance; and copies of our published plates of Fishes, from my drawings, were framed and placed on the walls of the same."

Much information was supplied to enquirers, and particularly to Mr. Tokichi Nishikawa, Zoologist to the Imperial Fishery Commission of Japan; and to the Fishery Commissioners of N. S. Wales.

Amongst the more important results of the year's work, Mr. Waite demonstrated that the Dusky Dog-fish, or "Blind Shark," (*Hemiscyllium modestum*, Günther), is ovoviviparous, also that the Wobbegong (*Orectolobus barbatus*, Gmelin, sp.) brought forth its young in a similar manner.[5]

In my Report for 1900, I alluded to Mr. Waite's researches amongst the Fishes of Lord Howe Island. These were continued as collections came to hand, with the result that No. 2 of the "Additions" has been published.[6] Amongst other interesting records, he described a new three-banded *Chætodus* (*C. tricinctus*, Waite), and figured Ogilby's *Monacanthus howensis*.

The donations during 1901 were larger than usual in past years. A very acceptable present of fish from New Britain was received from Dr. J. F. Flashman, comprising ten species; and another of Rifle-fish (*Toxotes chatareus*, Ham. Buch.) was sent from the Ulmsley River, Queensland, by Mr. G. H. Blakemore. These are caught with rod and line, and grasshopper bait, and are attracted by dropping stones into the water. An interesting variety of the Black Sole (*Synaptura nigra*, Macl.), in which the underside, for the most part, is coloured like the upper, was presented by Mr. N. Aceglav.

Mr. J. D. Ogilby presented a general collection, comprising one hundred and forty-five specimens (fifty-three species), viz.:—eighteen European, ten American, and twenty-five Australian. An example of a Saw-fish (*Pristis zysron*, Bleek.), was given by Mr. J. E. Chinery, a city fishmonger, measuring eight feet six inches over all, the saw being two feet seven inches long.

The piscatorial result of Mr. C. Hedley's visit to the inlying portions of the Barrier Reef, was the acquisition of thirty-four much needed fishes from northern waters.

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[5] Waite—Studies in Australiaa Sharks, with Diagnosis of a New Family.—*Aust. Mus. Rec.*, IV., 1, 1901, pp. 28 - 35, pl. iv.

[6] Waite—Additions to the Fish-fauna of Lord Howe Island, No. 2.—*Ibid.*, pp. 36 - 47, pls. v. - viii.

A most important addition, due to the forethought of a many-years donor, Mr. J. A. Boyd, of Eden, reached us in the form of a Basking Shark (*Cetorhinus maximus*, Gunner.), taken off that place. It is the second record only, so far as we know, for Australia, the previous capture having been off the coast of Victoria. It is nine feet long.

At the close of the year, the exhibited Fish Collection numbered 1,112 specimens, either dry and mounted or in spirits.

The specimens received by donation during the year were two hundred and ninety-nine; by exchange forty-two; by purchase sixteen; and eighty-five were collected.

Osteology.

(Mr. E. R. Waite, *Assistant-in-Charge*).

Three very important and interesting acquisitions were added to the Osteological series last year. A salted example of the Atlantic Luvaru (*Luvarus imperialis*, Raf.), was presented by the Fishery Commissioners. It was cast up on the bank of the river at Bermagui, N. S. Wales, and forms the first occurrence of the fish in the Pacific, so far as we know. From this, notwithstanding the salting process it had undergone, a very excellent skeleton was prepared.

For the first time a skeleton of the Chimæra or Ghost Shark (*Chimæra ogilbyi*, Waite), is present in the Museum, having been prepared from a fresh specimen, presented by Mr. A. G. Platé.

The third skeleton is a most remarkable instance of "tenostosis," or tendon ossification in a bird, a Native Companion (*Grus australasianus*, Gould), received from the Zoological Gardens.

A fine head of a Babirussa (*B. babirussa*, Linn.), from Pagoejaman, Celebes, was presented by Mr. E. V. Bensusan.

By purchase, the skull of a New Caledonian was procured, possessing an additional small and ill-developed molar in each lower ramus, four instead of three.

A commencement was this year made towards the exhibition of a Structural Osteological series, by mounting eighty-three shoulder-girdles of Birds.

Thirty-two specimens were received in all by donation; two were purchased; and six collected.

Insecta, Myriapoda, and Arachnida.

(Mr. W. J. Rainbow, *Assistant-in-Charge*).

Mr. Rainbow reports that of the two new cabinets provided last year, many specimens were placed in that devoted to the Arachnida. The new case for Australian Moths is fully occupied already. The whole of the Australian Coleoptera and Life-histories exhibited were furnished with printed labels. Attention was then given to the Australian Moths, and the task of setting out specimens for exhibition was nearly completed. The systematic arrangement of the cabinet specimens of Australian Beetles was commenced, and incidentally with this, the duplicate series of the same. As the work of rearrangement proceeded, the specimens were cleaned and remounted to a uniform guage.

A fine collection of one hundred and seventy-one Beetles from the Weddin Mountains, was presented by Mr. H. W. Cox; another, of a hundred and four, from the neighbourhood of Sydney and the Blue Mountains, by Mr. H. J. Carter, M.A.; seventy-seven from the Fowler's Bay District, S. Australia, by Mr. R. T. Maurice, including the rare *Stigmodera mniszechi*, Saund.; examples of *Mastochilus australasicus*, Perch., infested with Mites (*Aponomma ecinctum*, Newm.), from the Tweed River, by Mr. J. Yardley.

Amongst the Butterflies and Moths presented, may be mentioned one hundred and ten from the New Hebrides, by the Rev. Dr. Annand; forty-six from the Blue Mountains and South Coast, by Mr. G. A. Waterhouse; and thirty-seven Moths from Kensington Downs, Queensland, by Mr. A. J. Ewen.

A small but most valuable collection of Indian Mosquitos from the N.W. Provinces of India, was presented by Major G. M. Giles, I.M.S.; these will prove of great service to us in the future.

As illustrating the destructive work of Termites, two books, Dalziel's "British Dogs," completely riddled by these pests, were given by Mr. O. H. M. Paine; and an interesting exhibit of the nest of a Praying Mantis, with the insect and its young, was forwarded by Mrs. Hall, from Liverpool. A Scorpion (*Charon australianus*, L. Koch), new to our cases, was obtained by Mr. C. Hedley at the Barron Falls, near Herberton, Queensland.

The exertions of Mr. J. C. Wiburd, one of the guides at Jenolan Caves, have been the means of adding no less than five hundred and thirteen Spiders to our already rich Arachnidian Collection, from the various caves and surrounding country at the locality mentioned, accompanied by a reticularian web, the work of an *Amaurobius*.

Mr. J. J. Walker, R.N., of H.M.S. "Ringarooma," contributed thirty-two Spiders from Freemantle and Port Lincoln, thirteen from other parts of the continent, and one hundred and eighty from the New Hebrides, Loyalty Islands, and New Caledonia. Of these, five are types, viz., *Diæa bipunctata*, Rainb.; *D. regale*, Rainb.; *Leptodrassus insularus*, Rainb.; *Argyrodes antipodiana*, Camb.; and *A. walkeri*, Rainb. *Lycosa cœnosa*, Rainb., was originally recorded from Santa Cruz, now Mr. Walker has collected it on Tanna and Lifu. Similarly, *Jotus archi-pluvii*, Peckh., was also recorded from the same place, now Mr. Walker finds it on Tanna and Mallicollo. In Mr. Hedley's collection from Fitzroy Island, Barrier, occurred *Cryptothele doreyana*, E. Simon, a New Guinea Spider, and the first of its genus to be recorded in Australia Another first record also is that of the nest of *Brachythele pallida*, L. Koch., from Canterbury, presented by Mr. H. J. Carter, M.A.

At the beginning of the year, Mr. Rainbow contributed the first of a series of articles on the architecture, etc., of Australian Spiders, chiefly based on specimens in the Museum. Part 1[7] treats of the Territelariæ, or "Trap-door Spiders." This was followed about the middle of the year by Part 2—the Cribellatæ,[8] or Spiders provided with a *cribellum* and *calamistrum*.

The specimens obtained by presentation numbered seventeen hundred and forty-five; by exchange three hundred and eighty-one; by purchase fifty-eight; and by collection one hundred and ninety.

Conchology.

(Mr. C. Hedley, *Assistant-in-Charge*).

Mr. Hedley reports:—"The past year was the most prosperous in the history of this Section. The gain to the collection exceeded the growth of two ordinary years, and more administrative work than usual was performed. This advance is due to two circumstances—(1) To the efficient aid rendered me by a Volunteer Assistant, Mr. H. L. Kesteven, who for nine months attended daily, and both sorted and roughly classified the store collection, sorted dredged material for study, rearranged all the mounted cabinet specimens, registered and mounted new material, prepared a collection for school purposes, and under your supervision attended to inquirers during my absence in July and August; (2) I profited by a special leave of absence during the months just mentioned, to visit the north-east coast of Queensland, the Barrier Reef, and intervening islands, between Townsville and Cairns. By dredging and shore collecting eight hundred and seventy-eight species of Mollusca were obtained, including a large number of undescribed or little-known forms. This collection was determined and registered, and is now in course of being mounted."

"The first quarter of the year was spent in continuing the classification of the store collection, as described in last year's Report. This disposed of, I turned to the examination of the Mollusca dredged by the 'Thetis' Expedition, which pressure of other work had delayed for three years."

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[7] Rainbow—Notes on the Architecture, Nesting-habits, and Life-histories of Australian Araneidæ, based on Specimens in the Australian Museum: Part 1.—*Rec. Aust. Mus.*, IV., 1, 1901, pp. 5-12.

[8] Rainbow—*Ibid., loc. cit.*, 3, pp. 135-142.

"A thousand tablets were mounted during the year, and the contents of the old exhibition balustrade cases transferred to the new ones provided for the purpose."

A most laudable effort was made by Mr. Hedley to place on a firmer basis a number of Australian shells, described in the past by a few authors in a more or less haphazard manner. A paper of this description is his "New or Unfigured Australian Shells,"[9] in which he figured five old species described without illustrations; a second, "Revision of the Types of the Marine Shells of the 'Chevert' Expedition,"[10] from tropical Queensland coasts, and now in the Macleay Museum. Thirty of these "neglected species" were figured, and placed on a satisfactory basis. A third paper, "Studies in Australian Mollusca,"[11] rescued seven old unfigured forms from oblivion; and a fourth and last paper,[12] Part 4 of the preceding, accounts for four other shells previously little understood, and concludes with some pertinent remarks on the 'Challenger' Australian Station, known as "164 B," from which a number of North Atlantic shells are said to have been obtained during the voyage of the vessel in question. Mr. Hedley's supposition that this should read "64 B," a Mid-Atlantic Station, corroborated as it is by other facts, is so obvious that one wonders it has remained so long unsolved.

One of our most steadfast voluntary collectors, Mr. A. U. Henn, assisted by his brother, the Rev. P. U. Henn, both of Geraldton, W.A., surpassed his previous efforts by forwarding no less than ten hundred and sixty-eight specimens from that neighbourhood, thus providing us with a good collection of W.A. temperate Mollusca. These shells are of especial value by affording Mr. Hedley a knowledge of some of the forms originally described by Mr. C. J. Menke in his little-known work "Molluscorum Novæ-Hollandiæ Specimen," 1840, and except through this otherwise lost to history.

Mr. T. Nishikawa presented four *Meleagrina martensii*, Dunker, from the Bay of Agu, Japan; Mrs. G. J. Waterhouse, a constant donor, added to our collection a fine specimen of *Pandopœa australis*, Sby., with the siphons fully extended; and Mr. A. G. Waterhouse presented the type of *Cantharus waterhousiæ*, described some years ago by Mr. J. Brazier,[13] from Botany.

There was no more liberal donor during the year than Mr. Hedley himself. He presented to the Trustees 1,798 specimens from Japan, this continent, and various islands in the Pacific, with the conchological results of his Barrier Reef trip, consisting

9 Hedley—*Rec. Aust. Mus.*, IV., 1, 1901, p. 22.

10 Hedley—*Loc. cit.*, 3, p. 121, pls. xvi. and xvii.

11 Hedley—Proc. Linn. Soc. N. S. Wales, xxv., 4, 1901, p. 721, pl. xlviii.

12 Hedley—*Loc. cit.*, xxv., 1, 1901, p. 16, pl. ii.

13 Brazier—*Loc. cit.*, xxi., 3, 1896, p. 345.

of no less than 6,462 specimens, and comprising, as before stated, 878 species.

In the cases of the Invertebrate Gallery devoted to Conchology, there are now 30,681 specimens of Australasian shells, comprising 4,744 species, a large proportion being those of the celebrated "Hargraves" Collection. Elsewhere there are arranged 8,019 (850 species) specimens of foreign shells, many of which also formed a part of the same collection.

By donation, nine thousand nine hundred and sixty-six specimens were received in this section; sixty-one by exchange; and six by purchase.

INVERTEBRATA (OTHER THAN INSECTA, ETC., AND MOLLUSCA).

(Mr. T. WHITELEGGE, *Assistant-in-Charge*).

"During the past year," says Mr. Whitelegge, "I was chiefly occupied with the elaboration of the Sponges forwarded by the Fishery Commissioners of N. S. Wales and Prof. A. Dendy, D.SC. In addition to preparing the published papers on these, many sections were mounted in Canada balsam for future reference."

In addition to the ordinary duties of his Section, Mr. Whitelegge rendered me valuable assistance in working out various obscure fossil forms in connection with my own special line of research.

Of Prof. Dendy's presentation, Mr. Whitelegge says:—"It consists of four hundred and seventy-eight specimens, representing four hundred and sixty-two species, and contains five species enumerated in the 'Catalogue of Sponges in the Australian Museum,' two of which, there described as new, have up to now been wanting in our collection! Of the two hundred and ninety-five species and varieties described in this 'Catalogue,' one hundred and fifty-six are represented, including eight labelled as portions of types, and many others which are undoubtedly portions of types, now on exhibition in our Gallery. In the 'Zoologische Jahrbuch' for 1887, Dr. R. von Lendenfeld described one hundred and eighty-three species, or varieties, from Australian waters, and of the latter there are in Prof. Dendy's consignment one hundred and forty-four fragments, many of them probably bits of the original types now in the Museum of Natural History, London, notwithstanding that a large proportion of the species are labelled Port Jackson, or from the coast of N. S. Wales."

In my Report for 1900, I referred to the collection of Sponges received from the Fishery Commissioners, and Mr. Whitelegge's important work in connection therewith. His researches were completed early in 1901, and the results published.[14] The collection

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[13] Whitelegge—Report on Sponges from the Coastal Beaches of New South Wales.—*Rec. Aust. Mus.*, iv., 2, 1901, pp. 55 - 118, pls. x. - xv.

of over six hundred specimens yielded seventy-one species, ten of which were described as new. The commercial class of sponge is represented by twelve species and varieties, seven or eight of which may be regarded as having an economic value and belong to the genera *Euspongia* and *Hippospongia*. The most important economically is *Hippospongia illawarra*, Whitl., "being quite equal, if not superior, to many of the kinds used for domestic purposes." The work necessitated the preparation of two hundred and fifty microscopic sections, as well as the macroscopic and microscopic re-examination of one hundred and twenty specimens already in the Museum.

The investigation of these sponges again brought under Mr. Whitelegge's notice the chaotic condition of the Lendenfeldian types, a most regretable state of things when we remember that this collection is supposed to be one of the chief, if not the chief authority, for Australian Sponge nomenclature. A summary of the results arrived at by Mr. Whitelegge during his examination of Lendenfeld's types deposited in this Museum, is as follows:—Eighty-nine species and varieties were examined, and forty-three (nearly half!) were found to be wrongly or insufficiently diagnosed, or deducting the Horny Sponges, which are much less likely to error in the diagnosis of the fibres, the numbers are thus:—

——	Species and Varieties examined.	Wrongly or insufficiently diagnosed.
Sponges with spicules	28	14
Renierinæ (sub-family)	10	7
Chalininæ (sub-family)—Groups Cachochalininæ and Pachychalinæ	20	13
	58	34
Add Horny Sponges	31	9
Total	89	43

An example of one of the most beautiful of known Sponges, Venus' Flower Basket (*Euplectella aspergillum*, Owen), from the Philippines, was presented by Mr. W. Cruickshank; and two specimens in alcohol of the second species, *E. imperialis*, Ijima, from the Bay of Agu, Japan, were given by Mr. Tokichi Nishikawa, of the Imperial Fishery Bureau, Tokio; with six examples of the Glass-rope Sponges (*Hyalonema apertum*, Schulze, and *H. sieboldii*, Gray), from Japan also, by Mr. S. Koaze.

It is of some importance to note that a commercial sponge exists at Manahiki, or Humphrey Island, *Euspongia irregularis*, var. *pertusa*, examples having been presented by the Directors of the Pacific Islands Company, of this city. Amongst the specimens obtained by Mr. Hedley at Palm and Gould Islands, Barrier Reef, was a species of *Gellius*, commensal with an alga.

By exchange with the West Australian Museum, Perth, twenty-four specimens were obtained, half of which were new to our collection.

There are now exposed to public view three hundred mounted specimens of Australian Sponges.

A remarkably fine series of Corals, numbering fifty-nine specimens and thirty-three species, was brought from Palm Island, Barrier Reef, by Mr. Hedley, with equally good examples of *Heliopora cœrulea*, Pal., one with extended polyps, and an example of the Giant Anemone (*Discosoma kentii*, Had.). Our exhibition cases now contain three hundred specimens of Australian Corals.

Two rare Land Crabs (*Geocarcinus lagostoma*, M. Edw., and *Discoplax longipes*, M. Edw.), were brought from Ocean or Pleasant Island, by Messrs. F. Danvers Power and A. E. Stephen. From Lord Howe Island, we received a Crab (*Lumbrus affinis*, M. Edw.), obtained by Mr. W. S. Thompson, previously known only from Torres Straits, New Caledonia, and the Hawaiian Islands. Another interesting addition to the fauna of this beautiful Island, was a new Hermit Crab (*Calcinus imperialis*, Whitl.),[14] inhabiting the shells of *Turbo imperialis*, Gmelin. The presence of the much-dreaded Gribble (*Limnoria lignorum*, Rathke), in wood taken from one of the jetties at Circular Quay, and from a ferry steamer, was shown by Mr. Whitelegge[15] to be an accomplished fact.

A further valuable collection of Planarians, including thirty-one specimens, representing fifteen species and varieties, seven of which are types, was presented by Mr. Thomas Steel.

During 1901, thirteen hundred and sixty-two specimens were received by donation; thirty-four by exchange; twenty-four by purchase; and seventy-four were collected.

Ethnology.

(The Curator; Mr. W. W. Thorpe, *Mechanical Assistant*).

The collection of Australian and Polynesian Ethnology continues to increase, and the acquisitions were both interesting and valuable.

Dr. W. E. Roth continued to supply us with examples of Mollusca, used by the North Queensland Aborigines as food, thus adding fifty-five varieties to the excellent series already supplied by the same gentleman. A complete list of the edible Mollusca

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14 Whitelegge—Description of a New Hermit Crab (*Calcinus imperialis*), from Lord Howe Island.—*Rec. Aust. Mus.*, iv., 1, 1901, pp. 48–51, pl. ix.

15 Whitelegge—*Limnoria lignorum*, Rathke—a Wood-borer: its recurrence in Port Jackson.—*Loc. cit.*, 3, p. 143.

of North Queensland, as used by the Blacks, has lately appeared from the pen of Dr. Roth,[16] the species having chiefly been named for him here by Mr. Charles Hedley.

Four excellent "Nardoo" stones were contributed by Mr. J. S. Jackson, from Flood's Creek, seventy miles from Broken Hill, and another by Inspector W. Webster, of the Lands Department.

The Directors of the Pacific Islands Company, of Sydney, were good enough to donate a number of most acceptable Ethnological articles, procured for them by Messrs. F. Danvers Power and A. E. Stephen, from Ocean and Pleasant Islands. With these was a large lagoon fishing-net, contributed by Mr. A. Ellis, of Ocean Island; and a very handsome dancing petticoat, or kilt, from Niutao, Ellice Group, was presented by Mr. J. G. Whibley.

Two curious Gold Prospecting-dishes from Soepajang, Sumatra, were presented by Mr. E. V. Bensusan; a series of specimens illustrating the manufacture of the shell money known in New Ireland as *kokonon*, was presented by Mrs. E. E. Kolbe, of Ralum, New Britain; another very interesting corselet, from the Gilbert Group, was given by Mr. A. E. Finckh; and an additional ancestral drum, from Mallicollo, by the Rev. J. Paton.

Three hundred and forty-six specimens were presented; eight were obtained in exchange; and three hundred and twenty-nine by purchase.

Historical.

(The Curator; Mr. W. W. Thorpe, *Mechanical Assistant*).

The Museum is indebted to the State Premier (Hon. J. See, M.L.A.) for a valuable present, consisting of a finely-carved black-wood cheval-glass, two large silk umbrellas, and a standard, "loot" obtained in Pekin, and brought on their return by the N. S. Wales Naval Contingent.

From Major-General Pretyman, Bloomfontein, we received eight Boer rifles, used in the present South African campaign, including Martini-Henry, Westley-Richards, Westley-Richards Sporting, D.B. Sporting, and a Mauser rifle.

By donation twenty-seven specimens were acquired during the past year.

Numismatics (Coins, Tokens, Medals).

(The Curator; Mr. W. W. Thorpe, *Mechanical Assistant*).

The general collection of coins and foreign tokens had, up to the commencement of last year, never been examined in anything approaching a critical manner. A commencement was made in

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16 Roth—Food: Its Search, Capture, and Preparation.—*N. Queensland Ethnol. Bull., No. 3* (Queensland Parl. Papers, C.A. 81, 1901).

January by sorting the coins proper into countries and reigns, with preliminary determinations, and subsequent rough arrangement in a large cabinet, specially made for the purpose on the premises. Having accomplished this with the aid of my personal assistant, Mr. W. W. Thorpe, who has shown special aptitude for the work, the tokens, other than the Australian, were sorted, determined, and systematically arranged for reference by students. No attempt has yet been made to classify the Greek and Roman. To my astonishment I found that the Trustees possessed a most valuable series of Chinese coins, consisting of one thousand and ten pieces. From the catalogue accompanying them, the coins purport to have formed the collection of one Hwong Ping Sing, of Fuchow, gathered by himself during twenty years' collecting, and arranged in accordance with Chinese and Japanese 'Chronicles of Coins.' All in the catalogue agree fairly well with the descriptions given by Lockhart in his work, 'Currency of the East.'[17]

The catalogue is divided into six sections, viz.:—

(1) Coins of the Ancient Dynasties, circa 770 B.C. to 1616 A.D.
(2) Coins of the present Manchurian Dynasty, from 1616 to 1862 (including Rebel coinage).
(3) Annamese Coins (Cochin China), 1010 to 1427 A.D.
(4) Japanese Coins, 708 to 1864 A.D.
(5) Corean Coins (no date given in Lockhart).
(6) Coins used as Amulets.

Paper money was increased by the presentation of a five and a ten Chinese tael note, by Mr. F W. Luscombe.

The collection of Medals was largely added to during the year. Under the head of Commemorative Medals, we received a copy of the fine bronze medal struck by the Corporation of the City of London, to commemorate the "Raising and Equipment of the City Imperial Volunteers, and their Service in South Africa in 1899 – 1900," by F. G. Frampton, A.R.A.

To the kindness and ability of Mr. Emil Fuchs, of London, we are indebted for two medals, designed and executed by him. One is "To the Memory of those who gave their Lives for Queen and Country," and relates to the present Boer war. The second was a commission to Mr. Fuchs from the Queen, and was intended by the latter as a personal memorial of the end of the century. It is executed in dull oxidised silver. The profile head of Her Majesty on the obverse is said to be one of the best likenesses that any sculptor or medallist has yet achieved.

A number of medals or medaletes, commemorative of Australian Federation were struck locally, five officially, the remainder as private commercial speculations. Examples of all, in duplicate, were secured for our collection.

[17] Lockhart—' Currency of the the East," i. and ii., Hongkong, 1895.

In this section sixty-six specimens were presented; sixteen acquired by exchange; and fifty-seven by purchase.

Mineralogy.

(Mr. T. Cooksey, Ph.D., B.Sc., *Consulting Mineralogist;*

Mr. C. Anderson, M.A., B.Sc., *Assistant-in-Charge*).

As Dr. Cooksey, in his temporary capacity, attended merely to the determination of acquisitions, principally the previously purchased Porter Collection, the general conduct of the Mineral Section fell on myself until the arrival of Mr. Anderson, *i.e.*, from January to July. During that period my Assistant, Mr. W. W. Thorpe, registered no less than 10,143 specimens, and helped me to incorporate them in the collection. In the fore part of the year, with the assistance of Mr. B. Lucas, the steady replacement of old MS. labels by printed ones progressed, and a number of additional specimens was placed in the cases.

On Mr. Anderson's arrival, his attention was given to the rearrangement of the case containing specimens illustrating the occurrence of gold, and cut and rough gem-stones. These were all remounted, augmented, and supplied with printed labels.

An addition to our collection was made by Mr. Herbert Basedow, by the presentation of Stibio-tantalite, from Greenbushes, W.A. Mr. S. L. Bensusan presented Stannite from Boro Creek, and Mr. D. A. Porter the same mineral from Howell. Messrs. F. Danvers Power and A. E. Stephen collected samples of the phosphatic deposits at Ocean and Pleasant Islands, and added typical examples to our series. A small general collection of Australasian minerals was presented by Mr. R. J. Etheridge.

By exchange, a copy of the Boogaldie Meteorite was obtained from the Technological Museum, Sydney; and one of the Rhine Valley Meteorite from the School of Mines and Industries of South Australia, Adelaide.

Two hundred and nineteen specimens were acquired by donation; four by exchange; and ninety-eight by purchase.

Palæontology.

(The Curator; Mr. W. W. Thorpe, *Mechanical Assistant*).

The principal professional work performed by myself, was the determination in the early part of the year of (*a*) the collection of Queensland Cretaceous fossils, forwarded by Mr. W. H. Blomfield;[18] (*b*) a series of Platyschismæ for the Tasmanian Museum; (*c*) Cambrian Trilobites for the Government Geologist of South Australia; (*d*) Cretaceous fossils from South Australian locali-

18 Etheridge—Report for the Year 1900.—*Rec. Aust. Mus.*, iv., 4, 1901, p 173.

ties, for the same; (*e*) Silurian fossils from Tasmania, for the Government Geologist of that State; (*f*) study of a new genus of Permo-Carboniferous Gasteropoda *(Keeneia)*;[19] (*g*) study of Palæozoic Corals and material prepared for publication; (*h*) a very interesting study of cone-like Stroboli, attached to foliage resembling that of *Phyllotheca*,[20] which adds another form of fructification to those already described as appertaining to this plant; (*k*) study of a Mesozoic Bivalve *(Ctenostreon)* from Western Australia,[21] which, although casually recorded once before, had neither been figured nor described; (*l*) identification of a *Lingula* associated with *Lepidodendron*,[22] marking a well defined horizon in beds believed to be of Upper Devonian age, in the Canobolas section near Orange. Finally some time was given to the study of a series of Cretaceous fossils received from the Government Geologist of Natal; I hope to prepare a report on this collection in the future, but it will take some time.

Our Permo-Carboniferous Mollusca were increased by gatherings made by Mr. W. S. Dun, at Wollongong, and presented by him; and from Tasmanian localities by Mr. T. Stephens, M.A., and Miss G. King. Another tail-core of the Horned Lizard *(Miolania platyceps*, Owen), was received from Mr. J. B. Wilson, of Lord Howe Island, and Molluscan casts from the Phosphatic deposits of Ocean and Pleasant Islands, which appear to be those of living species, presented by Messrs. J. T. Arundel and F. Danvers Power.

An interesting fossil was presented by Mr. Thomas, proving the existence of the genus *Straparolus*[23] in the Lower Marine Series of the Permo-Carboniferous in N. S. Wales. This has been described by me as *S. ammonitiformis.*

Some of the finest examples I ever saw of that very beautiful organism, the Chain Coral *(Halysites)*, were presented by the Rev. J. Milne Curran from a locality near Orange; these I hope to describe at some future date.

Another interesting geological discovery was that by Mr. E. Lowe, of a very refractory and highly fossiliferous limestone, covering a large extent of country around Ravensleigh Station, Gregory River District, Carpentaria. This limestone contains bones of mammals and birds, with land and fresh-water shells of

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19 Etheridge—A new Permo-Carboniferous Genus *(Keeneia)* of Pleurotomariidæ, etc.—*Rec. Aust. Mus.*, iv., 5, 1902, p. 195, pls. xxxii.-xxxiii.

20 Etheridge—Cone-like Strobili, attached to a *Phyllotheca*-like foliage. —*Loc. cit.*, 1, p. 1, pls. i. and ii.

21 Etheridge—*Ctenostreon pectiniformis*, Schlotheim, an Australian fossil. —*Loc. cit.*, 1, p. 13, pl. xiii.

22 Etheridge—*Lingula*, associated with *Lepidodendron.*—*Loc. cit.*, 3, p. 119.

23 Etheridge—A *Straparolus* in New South Wales.—*Rec. Aust. Mus.*, iv., 5, 1902, p. 200, pl. xxxiii., figs. 1 and 2.

existing species. The chief specimen of interest, however, was a partial Crocodile skull that in its present condition is indistinguishable from that of the living coast form, *C. porosus.*

In last year's Report, I referred to some tree-trunks of Cretaceous age, bored by *Teredo*, as forming part of the collection presented by Mr. H. W. Blomfield; this borer has now been described as *Teredo vastitas.*[24]

Two hundred and ninety-six specimens were presented; one hundred and four obtained by exchange; and seventy-eight purchased.

Library.

(Mr. S. Sinclair, *Librarian*; Mr. F. T. Clark, *Assistant*).

The need of more accomodation in the Library for the storage of books, or, to be strictly exact, the need of a larger Library, is beginning to be felt, as well as the want of assistance to register and catalogue, and to supervise the issue and return of books. The books and shelves were thoroughly cleaned during the year.

The acquisitions numbered five hundred and sixty-six volumes, besides pamphlets and unbound parts of periodicals.

The Trustees Exchange List of Corresponding Societies and Institutions now contains about three hundred names, from most of which valuable return exchanges are received. In fact the bulk of the acquisitions to the Library of late years has come from this source, our ability to purchase being very limited.

Office.

(Mr. S. Sinclair, *Secretary;* Mr. F. T. Clark, *Clerk*).

The work of the office, inclusive of correspondence, accounts, and general business, is naturally increasing in proportion to the general work of the Museum, and further clerical assistance is much wanted. All documents and accounts were closed at the end of the year.

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24 Etheridge—Two Undescribed Pelecypoda from the Lower Cretaceous of Queensland, etc.—*Loc. cit.*, p. 201, pls. xxxiv., xxxv.

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RECORDS

OF THE

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R. ETHERIDGE, JUNR., J.P.,

Curator.

SYDNEY, 25TH AUGUST, 1902.

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OCT 6 1902

ADDITIONS TO THE MIDDLE DEVONIAN AND CARBONIFEROUS CORALS IN THE AUSTRALIAN MUSEUM.

By R. ETHERIDGE, Junr., Curator.

(Plates xxxvii. – xl.)

1. MIDDLE DEVONIAN.

Genus DIPHYPHYLLUM, *Lonsdale*, 1845.

(Murchison's Geol. Russia in Europe, 1845, i., p. 622.)

DIPHYPHYLLUM GEMMIFORMIS,[1] *sp. nov.*

(Plates xxxvii., fig. 1; xxxix., figs. 1 and 2; xl., fig. 1).

Sp. Char.—Corallum composed of fasciculate to sub-compound corallites, forming more or less large globose colonies. Corallites radiating from a common centre, comparatively short, but the heighth of the corallum increased by repeated gemmation; straight or slightly flexuous, often laterally united into clusters by a partial union of the walls, but without exothecal outgrowths, circular when single, imperfectly polygonal when united, and with an average diameter of eight millimetres; walls thin; calices deep. Septal area as a very distinct peripheral ring, from a quarter to one fifth the width of a corallite, forming a flat border around each calice; septa 30 – 40, all primary, proximally straight, distally flexuous, delicate, and at times laterally denticulate, extending inwards for about one quarter the width of the corallites. Interseptal loculi occupied either by complete transverse dissepiments forming several cycles, particularly towards the distal portions of the loculi, or incomplete, forming irregular vesicles within the transverse dissepiments, peripheral portions of the loculi sometimes quite devoid of dissepiments, leaving clear spaces. Tabulate area comparatively large; tabulæ very variable both in their distance apart and in character; they may be moderately close, very close, or distant from one another, horizontal, rather oblique, slightly concave, or inosculating, when vesicles are formed, semilunate, lenticular, or even globular in form. Gemmation parietal and frequent.

1 Formed of buds.

Obs.—A remarkable species, of a type simulating, on a cursory examination, the growth of a compound astræiform coral, in consequence of the frequent lateral union of the corallites. When in this condition the latter assume, more or less, a polygonal outline, and such clusters are often of considerable extent. In defining the genus Rominger[2] says :—" The stems [corallites] are rarely in intimate contact so as to form astræiform masses," and from its exceptional nature this species is peculiar. The interspaces between these clusters are occupied by ordinary free and generally smaller corallites, cylindrical in form.

The weathered appearance of this coral is one that at once attracts attention, as the tabulate areas stand well above the general surface, simulating thick columellas, and around them are seen the flat septal areas, the weathering out of the interseptal loculi reducing the septa to a ring of strong radii. One specimen, however, exhibits the actual terminal surface of the corallum, and whilst the flat septal area is still maintained, the calices present a rather deep and pit-like appearance. Whenever the corallites assume the composite condition, the lateral union of the walls is generally, although not always, complete, for at times a dividing line of matrix, more or less continuous, is visible in places.

The corallites may be described in general terms as short, the corallum attaining its height by repeated parietal gemmation, from a parent centre. The corallum is, therefore, at first formed by a series of radiating corallites, which assume gradually a vertical line of growth as the colony approaches maturity. Masses at least six inches in height are thus formed, the largest corallite yet measured having a diameter of nine millimetres.

The proper walls and other tissues are represented in sections by dark lines, backed by a lining of lighter secondary deposit, the wall in each corallite being formed by the confluent peripheral or proximal ends of the septa.

Both transverse and longitudinal sections present some points of great interest. In a transverse section one is struck with the bi-structural nature of the endothecal tissue filling the interseptal loculi. In some instances the loculi are comparatively devoid of tissue at their proximal or peripheral ends, but display several cycles of transverse dissepiments at their inner or distal ends. Or, these partitions may occur regularly throughout a series of loculi, the ordinary dissepimental vesicles so formed being again subdivided in an irregular manner by additional tissue producing a supplementary vesicular tissue. The septa are all primary, and present traces of a distinct lateral denticulation, reminding one of the genus *Heliophyllum*.

[2] Rominger—Geol. Survey Michigan—Report Lower Peninsula, 1873-76, iii., 2, 1876, p. 120.

In viewing a longitudinal section we observe that the peripheral tier of vesicles is often large, followed by two or three tiers of smaller, or the whole septal zone is occupied by four or five tiers of smaller vesicles, all convex upwards, and as a rule semi-lunate in form, although some are quite globular. So marked is this in some corallites that this external zone presents quite the appearance of a *Cystiphyllum.* In certain corallites, although not in all, the " walls " of the innermost tier of vesicles, or that next to the tabulate area, are thickened, presenting the appearance of an inner mural investment, but which is not very apparent in a transverse section.

The larger mass of each corallite is occupied by the tabulæ. These are very variable in character, and in their distance apart from one another. They may be quite distant, moderately close, or very close, in fact quite approximate, and horizontal, oblique, concave, or inosculating, when large and small vesicles are formed, in shape semi-lunate, lenticular, or even globular. Deflection at the edges, when the tabulæ are horizontal, is occasionally present, but never marked. The result of this variability is that, in a horizontal section, an absolutely clear old visceral chamber is the exception ; generally the plane of the latter is occupied by one or more cut edges of tabulæ. For diversity in form of the tabulæ this is one of the most remarkable corals I know of.

In its mode of growth *D. gemmiformis* is quite distinct from any Australian form of the genus hitherto described. It is a larger species than *D. mitchelensis,* mihi,[3] with a greater development of vesicular tissue, and does not possess septa of the second order. It is also distinct from *D. robustum,* mihi,[4] which is larger and possesses secondary septa.

Two American species at least, referred by W. J. Davis to *Diphyphyllum,* assume a composite form of growth, viz., *D. bellis,* Davis,[5] with the general outward appearance of a *Cyathophyllum,* which is even more composite than *D. gemmiformis,* and *D. conjunctum,* Davis.[6] Both are very large and compound Middle Devonian forms.

Loc.—Taemas Bridge Road, north bank of Murrumbidgee River (Aust. Mus.); T. Hughes' selection, Parish of Warroo, Co. Murray, Murrumbidgee River (*C. Cullen*—Geol. and Mining Mus., Sydney); North of Portion 41, Parish of Warroo, Co. Murray, Murrumbidgee River *(C. Cullen—ibid.)*

Hor.—Cave Limestone—Middle Devonian.

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3 Etheridge—Geol. Surv. Vict., Progress Report xi., 1899, p. 30, pl. A., f. 6-8 and 12, pl. B., f. 11.

4 Etheridge—Rec. Geol. Surv. N.S.W., vi., 1899, 3, p. 153, t. 32, f. 1 and 2, t. 37, f. 2.

5 Davis—Kentucky Fossil Corals, pt. 2, 1885, t. 108, f. 2, t. 116, f. 4.

6 Davis—*Loc. cit.,* t. 116, f. 1 - 3.

Genus CYSTIPHYLLUM, *Lonsdale*, 1839.

(Murchison's Sil. System, 1839, p. 691.)

CYSTIPHYLLUM (? MICROPLASMA) AUSTRALASICA, *Eth. fil.*

(Plates xxxix., figs. 3 and 4; xl., figs. 3 and 4).

Cystiphyllum americanum, var. *australasica*, Eth. fil., Geol. Pal. Q'land, &c., 1892, p. 58, pl. 3, f. 13 and 14.

Sp. Char.—Corallum, more or less fasciculate, forming loosely agregated colonies. Corallites long and robust, partially united laterally, or entirely disconnected, with an average diameter of from ten to twenty millimetres, round, oval, or pyriform in section; walls dense and thick, about one to two millimetres. Vesicular tissue strong and copious, filling the entire visceral chambers; vesicles in the peripheral region smaller than those in the centre of the corallites, the former usually sublunate in transverse section, with a long convex face pointing inwards, and two short concave faces outwards, the latter few or many, irregular in size and form, round, oval, or polygonal. Septal striæ sometimes seen on the convexity of the vesicles, more particularly in the peripheral zone.

Obs.—The New South Wales specimens now under description are specifically identical with a coral described by me from the Middle Devonian of Queensland, as above. Of this I am convinced after a re-examination of the type of the latter, and also by an inspection of additional material, both kindly forwarded to me for the purpose by Mr. W. H. Rands.

The corallites are either entirely separate or in partial contact, and long (as much as six inches), cylindrical, or slightly curved. In the former condition they are round, with a maximum diameter, so far as observed, of twenty millimetres. When in contact the outline of the corallites becomes modified to oval, or a peculiar sub-pyriform shape, the contact side often becoming truncated, and the free side gradually swelling out to the normal circular outline.

The walls are more or less thickened, and in some of the vesicles there is a stereoplasmic deposit also, but without obliteration of their original tissue. Septa are not present, but are at times represented by irregularly distributed endothecal striæ on the convex faces of the vesicles forming the general visceral tissue. In sections they appear as cut edges of spine-like ridges, but some corallites are entirely without them. A peculiar development is exhibited within the walls in some cases, the nature of which is by no means clear. This consists of a ring, more or less continuous, of conjoined thickened short protuberances, each having distally a blunt pyramidal end. There is no visible median line in any of these, but the structure of each is in divergent layers from an imaginary central line, having much the appearance of the secondary stereoplasmic thickening one is accustomed to see encasing primary septa in many rugose corals.[7] The absence of this primary line, and the uncertain development of the protuberances, detracts from the latter possessing a septal nature.

The vesicular tissue is clearly separable into an outer and inner tissue. The vesicles forming the peripheral zone are always smaller than those in the centre, and in form are usually semilunar, each with a long convex inner face and two concave outer faces, very much resembling the corallites in some species of *Alveolites*; this peripheral zone is always the wider of the two. Irrespective of their larger size the central vesicles are remarkable for diversity of form, as already explained, the polygonal outline being traceable both in transverse and longitudinal sections.

In one particular corallite there is even a line of demarcation between the two sets of vesicles, caused by the tissue of the inner or convex edges of the innermost circlet of the peripheral vesicles becoming much thickened.

The stereoplasmic investment of the walls when present is dense and structureless, and the same may be said of the layer at times seen within the vesicles, and the line of demarcation in the single corallite just described.

This coral has so far been observed in New South Wales only in limestone masses, from which it has been found impossible to dissassociate it, but Queensland examples from the Reid's Gap Limestone, near Townsville, are sometimes met with in the round and even with traces of the epitheca preserved.[8] This appears to have been concentrically striated. Growth accretion swellings also existed, and at times a sub-pedunculate base.

The relation to *Cystiphyllum* is shown in the highly vesicular nature of the corallites, and the presence of the endothecal spines. On the other hand, if the obtusely conical inward peripheral projections are of a septal nature, hardly possible, however, I think, a transition to *Microplasma* is indicated. The distinction between *Cystiphyllum* and *Microplasma* has been very clearly explained by Dr. Clemens Schlüter, who says that the radially arranged endothecal striations of the former are not the equivalents of the stunted septa around the wall of the latter. If, therefore, the projections described in this coral are not of a septal nature, we are here dealing with a *Cystiphyllum*; if, on the contrary, they partake of the characters of septa, our coral would appear to occupy a position intermediate between the two genera.

Amongst *Cystiphylla* the present species is otherwise allied to *C. cylindricum*, Lonsd. (*non* Edw. and Haime), *C. americanum*, Edw. and H., and similar elongated cylindrical stem-like forms.

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[7] An excellent illustration of this is given by Nicholson (Manual Pal., 3rd Edit., i., 1889, p. 247, f. 127 B. and C.)

[8] Etheridge—Geol. Pal. Q'land, &c., 1892, pl. 3, f. 13.

Loc.—The following localities considerably extend our knowledge of the distribution of this coral:—Fernbrook (Limekilns) near Bathurst (*R. Etheridge*—Aust. Mus.); Isis River, Parish Lincoln, Co. Brisbane (*C. Cullen*—Geol. and Mining Mus, Sydney); Cavan Holding, Parish Cavan, Murrumbidgee River, Co. Cowley (*C. Cullen*—*ibid.*); Quarter of a mile south of Alum Creek, Parish Warroo, Murrumbidgee River, Co. Murray (*C. Cullen*—*ibid.*)

Genus SYRINGOPORA, *Goldfuss*, 1826.

(Petrefacta Germaniæ, 1826, i., p. 75.)

SYRINGOPORA SPELÆANUS,[9] *sp. nov.*

(Plates xxxvii., fig. 2; xxxviii.)

Sp. Char.—Corallum large, composed of loosely aggregated clusters of corallites. The latter are long, at least five inches, often contiguous, parallel to or diverging from one another, united by endothecal outgrowths, or by lateral union of their walls; diameter five and a half to six and three quarter millimetres. Endothecal outgrowths strong and short, with a diameter of one millimetre. Septa small and numerous (at least sixty in a cycle), short, dentate, terminating in fine filaments. Visceral chambers oval or round. Tabulæ very numerous, infundibuliform, the invagination long and deep, very unsymmetrical in section. Lateral budding plentiful.

Obs.—A remarkable and peculiar *Syringopora*, in all probability forming large colonies, the largest specimen seen being a mass seven inches by five and a half. The corallites are either close to one another, or separated by considerable intervals, and are either parallel to or diverge from one another at various angles. They are long (five inches at least), occasionally united by endothecal outgrowths, but more commonly by lateral union of their walls. The diameter is considerable even for a *Syringopora*, from five and a half to six and three quarter millimetres, hence the colonies possessed a strong and robust appearance. Similarly the endothecal outgrowths when present were strong and robust, although short.

Both the septa and tabulæ are numerous, the former peculiar in that, for the diameter of the corallites, their size is remarkably small. The wall of each corallite being rather thickened, the septa present the appearance of very numerous short teeth, each terminating in a short fine filament. Disintegration, apparently before fossilisation, had often removed these acicular terminations, giving to the corallite inner edges a ragged appearance, and reducing the septa to a series of tooth-like projections. The precise number of septa in a cycle is uncertain, but there are certainly

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[9] Association with a cave.

sixty at least. The tabulæ are numerous and strictly infundibuliform, the invaginations being deep, and the "onion-like" rings very unsymmetrical when seen in section.

Lateral union between the corallites by conjunction of the walls is more prevalent than by endothecal outgrowths. Such unions, however, are seldom entirely complete between any two corallites, for union took place irregularly, leaving free interspaces. I figure a good instance of five corallites, more or less united in a chain, but no inter-communication by means of mural pores has been noticed. (Plate xxxviii.)

Like all, or at any rate the majority of the fossils from the Cave Flat Limestone, the tissues of this coral have undergone great change, a point I have elsewhere previously referred to in connection with many of our Palæozoic fossils, particularly corals.

The absence of connecting floors at once readily distinguishes this *Syringopora* from *S. bellensis*, mihi.[10] *S. porteri*, mihi,[11] like its ally *S. auloporoides*, De Kon.,[12] is of a totally different habit and size, to say nothing of the greatly thickened walls and the narrow undivided tube-like visceral chambers. *S. novæ-cambrensis*, mihi,[13] is a Carboniferous form of exceedingly regular growth, with a quantity of equally regular endothecal outgrowths, and is quite distinct from *S. spelæanus*. Lastly *S. syrinx*, mihi, although possessing some points in common with the former, is at once distinguished by the limited number of septa present in its corallites.

In size, and to a certain extent also in mode of growth, there is a resemblance to the Devonian *Syringopora abdita*, De Vern., but the septa in our form are far more numerous.

The exteriors of the corallites are densely covered with Beekite "rosettes," and in consequence the characters of the epitheca are effaced.

Lateral budding is copious, the young corallites immediately assuming the characters of the parent, and in the general mass of the corallum becoming undistinguishable from the more mature tubes.

This form is noteworthy amongst our *Syringoporæ* for the size of its corallites.

Loc.—Cave Flat, Murrumbidgee River (Aust. Mus.)

Hor.—Cave Limestone—Middle Devonian.

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10 Etheridge—Rec. Geol. Surv. N.S.W., v., 1898, 4, p. 149, t. 16.

11 Etheridge—*Ibid*, vi., 1899, 3, p. 176, t. 18, f. 3, t. 31, f. 1 and 2.

12 De Koninck—Foss. Pal. Nouv. Galles du Sud, 1877, 1, p. 76, t 3, f. 1.

13 Etheridge—Rec. Geol. Surv. N.S.W., vi., 1899, 3, p. 177, t. 18, f. 4 and 5, t. 29, f. 1, t. 33, f. 1 and 2.

Genus DESMIDOPORA, *Nicholson*, 1886.
(Geol. Mag., [3], iii., 1886, p. 289.)

DESMIDOPORA NICHOLSONI, *sp. nov.*
(Pl. xl., fig. 2)

Sp. Char.—Corallum apparently forming irregular, lobate, or sub-massive colonies of medium size, presenting on the weathered surface a roughened or rasp-like appearance. Corallites long, tube-like, approximately straight, but here and there gently curved ; walls firmly united, slightly thickened, but not incrassated nor the primordial walls visible. Calices either slightly oblique, semilunar to transversely elongate, irregularly curved or polygonal, occasionally sub-triangular and definitely circumscribed, or as winding and to some extent sinuous grooves, when they often become confluent ; shorter diameter one third of a millimetre, longer diameter a half to one millimetre, but often reaching two millimetres, and in some instances as much as five. Tabulæ numerous but distant, complete, horizontal or concave, seldom oblique, on the same line in contiguous corallites or not. Mural pores large and very irregularly distributed. Fission of tube walls frequent.

Obs.—*Desmidopora nicholsoni* is one of the most interesting Palæozoic corals it has been my good fortune to examine, and is the means of introducing into Australian Palæontology a very unlooked for genus.

The form of the corallum is not fully known, as all the specimens so far observed are fragmentary. The external characters do not appear to have been of a striking nature, but it is in a transverse section that its very peculiar features become apparent. The eye is at once struck with the diversity of form of the corallites. Some are semilunar or sub-triangular, others polygonal, with a longer diameter of half to one millimetre, and definitely circumscribed. Interspersed with these are others of an extraordinary irregularity of outline, becoming more or less extensively confluent, entirely loosing their circumscribed outline, and becoming winding and sinuous, looking like several normal calices run into one ; externally such calices present a more or less vermiculate appearance. These attain a longest diameter of three millimetres, and in some instances of five millimetres. On the other hand the shortest diameter in all the corallites is one-third of a millimetre. Amongst the circumscribed corallites some are triangular, with a long convex and two short concave sides ; others with a convex long side, and two short straight sides of about equal length, interspersed with almost truly quadrangular, lenticular, and sublunar corallites, but always with one diameter greatly exceeding the other.

One remarkable peculiarity was noticed in this coral, a tendency to form spots or areas of small dimensions, from three to four millimetres in diameter, in which the corallites are more than ordinarily irregular, but around which the others do not show any tendency to revolve.

The walls of the corallites are somewhat thickened, but I have not succeeded in detecting any definite trace of a primordial wall.

In a transverse section the fission of the walls is at times very apparent, and is indicated by a projecting inwards of the newly formed wall into the visceral chamber of an old corallite.

In a longitudinal section the oblong visceral chambers are filled with clear calcite, with here and there chalcedonic blebs along the walls. The eye is also struck with the variable diameter of the tubes, arising from causes already explained.

The mural pores are large and very irregularly distributed, and have a longest diameter of one third of a millimetre. The pores appear as oval openings whenever the plane of the section is coincident with that of one or more of the walls, or as gaps in the latter indicated by a break in their continuity.

The tabulæ are, as a rule, distant and variable in direction, being either horizontal, concave, or less frequently oblique. They may be on the same level in contiguous tubes, or strictly alternate, but no satisfactory evidence exists of a tendency on the part of any of them to become vesicular, as in *D. alveolaris*, Nich., " when the section happens to intersect one of the rows of confluent corallites in any direction except a directly transverse one."

I have quite failed to detect any trace of septa, nor have I seen anything at all analagous to the peculiar moniliform structure depicted in one of Nicholson's sections. I would suggest the possibility, nothing more, of these circular or oval bodies being blebs of chalcedony. A similar appearance is at times seen in some of our Palæozoic corals.

Desmidopora was proposed by Nicholson for a Wenlock Limestone coral, nearly related to *Alveolites*, but differing from the latter and other known genera of Favositidæ as follows:—(1.) The primordial wall is entirely wanting. (2.) Some of the corallites are united in sinuous serial rows by a deficiency of their walls on corresponding sides, the calices becoming winding labyrinthine grooves. (3.) Absence of septa, or septal spines. (4.) In the circumscribed corallites the tabulæ are simple, but in the serially united corallites they become vesicular. (5.) Increase by fission.

The Australian coral, I now refer to this genus, agrees with all the above characters, except that the evidence of vesicular tabulæ is not clear.

Named in honour of the late Prof. H. A. Nicholson, M.D., &c.

Loc.—Cave Flat, Murrumbidgee River (Aust. Mus.)

Hor.—The Cave Limestone—Middle Devonian.

CARBONIFEROUS.

Genus Lithostrotion *(Lhuid), M. Edwards and Haime*, 1851.
(Polyp. Foss. Terr. Pal., 1851, p. 432.)

Lithostrotion ? columnare, *Eth. fil.*

Lithostrotion ? columnare, Eth. fil., Bull. Geol. Survey Q'land, No. 12, 1900, p. 18, pl. i., f. 1, pl. ii., f. 1 – 5.

Loc.—Horton River, between Eulowrie and Pal-lal, Co. Murchison *(D. A. Porter*—Aust. Mus.)

Hor.—Carboniferous. ? Gympie Series.

Genus Syringopora, *Goldfuss*, 1826.
(See *ante.*)

Syringopora syrinx, *Eth. fil.*

Syringopora syrinx, Eth. fil., Bull. Geol. Survey Q'land, No. 12, 1900, p. 6, pl. i., f. 6 – 9, pl. ii., f. 11.

Loc.—Pal-lal Station, Horton River, Co. Murchinson (*D. A. Porter*— Aust. Mus.)

The occurrence of the two foregoing species in the Horton River beds is a point of much interest, as it tends to indicate a relation between the latter and the Lion Creek Limestone, at Stanwell, near Rockhampton, Queensland.[14] The two corals now recorded are accompanied by a second *Lithostrotion*, intermediate in its structure between *L. ? columnare*, Eth. fil., and *L. ? arundineum*, Eth. fil.[15] It is a fasciculate form, generally resembling the last named, but with a much larger number of septa, and these invariably united in pairs, each primary with its secondary. The columella is of the type of *L? columnare*, rather than that of *L. ? arundineum.* It may be only a local growth of the former, in which case the characters of *L ? columnare* will require to be enlarged, or, on the other hand, a closer study, when time permits, may prove it to be quite distinct.

I am indebted to Mr. E. R. Waite for the micro-photographs from which the figures are reproduced.

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[14] Etheridge—Corals from the Coral Limestone of Lion Creek, &c., *Bull. Geol. Survey Q'land*, No. 12, 1900.

[15] *Ibid*, p. 19, pl. i., f. 3 and 4, pl. ii., f. 6.

NEW RECORDS OR RECURRENCES OF RARE FISHES FROM EASTERN AUSTRALIA.

By Edgar R. Waite, F.L.S., Zoologist.

(Plates xli. – xliii.)

In the present paper I record three fishes not previously recognised from New South Wales. Food is the chief matter dealt with under *Cetorhinus maximus*, Gunner; a short description is given of a specimen of *Tetragonurus cuvieri*, Risso, taken in our waters; and *Pomadasis hasta*, Cuvier and Valenciennes, is recorded from an example secured in the Richmond River.

A catch of three specimens of *Chimæra ogilbyi*, Waite, is recorded, and descriptions and figures each of *Prototroctes marœna*, Günther, and *Harpe vulpina*, Richardson, are furnished, both species being very rare in our waters.

Finally, a description is published of *Valenciennia longipinnis*, Bennett, from an example taken on the Barrier Reef, Queensland. The nature of the original figure suggested the advisability of re-illustrating the species. I have, therefore, taken great pains with the drawing now offered.

Cetorhinus maximus, *Gunner.*

Squalus maximus, Gunner, Trondhjem. Selskabskr., iii., 1765, p. 33.

To Mr. J. A. Boyd, of Eden, we owe the privilege of first recording this interesting Shark for New South Wales. In May, 1901, this gentleman forwarded a piece of "baleen," which I recognised as portion of the gill of *Cetorhinus*, the shark having been taken in Twofold Bay. On the 14th August following, another Basking Shark entered the bay, and was shot. Its identity was recognised by Mr. Boyd, who watches our interests in this locality, and the specimen was at once forwarded to Sydney. It proved to be a young male, ten and a half feet in length.

The stomach and intestines were found to be charged with food, the whole forming a gelatinous-like substance of a bright salmon colour. Mr. Thomas Whitelegge, to whom I submitted a sample, pronounces it to be composed of the Anomurous Crustacean *Munida subrugosa*, White, commonly called "Whale-food," a term applied to pelagic assemblies of Pteropods or Crustaceans.

The only other Australian example of *Cetorhinus* previously known, was caught in November, 1883, at Portland, on the western coast of Victoria. This specimen was described by McCoy,[1] who writes:—"I find another extremely curious and interesting point, not before noticed, viz., that its food, as with many Whales, is often composed of myriads of the minute, floating, oceanic Pteropodous Mollusca. Of the scores of Basking Sharks that have been opened in the Northern Hemisphere, not one contained any remains of fishes or large objects, and the food was, until now, unknown. Linnæus mentions Medusæ, Pennant suggests sea-weeds, and Mr. Low(e) says he found a pulpy red mass, which he likened to bruised crabs, or the roe of Echini. Neither crabs nor Echini could be obtained by a creature like this, too large to approach the shallow shores, and in all probability what Mr. Lowe saw was what I have here noted, the red pulpy mass filling the intestines of our example being altogether composed of body and shells of a species of the genus *Cuvieria* or *Triptera*, ... the mass being tinted of a 'boiled shrimp' red from the remains of the soft parts, colored like the much larger *Triptera rosea* of Quoy and Gaimard."

With the foregoing passage in mind, I requested Mr. Charles Hedley also to examine the food, and he came to the same conclusion as Mr. Whitelegge and myself, namely that remains of Mollusca were not present, all recognisable matter being crustaceous. No one will doubt the determination of the late Sir Fredk. McCoy, nor likewise the pronouncement of my two colleagues.

The two findings are not, however, as might on first sight appear, at variance, but merely emphasise the fact that *Cetorhinus* is a surface feeder, both the Mollusca and Crustacea, having many pelagic representatives. The shark, passing open-mouthed through a sea of surface life, would be perfectly indifferent as to whether it was composed of Pteropods or *Munida*, and moreover would be incapable of discrimination.

A beautiful illustration of parallel adaptation is furnished by two widely different animals, the Right Whale and the Basking Shark; both feed in precisely the same way upon the same food, and the function of a sieve, performed by the baleen in the whale, is discharged by a curious modification of the gills in the shark.

"The Right Whale—and the following statements apply, of course, to the southern as well as the polar Right Whale—feeds, as is well known, upon minute pelagic creatures. The minuteness of the food led the ancients to the belief that they lived on water only. Pteropods and Crustacea form the bulk of its food, which it has not, therefore, to laboriously collect. The Arctic seas are often dyed for acres with these small floating animals, ...

[1] McCoy—Prod. Zool. Vic., ii., Dec. xi., 1885, p. 11, pl. civ.

and the whale moves through its native element, either below or near the surface, with considerable velocity, its jaws being open, whereby a body of water enters its capacious mouth, and along with it the animalculæ (termed by the whalemen 'Right Whale feed,' or 'Brit.')"—Beddard.[2]

CHIMÆRA OGILBYI, *Waite.*

Chimæra ogilbyi, Waite, Mem. Aust. Mus., iv., 1899, p. 48, pl. vi.

Seven examples of this species, all females, were originally taken off Port Hacking and Botany Bay.

On the 19th July last, an eighth example was brought to the Museum for identification by Mr. A. G. Platé, who found it stranded at Manly; its flesh had been considerably gnawed, presumably by rats, but as its cartilaginous framework was intact, Mr. Platé left it with us. Its skeleton has since been prepared for exhibition in the Museum.

This specimen was also a female, a circumstance the more to be regretted from the fact that, as I afterwards learned, it was one of three examples caught by some fishermen; after death they were returned to the water, and one, as we may reasonably suppose, was cast up on to the beach at Manly. We usually imagine that the fish lost is finer than the one hooked, so we may grieve to think that at least one of the two examples not recovered might have been a male.

PROTOTROCTES MARÆNA, *Günther.*

(Plate xli.)

Prototroctes marœna, Günther, Cat. Fish. Brit. Mus., v., 1864, p. 382.

In March, 1901, I recorded this species for the first time from New South Wales.[3] The specimen was obtained near Mount Kosciusko, in the upper reaches of the Snowy River. This river joins the ocean in Victorian territory.

Now, however, I am able to chronicle it from a river wholly within our borders. On October 25th following, the Fishery Commissioners sent for determination an example taken in the Shoalhaven River, near Berry, eighty miles south of Sydney.

The accompanying figure represents this specimen, from which also the following description is derived.

B. 7; D. 12; A. 18; V. 7; L. lat. 78; L. tr. 7 + 13.

Length of head 5·1, height of body 4·2 in the total length. Diameter of eye 4·6, and length of snout 3·3 in that of the head, equal to the interocular space, which is convex. The head is small, conical, and compressed; the upper jaw is the longer, and

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2 Beddard—A Book of Whales, 1900, p. 131.
3 Waite—Rec. Aust. Mus., iv., 1901, p 53.

slightly produced at the margin; the lower jaw is very acute; the cleft of the mouth sub-horizontal; the maxillary narrow and extending to beneath the anterior margin of the eye. The nostrils of each side are close together, rather nearer to the eye than the end of the snout. The subopercle is moderately developed, but the interopercle is very small and fails to cover the branchiostegals. A single series of small teeth in each jaw, on the vomer and palatines.

The body is compressed, becoming more so posteriorly, and below, especially behind the ventrals: it is elongate, evenly and similarly curved above and below.

The dorsal fin commences midway between the end of the snout and the middle caudal rays, and is one-fourth higher than long; the first divided ray is the longest, the others regularly decrease to the last, which is less than half the length of the longest; the adipose fin lies much nearer to the base of the caudal than to the dorsal, its length equals the diameter of the eye. The anal commences beneath the dorsal rays, when depressed, and extends to beyond the adipose fin; its length is slightly greater than its height, and its anterior rays equal to those of the dorsal. To these the pectoral is also nearly equal, its upper rays are the longest. The ventral is situated wholly in front of the dorsal; it is rather shorter than the pectoral. The caudal is equal in length to the head, it is forked, with the lobes equal. The peduncle is strongly compressed, its height equal to twice the diameter of the eye.

Scales.—The whole head is naked, and on the occiput is sharply defined from the scaly body. The scales are of moderate size, thin and cycloid. The lateral line is traceable only on the hinder half of the body, being well pronounced posteriorly, but not apparent in advance of the ventrals; it occupies a median position.

Colours.—Head and body above, olive, this colour separated from the yellowish tint of the lower surfaces by a dark grey streak, about half-an-eye diameter in width, passing the whole length of the body in a median position. On this streak the lateral line is placed. All the fins colourless, the dorsal fin has a dark band running along its middle.

Length of specimen, 200 mm.

I may be unfortunate in having drawn what I believe to be a slightly abnormal specimen, though the only feature in which this is apparent is in the number of dorsal rays; there are twelve instead of the previously described ten, the latter number also found in our Snowy River example. As, however, rays are liable to vary in number, and much more so than spines, such a difference is of small account; moreover the anterior rays are so very close together that any addition to the length of the fin would be inappreciable.

A more serious difference, but one not shown in the figure, is in the number of branchiostegal rays. In the Shoalhaven River specimen there are seven; in the type, and also in that from the Snowy River, they number but six.

Günther states that there is no lateral line. If the type were re-examined possibly some indication would be found, as an incomplete one exists in both our specimens.

Apart from these points, and slight variation in the length of the head, etc., I do not see any differences between our specimen and the type as described; certainly, with an almost typical specimen from the Snowy River—an intermediate locality—any thought of regarding the Shoalhaven River fish as specifically distinct from the type would be unwarrantable. It would, however, be interesting if Zoologists in Southern Australia and Tasmania would ascertain to what extent the species varies in their waters.

In Tasmania, where it is very common, this fish is known as the Grayling—a name also applied in New Zealand to the second species of the genus, *Prototroctes oxyrhynchus*, also described by Günther,[4] and figured by Hector.[5]

TETRAGONURUS CUVIERI, *Risso.*

Tetragonurus cuvieri, Risso, Ichth. Nice, 1810, p. 347, pl. x., fig. 37.

The specimen noticed below is the first record of the species for continental Australia. From Lord Howe Island two examples have been made known. The first was described and figured by Macleay[6] as *Ctenodax wilkinsoni*, the author afterwards publishing its generic identity with *Tetragonurus*.[7] The second example was obtained in 1887, by members of the Museum collecting party. These two specimens formed the subject of Ramsay and Ogilby's paper, "On the Genus *Tetragonurus* of Risso."[8] These authors, on comparison with a specimen from the Mediterranean, came to the conclusion that whereas the Pacific and Atlantic forms were specifically identical, those from the Mediterranean could not be so regarded until further examinations had been made. The attitude of the authors is expressed by one of them[9] using Lowe's name of *T. atlanticus* for local specimens instead of Risso's *T. cuvieri*, first applied to an example from Nice.

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4 Günther—Proc. Zool. Soc., 1870, p. 150.

5 Hector—Edib Fish. New Zealand, 1872, p. 123, pl. x., fig. 91.

6 Macleay—Proc. Linn. Soc. N.S.W., x., 1885, p. 718, pl. xlvii.

7 Macleay—*Loc. cit.*, (2), i., 1886, p. 511.

8 Ramsay and Ogilby—Proc. Linn. Soc. N.S.W., (2), iii., 1888, p. 9.

9 Ogilby—Aust. Mus. Mem., ii., 1889, p. 61.

On September 21st last, an Italian fisherman, plying his trade at Narrabeen, brought us a fish which I recognised as *Tetragonurus*. He remarked that though he had not noticed anything like it here before, he was sure he had seen the same fish in the Mediterranean, off the Lipari Islands.

The species is subject to considerable variation; the number of dorsal spines ranges from fifteen to twenty-one, the relative position of the fins is not constant, while the colour is either brown or black.

While a detailed description is unnecessary, the following general features of the New South Wales specimen may be useful.

D. xviii. 13; A. ii. 10; V. i. 5.

Length of head 4·9, height of body 7·3 in the total length. The eye, which is 4·7 in the length of the head, occupies a more posterior position than in the examples from Lord Howe Island; in these the length of the snout equals the diameter of the eye, in mine it is fully one-half longer.

The teeth in each ramus of the upper jaw number twenty-four, in the mandible thirty.

The dorsal fin commences well behind the end of the pectoral, the distance between its origin and the tip of the snout being contained 2·9 times in the total length. In the Lord Howe Island examples, the corresponding figure is 3·7, and the fin arises above the middle of the pectoral. In these the distance between the last anal ray and the base of the caudal, is four-fifths the length of the head, but equal to the head in my specimen. In this also the ventral fin has a much more posterior insertion.

Colour.—The colour is black, equally so below and above; when fresh each scale was shot with violet and gold; the iris is blue.

Length of specimen 256 mm.

In many fishes variations such as those above indicated would be held to constitute specific differences, yet if we examine other descriptions of this fish we shall find even greater disparity. On the other hand, complete intermediate conditions are described, so that with *T. atlanticus*, Lowe, *T. wilkinsoni*, Macl., is correctly sunk as a synonym of *T. cuvieri*, Risso.

The range of the species may be stated as Mediterranean, Atlantic (Madeira, and Wood's Holl, Massachusetts, U.S.A.), and South Pacific (Lord Howe Island, and coast New South Wales).

The following are the original references to the names bestowed:

Tetragonurus cuvieri, Risso, Ichth. Nice, 1810, p. 347, pl. x., fig. 37.

Tetragonurus atlanticus, Lowe, Proc. Zool. Soc., 1839, p. 79.

Ctenodax wilkinsoni, Macleay, Proc. Linn Soc. N.S.W., x., 1885, p. 718, pl. xlvii.

Tetragonurus wilkinsoni, Macleay, *loc. cit.*, (2), i., 1886, p. 511.

Pomadasis hasta, *Bloch.*

Lutjanus hasta, Bloch., Ichtyol., vii, 1797, p. 87, pl. ccxlvi., fig. 1.

For Australia, this species was first recorded from Cape York and the northern coasts. Of its occurrence on the east coast of Queensland, Saville Kent writes:[10] "The javelin fish, *Pristipoma hasta*, which grows to a considerable size, and is much esteemed for food, occurs plentifully northwards from Rockingham Bay, and has been collected by the author . . . . as far west as Port Darwin and the Cambridge Gulf. This fish is also known locally as the 'Queensland Trumpeter,' with reference to the grunting noise it makes on being taken from the water."

A beautiful example, taken from the Richmond River, enables me to add the species to the fauna of New South Wales. It was sent to the Sydney Fish Market on July 17th last, and rescued by one of the Inspectors of the Fisheries Department. It was forwarded to the Museum for identification by Mr. J. A. Brodie, Chief Inspector.

Harpe vulpina, *Richardson.*

(Plate xlii.)

Cossyphus vulpinus, Rich., Proc. Zool. Soc., 1850, p. 287.

This species appears to have been but once noticed since first described. Castelnau[11] gave it a place in his list of Port Jackson fishes; but Ogilby,[12] doubting the record, remarked: "No proof of its occurrence is adduced." The original of the species was a dried skin from which the colour had faded. In his Catalogue, Günther[13] treated it as insufficiently described, though with his usual care Richardson recorded all the features such a poor specimen presented.

In June, 1887, as I learn from the Museum register, a specimen then identified as *Cossyphus vulpinus*, and taken in Port Jackson, was purchased by the Trustees. No description of the specimen was published, and as the example was stuffed, it is not now suitable for the purpose; I am, however, able to verify the identification.

We are indebted to the Fishery Commissioners for a recent example; the fish was forwarded for identification, and afterwards purchased for the National Collection. It was obtained in the Sydney Fish Market, on July 17th, 1901, having been sent there with a consignment of fish from the Richmond River.

The type specimen was taken in King George's Sound; I now verify the Port Jackson locality, and add that of the Richmond

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10 Saville Kent—Great Barrier Reef, 1893, p. 281.

11 Castelnau—Proc. Linn. Soc. N.S.W., iii., 1879, p. 354.

12 Ogilby—Cat. Fish. N.S.W., 1886, p. 44.

13 Günther—Brit. Mus. Cat. Fish., iv., 1862, p. 102 (foot-note).

River. The fish is in splendid condition, and I take the opportunity of supplying the accompanying description and figure.

D. xii. 10; A. iii. 11; V. i. 5; P. 16; C. 12+4; L. lat. 34; L. tr. 5+14.

Length of head 3·1, height of body 3·0, length of caudal 4·2 in the total length (caudal excluded). The eye is 4·8 in the length of the head; the interorbital space is slightly convex, one-sixth less than twice the diameter of the orbit; the snout is not pointed, its length scarcely twice the diameter of the same. The nostrils are widely separated, the distance between them being half the diameter of the eye; the anterior opening is minute, situate in a small smooth area, the posterior larger, neither with raised margin. Upper profile of head a low curve, slightly tumid between the posterior nostrils. Jaws equal, each with two pairs of anterior canines; the lateral teeth are similar, but much smaller, four or five in each ramus of the upper and seven in the lower jaw, within these is an osseous ridge bearing a number of granular teeth; these ridges terminate anteriorly, each in a flattened plate bearing granular teeth; a canine tooth at the angle of the upper jaw. Cleft of mouth horizontal, the maxilla is concealed by the pre-orbital and extends to beneath the anterior margin of the eye.

The dorsal fin commences above the upper angle of the pectoral; the membrane extends beyond the spines and is thickened towards the tip, the point of the spine piercing its front margin; the length of the first spine equals the diameter of the eye; the spines regularly increase in length to the sixth, whence they are subequal, the longest spine one-half longer than the first, and equal to the first ray, which is less branched than the others; the sixth ray is the longest, one-half longer than the longest spine; the soft dorsal is produced backwards. The base of the spinous is more than twice the length of that of the rayed portion. The anal commences beneath the penultimate dorsal spine, and terminates slightly behind that fin; the spines are much stronger than those of the dorsal, and are similar in respect to the membrane; the third spine is the longest, to which the rays are equal, the last two excepted, and twice the diameter of the eye; the shape of the fin is similar to that of the soft dorsal; the ventral fin arises beneath the lowest pectoral ray and reaches to the vent, its length 1·5 in that of the head, the length of the spine equal to that of the longest dorsal. Pectoral acute above and rounded below, extending to beneath the twelfth scale of the lateral line, its length 1·6 in that of the head. Caudal truncate, the height of the peduncle 2·2 in that of the body.

Scales.—Snout, preorbital, interorbital space, and chin, naked; six rows of small scales on the cheek; dorsal and anal fins with a basal scaly sheath, larger at the rayed portion. Curvature of lateral line very low, the tubes simple, directed upwards.

Colours.—General colour of head and body bright red, lighter beneath; a yellow spot above the lateral line, below the 8 – 10 dorsal spines and another on the caudal peduncle immediately behind the dorsal rays; scales at the base of the tail with purple spots. The membrane of the first three dorsal spines wholly black, each successive spine bears less black, it occupying the upper portion, so that the last spine is merely tipped with black; the remaining portion of the fin is red; between the fifth and sixth ray and on the basal half is a dark purplish-red blotch: all the other fins red.

Length of specimen 390 mm.

Most of the differences observable between the above description, and that by Richardson, may be accounted for by the different conditions of the respective specimens. In the original description the number of lateral teeth is given as six on each maxillary and fourteen on each limb of the lower jaw: the number of these teeth possibly varies a little. The difference between the series in the upper and lower jaw, however, is so unusual that I am inclined to think the number fourteen includes both mandibles, more especially as I count seven teeth on each side in our example.

VALENCIENNIA LONGIPINNIS, *Bennett.*

(Plate xliii.)

Eleotris longipinnis (Bennett), Beechey, Voy. Blossom, Zool., 1839, p. 64, pl. xx., fig. 3.

This fish was first described in 1839 from Loo Choo. Bennett does not appear to have seen a specimen, his account being based upon a drawing, and on notes by Messrs. Lay and Collie. The latter are very accurate, but the drawing, to judge from the reproduction, is crude and faulty; the fish, however, presents such striking features that the illustration is easily recognisable. In his Catalogue, Günther[14] treats it as insufficiently described; but in the 'Fische der Südsee,'[15] he recognises and describes an example from Fiji. He also mentions that it is found in different parts of the East Indian Archipelago, observations possibly made by Bleeker, whose paper[16] I am, however, unable to consult.

From Mr. Charles Hedley the Trustees have received a small collection of fishes taken at Green Island, an outlier of the Barrier Reef, off Cairns, Queensland. Included is an example of *Valenciennia longipinnis*, and I embrace this opportunity to re-describe and re-figure the species. The specimen is a female in full roe, and differs from the male mainly in having the fins less produced; the colour markings appear to be very similar in both sexes.

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14 Günther—Cat. Fish. Brit. Mus., iii., 1861, p. 105 (foot-note).
15 Günther—Journ. Mus. Godeffroy, v., 1876, p. 190.
16 Bleeker—Versl. en. Med. Akad. Amsterd., 1876.

D. vi. i. 12; A. i. 12; P. 21; V. i. 5; C. 13 + 6.

Head large and broad, its length 3·6 in the total (exclusive of the caudal); height of body 4·9, and length of tail 2·4 in the same. The eye is set close to the upper profile, its diameter one-fifth the length of the head, the inter-orbital space being one-sixth, and the snout one-half of the same. The nostrils are rather close together, the anterior in a low tube, the posterior one a simple pore and situated twice as far from the eye as from the anterior one. Profile of head parabolic, it is extremely declivous from before the eye to the snout, almost horizontal from the same point to the origin of the dorsal fin. Jaws equal, with protruding lips, mouth horizontal, the maxilla extending to beneath the posterior nostril. Teeth needle-like, in a double row in front, with canines at intervals, becoming larger laterally, but not continued on to the sides of the jaws; the dentition of the lower is stronger than that of the upper jaw; the upper teeth are separated from the oral cavity by a broad deep transverse membrane; a similar but smaller membrane exists in the lower jaw.

The dorsal fin commences immediately behind the insertion of the pectoral; the first spine is a fifth longer than the diameter of the eye; the succeeding spines regularly increase in length to the fifth, which is the longest and equal to the height of the body, all are very weak and their extremities flexible. The membrane is barely united to the base of the spine of the second dorsal; this spine is longer than the first of the anterior fin, but a little shorter than the succeeding rays, which are subequal, and two-thirds the height of the fifth spine; the length of the base is not twice that of the spinous portion, and its rays form a very acute angle behind, which reaches slightly beyond the base of the caudal rays. The anal commences beneath the first dorsal ray and terminates evenly with that fin; its rays are similar to those of the dorsal, but are a little lower anteriorly and higher behind. The ventrals arise almost from a common base, and are short, the fourth ray being but 1·3 in that of the pectoral; they reach three-fourths their length to the vent. Anal papilla small. The pectoral has a broad muscular base, it is sublanceolate in shape, the central rays being the longest, reaching to beneath the spine of the second dorsal fin, and 1·4 in the length of the head. The caudal is evenly acuminate, its length one-half longer than the head; its central rays are produced, being more than twice the length of the outer ones; the depth of the peduncle is 1·8 in that of the body.

Scales.—Head entirely naked, the upper anterior body scales are extremely small and incomplete; posteriorly and below the scales are well defined and larger; there are about one hundred and forty longitudinally and forty transversely; there is no lateral line.

Colours.—The snout and anterior part of the head above are grey, dotted with dark blue; the cheeks and opercles green, crossed by three horizontal blue lines—the uppermost (close below the eye) is wholly blue, the middle one has a white line below it, and the lowest, one above it; the throat is yellow, with blue markings; inside the mouth is jet black, and the transverse membranes brilliant orange. The hinder part of the head and upper part of the body is grass-green above, yellow on the sides, and paler beneath. The body bears four longitudinal red lines, the two lowest passing from head to tail in the upper half; the upper line runs off below the fourth dorsal ray, while the next line is continued along the upper edge of the caudal pedicle, where it merges into its fellow; both these arise from behind the eye. The upper part of the body is marked by eight transverse dark-green bars, some of which are separated by another, less defined. Of the principal bars, the first passes in front of the dorsal fin, the next two at its base, the four succeeding below the rayed portion, and the last on the caudal peduncle. The second, fourth, sixth, seventh, and eighth are irregularly produced on to the middle of the side, where they each form a striking mark; this consists of a large deep red blotch, almost surrounded by a blue line, but incomplete above where the red colour merges into that of the green bar. There are two or three rows of blue spots between each body mark. All the fins are hyaline, marked as follows:—The third, fourth, and fifth dorsal spines are tipped with orange, the fourth surmounted by a black line; this fin is obliquely crossed by eight pink lines; the second dorsal carries on its basal half, three rows of dark-edged blue ocelli, and a yellow intramarginal band, the anal a sub-basal orange band and a yellow intramarginal one; the base of the pectoral is pink, with three longitudinal blue streaks, and on its inner side a large black blotch; the rays cover the first red body-blotch. Tail, with ocelli like those of second dorsal, but larger, two orange patches at its base, and a dark-grey sub-marginal border.

Length of specimen, 153 mm.

Attention may be drawn to a slight difference between Dr. Günther's description and my own: this author states that the cleft of the mouth (mundspalte) extends to beneath the middle of the eye; in our example it fails to reach it; the other differences are doubtless sexual. Bennett (Lay) makes mention of the flat yellow membrane between the tongue and the lower row of teeth, but has overlooked the larger membrane in the upper jaw, which is capable of being laid back to the roof of the mouth. The nature and position of these membranes forcibly suggest luminosity during life, an idea heightened by the circumstance of the whole interior of the mouth being of jet black colour, a character also recorded by Bennett, and a feature frequently associated with luminous organs in the region of the mouth.

This species differs generically from the typical Eleotrids, and as Bleeker has identified it with his genus *Valenciennia*, I have no choice but to accept his ruling.

NOTES ON LENDENFELD'S TYPES DESCRIBED IN THE CATALOGUE OF SPONGES IN THE AUSTRALIAN MUSEUM.

By Thomas Whitelegge, Zoologist.

Recent investigations have demonstrated that a large proportion of the descriptions contained in the "Catalogue of Sponges" are inaccurate, and also that the names attached to some of the exhibited types are calculated to mislead rather than assist the inquiring student. Under the circumstances I have been urged to undertake a revision of the species described in the above-mentioned work. The task is beset with many difficulties, somewhat thankless in its nature, and far from being agreeable. In the interest of science it is highly necessary that such a revision should be immediately instituted, in order to prevent further confusion in the nomenclature of our sponge fauna. In undertaking this revision I am fully cognisant of the difficulties presented. In order to render the work reliable, I resolved to examine all the material available, and to take nothing for granted. The course pursued is the same as that adopted in the Report on Sponges from the Coastal Beaches of New South Wales,[1] *i.e.*, to ascertain the whole of the characters of any given specimen before consulting the description, notwithstanding the fact that many of the specimens were obviously wrongly named. In almost every case at least two or more sections have been examined, the spicules measured *in situ*, and in doubtful specimens the spicules have been boiled out and carefully measured in the free condition. It is rather a peculiar coincidence that so many of the wrongly identified examples should bear such appropriate specific names. A few instances will serve to illustrate this point. Thus there are two specimens labelled *Placochalina pedunculata*, var. *mollis*, these upon examination proved to be (1) *Chalina palmata* and (2) *Clathria tenuifibra*. The first named consists of a series of flat lamellæ, which are intricately folded, and the specimen bears the manuscript name of *Placochalina reticulata*. The second form

[1] Whitelegge—Rec. Aust. Mus., iv., 2, 1901.

has been neatly perforated by a boring Isopod, and hence it is labelled *Placochalina porosa.* *Antherochalina dura* is represented by a specimen of the cake-shaped *Chalina globosa*, and appears under the manuscript name of *Suberochalina panis.* The following cases will convey to the reader some idea of the difficulties met with, and also of the confusion revealed by the examination of this collection. I may here remark that the examples are not all regarded as types, although it is possible some of them may be portions of the actual type specimen.

There are three examples bearing the name of *Antherochalina perforata*, two in the exhibited collection and one from the British Museum. The spicules in the original diagnosis are given as "oxea 0·09 mm. long and 0·003 mm. thick." A specimen from Port Phillip (No. 292) agrees with the figure and description in every point except one, and that is that the spicules are *styli* 0·09 to 0·11 mm. long and 0·003 to 0·004 mm. thick.

The British Museum specimen from Broughton Islands, New South Wales,—which is the original habitat given for the type,—is too fragmentary to afford any characters except those pertaining to a section. The spicules present are—*(a)* stout styli, 0·1 to 0·15 0·01 mm.; *(b)* slender tylostyli, over 0·2 mm. long and 0 003 by mm. in diameter; *(c ?)* I have also observed spicules which may be echinating styli, about 0·06 mm. long. No. 315, the third specimen, is identical with the following species.

There are also three examples bearing the name of *Anthero-chalina frondosa*; two of these agree with the figure and the description. The spicules are described as "curved styli, 0·3 mm. long, and 0·016 mm. thick." In our specimen, and also in that from the British Museum, there are at least three other forms of spicules present—*(a)* curved strongyla, *(b)* slender oxea and styli, and *(c)* minutely spined echinating styli, with blunt spinose apices. The third example (No. 329) is identical with *Reniera dendyi.*

With regard to the above, I feel convinced that the Port Phillip specimen of *A. perforata* is correct, and by adding the word styli in place of oxea, the description and the specimen would be brought into full accord. But there remains the specimen from Broughton Islands, which is probably a species of the genus *Clathria.*

The case of *A. frondosa* is not so simple, inasmuch as the description requires three kinds of spicules adding, one of which indicates that the species belongs to the Ectyoninæ, and not to the Chalininæ. The Museum specimen resembles the figured type so closely that it requires close inspection to be sure that it is not the example figured. The sponge is described as being "longitudinally folded lamella;" it is possible that our example is half of the original specimen, since it bears evidence of having been longitudinally bisected. The habitat is stated to be Eastern Australia, from the data in the register. Western Australia is probably the habitat of this species.

If any justification were needed for the views expressed in the present or preceding papers, the examination of the species included in this contribution fully vindicates the writer's position, and proves the urgent necessity for a complete revision of the Lendenfeldian species, not only the species described as new in the "Catalogue of Sponges," but also those described in the Zoologische Jahrbücher in 1887.

This chaotic condition of a collection of types is very unsatisfactory, and in many cases there is no hope of reducing the species to order without the aid of additional specimens. It is a pregnant fact that Prof. Arthur Dendy's donation contains authentic representatives of types described in the "Catalogue of Sponges," but not found in the Museum collection, the names of which cover some other sponge. Prof. Dendy's presentation consists of specimens received from the British Museum, and it is therefore possible that the types of others wrongly represented in the collection may also be there. The material examined and described in the following pages includes the species enumerated in the Catalogue of Sponges, from pages 78 to 91.

The following list contains thirty-two species and varieties represented by fifty-two specimens, twenty-two of which are from the British Museum collection; out of the fifty-two specimens, fourteen agree with the descriptions, fifteen are wrongly named, and the remainder are at variance with the diagnosis, either in the dimensions or the kind of spicule present. In some cases the discrepancies are great, in others small, but in any instance the inaccuracy is sufficient to lead the investigator astray, and thus prevent a satisfactory identification of the species by means of the description. Many of the forms included in the list remain unaffected as species. For instance, *Antherochalina perforata* is represented by three examples, two of which bear labels in the author's handwriting; the third is from the British Museum, and was probably named by the author of the species. Only one out of the three agrees with the figure, and this example possesses stylote spicules, whereas the type is said to have oxea. There still remains a doubt as to what particular sponge was described under the above name. Considering the confusion at present existing in the nomenclature of Australian sponges, I decided to avoid altering any names except those affecting the generic position of the species; in these cases their proper place is indicated in the text. The manuscript and specimen numbers of all the examples in the Lendenfeldian collection are given under each species.

LIST OF SPECIES DEALT WITH, SHOWING RESULTS OBTAINED.

A, Australian Museum specimen; B, British Museum specimen.

Species marked with an asterisk (*) agree with the description; those marked with a dagger (†) are wrongly named.

		Species.	Spicules as described.	Spicules actually present.
		Sub-family RENIERINÆ.		
	A	*Reniera collectrix*	oxea and styli	oxea
	B	,, ,,	oxea and styli	oxea
*	A	,, *australis*	oxea	oxea
*	B	,, ,,	oxea	oxea
	A	,, *megarrhaphea*	oxea	oxea and styli
†	B	,, ,,	oxea	oxea
	A	,, *pandœa (Rhaphisia)*	styli	oxea and rhaphides
		,, *lobosa* (not represented)		
	A	*Petrosia hebes*	oxystrongyla	oxystrongyla, strongyla and oxea
	B	,, ,,	oxystrongyla	ditto
	A	*Halichondria rubra (Rhaphisia)*	oxystrongyla	oxea and rhaphides
	B	,, ,, var. *tenella*	....	....
	A	,, *mammillata*	oxystrongyla 0·25 mm. long	oxystrongyla 0·1 mm. long
†	B	,, ,,	....	foreign spicules
	A	,, *clathriformis*	oxystrongyla 0·33 mm. long	oxystrongyla 0·09 to 0·11 mm. long
†	B	,, ,,	....	oxea and rhaphides
	A	*Reniochalina stalagmites*	oxea	oxea and styli
	B	,, ,,	oxea	oxea and styli
	A	,, *lamella*	oxea and styli	oxea and styli
		The above form is identical with *Reniochalina stalagmites.*		
		Sub-family CHALININÆ.		
*	A	*Chalina globosa*	oxea	oxea
*	B	,, ,,	oxea	oxea
*	B	,, *subarmigera*	oxea	oxea

LIST OF SPECIES DEALT WITH, SHOWING RESULTS OBTAINED—*Continued.*

A, Australian Museum specimen; B, British Museum specimen.

Species marked with an asterisk (*) agree with the description; those marked with a dagger (†) are wrongly named.

		Species.	Spicules as described.	Spicules actually present.
	A	*Chalinopora tenella*	oxea 0·14 mm. long and 0·004 mm. thick	oxea 0·1 mm. long and 0·002 mm. thick
	A	„ *lamella*	oxea 0·11 mm. long and 0·004 mm. thick	oxea 0·8 – 0·9 – 0·002 – 0·004 mm.
	B	„ „	...	oxea 0·7 – 0·8 by 0·002 mm.
†	A	„ *siphonopsis*	styli 0·14 mm. long by 0·003 mm. thick	oxea 0·08 by 0·0055 mm.
	B	„ „	...	oxea 0·09 – 0·1 by 0·0015 to 0·002 mm.
*	A	*Cladochalina euplax*	oxea 0·07 – 0·002 mm.	oxea 0·07 – 0·002 mm.
*	B	„ „	...	...
†	A	„ *mollis*	oxea 0·077 – 0·0017 mm.	oxea, strongyla, styli, and foreign spicules.
†	B	„ „	...	oxea 0·07 – 0·004 mm.
†	A	*Chalinella tenella* The above is a Horny Sponge.	...	...
	B	*Chalinella tenella*	oxea 0·33 mm. long	oxea 0·07 mm. long
*	B	*Challinissa elongata*	oxea	oxea
*	A	„ *elegans*	oxea	oxea
*	B	„ „	oxea	oxea
*		„ *communis*	oxea	oxea
*	B	„ „ var. *flabellum*	oxea	oxea
*	A	*Pachychalina manus*	oxea 0·059 – 0·005 mm.	oxea 0·05 – 0·06 by 0·004 – 0005 mm.
†	B	„ „	...	oxea 0·07 by 0·004 and also 0·08 by 0·005 mm.
†	A	„ „ The above appears to be similar to *Euchalina exigua.*	...	...
†	A	*Ceraochalina multiformis*, var. *dura* This is a specimen of *Thalassodendron viminalis.*	...	...
*	B	*Ceraochalina multiformis*, var. *dura*	oxea	oxea

LIST OF SPECIES DEALT WITH, SHOWING RESULTS OBTAINED—*Continued.*

A, Australian Museum specimen; B, British Museum specimen.

Species marked with an asterisk (*) agree with the description; those marked with a dagger (†) are wrongly named.

		Species.	Spicules as described.	Spicules actually present.
†	A	*Antherochalina perforata* .... The above is identical with *Antherochalina frondosa*	....	....
	A	*Antherochalina perforata*	oxea 0·09 – 0·003 mm.	styli 0·09 – 0·011 by 0·003 – 0·004 mm.
†	B	„ „	....	styli, tylostyli, and probably echinating styli
	A	„ *frondosa*	styli....................................	styli, strongyla, oxea, and echinating spined styli
	B	„ „	....	ditto
†	A	„ „ .... The above example is identical with *Reniera dendyi*	....	....
†	A	*Antherochalina dura*........................ .. This example is identical with *Chalina globosa.*	....	....
†	A	*Placochalina pedunculata*, var. *dura*... .... This example is *Pachychalina punctata.*	....	....
		Placochalina pedunculata, var. *pocula* .... Not represented in the collection.	....	....
	A	*Placochalina pedunculata*, var. *mollis*	....	....
	A	.... There are two examples under this name— (1) *Chalina palmata.* (2) *Clathria tenuifibra.*	....	....

Family HOMORRHAPHIDÆ

Sub-family RENIERINÆ.

Reniera collectrix, *Lendenfeld.*

The type (No. 477) has been compared with a fragment from the British Museum; it is massive, with an irregular upper surface and has several points of attachment at the base. The length is 160 mm., the breadth 100 mm., and the height is about 60 mm. The texture is hard and tough. The colour externally is a dirty white, and the cut surface is marked by a series of irregular lines of a dark brown or black in shade, which indicate the course of the foreign bodies. The latter consist of fragments of various species of *Crisea*, together with a few sand grains and bits of zoophytes. The stems of *Crisea* are very abundant throughout the sponge, and perfect specimens are attached to the outer surface. In longitudinal section it exhibits large areas of sarcode, with scattered foreign bodies, often wide apart. In the clear spaces a few proper oxeote spicules are scattered here and there, but rarely exhibit "strings of single spicules, which are attached to each other by their ends;" in some parts near the surface they occur in irregular tracks about 0·7 wide, and are disposed at all angles to each other. The spicules are described as "oxea and styli, the former more numerous than the latter;" but the various sections failed to yield any styli that I could regard as proper to the sponge. The dermis, besides containing abundant oxea similar to those in the ground substance, exhibits scattered sphærasters, triradiates, tylota, and styli, the latter of very variable dimensions and probably of foreign origin.

A fragment of the sponge was boiled in nitric acid; the residue when examined did not reveal any styli that might be safely regarded as belonging to it. The spicules are oxea 0·1 to 0·13 mm. long, and 0·005 mm. in thickness.

Reniera australis, *Lendenfeld.*

Reniera australis, Whitelegge, Mem. Aust. Mus., iii., 2, p. 324.

Spicules, oxea 0·12 by 0·004 mm.

Reniera megarrhaphea, *Lendenfeld.*

The type of this species (No. 385) now measures 60 mm. in height, 40 mm. in breadth, and 25 mm. in thickness; originally it was probably much larger; in its present condition it exhibits three cut surfaces. The texture internally is firm, open, and breadlike. The dermis (to the unaided eye) is smooth, porous, and finely reticulated, but rather harsh to the touch.

The primary fibres are 0·2 mm. in diameter, and about the same or less apart. The secondaries vary greatly; when in the form of distinct fibres they are usually about 0·05 in diameter.

The mesh is oval or elongate, and is from 0·2 to 0·3 mm. wide. The main fibres consist of very dense bundles of oxeote spicules, with a few large, and numerous small, styli; the latter are generally disposed at right angles to the fibres, and project beyond their limits; they are especially abundant in the dermal skeleton, and form rather dense, radiating tufts at the surface. There is little or no obvious spongin investing the fibres.

The spicules are as follows :—

(a) Curved or straight oxea, tapering from the middle to acute points; size 0·35 to 0·8 by 0·006 to 0·025. A few styli, equal to the larger oxea, are present.

(b) Small straight styli, with a well-rounded base and acute apex; size 0·2 to 0·25 mm. by 0·006 to 0·007 mm. The latter might probably be the "straight-pointed *oxea ?* about 0·02 mm. long and 0·008 mm. thick" of the original description, but there is a wide difference between 0·2 mm. and 0·02 mm. in length.

The British Museum fragment from New Zealand is a mere scrap, barely sufficient to afford a section; the spicules are oxea 0·2 mm. by 0·01 mm., which is much larger than the original dimensions given of the smaller kind. The spicules are uniform in size; there are no "smaller ones, densely packed, and scattered more or less irregularly between the fibres, and also participating in their formation."

RENIERA PANDÆA, *Lendenfeld, sp.*

The type (No. 302) has been so cut up that its width or height cannot be estimated, the thickness varies from 20 to 30 mm. It agrees with the brief description of the outward form. The dermal membrane is very minutely porous, but it requires a lens to see the indistinct, surface reticulation.

The primary fibres are 0·1 mm. in diameter, and are separated by spaces 0·2 to 0·5 mm. wide. In some parts they are quite distinct, in others consisting of diffused longitudinal bands of spicules, which occasionally present two or three lines of concentration, and they are here and there connected by rarely distinct secondary fibres. The mesh is extremely irregular and generally obscured by deposits of numerous scattered spicules.

The spicules consist of straight or but little curved oxea; they are mostly cylindrical to within one or two diameters of the extremities, and from thence suddenly taper to acute points; size 0·18 to 0·2 mm. by 0·006 to 0·008 mm. Numerous rhaphides 0·12 mm. in length and 0·0015 mm. in thickness, occur throughout the sponge, either scattered or in bundles. I failed to find any "styli" either *in situ* or by boiling a portion of the sponge.

The above spicular characters are those of a *Rhaphisia*, to which genus I propose to remove the species.

Reniera lobosa, *Lendenfeld*.

Not represented in the collection.

Petrosia hebes, *Lendenfeld*.

This species agrees with the diagnosis, but the latter is deficient as regards the spicules present. Besides the "stout and large oxystrongylote spicules with blunt ends, which measure 0·22 mm. in length and 0·013 mm. in thickness," there are numerous boomerang-shaped strongyla 0·06 to 0·09 mm. in length, and 0·008 mm. in diameter; also abundant slender oxea 0·15 to 0.22 mm. in length, and 0·0045 to 0·006 mm. in thickness.

Halichondria rubra, *Lendenfeld*.

This species has already been referred to the genus *Rhaphisia*.[2]

Halichondria mammillata, *Lendenfeld*.

The type (No. 338), a spirit specimen, agrees with the description in every character, except the dimensions of the spicules. The latter are described as "mostly straight, exceptionally, also slightly, curved, sharp-pointed oxystrongyla, 0·25 mm. long and 0·006 mm. thick." The spicules observed *in situ* in the type, and also others obtained by boiling, measure about 0·1 mm. in length and 0·004 mm. in diameter. The British Museum example received under this name has the fibres densely charged with foreign spicule fragments.

Halichondria clathriformis, *Lendenfeld*.

The type (No. 409) measures 130 mm. in height, and 60 mm. in width. The specimen consists of two compressed branches, joined at the base and also at the summit by short processes. The branches are 20 mm. in their broad and 15 mm. in their narrow diameter. The dermal membrane is smooth, and exhibits a series of circumscribed areas, which are reticulated and porous; these are separated by narrow well defined non-porous spaces. The oscula are few and scattered, and measure from 5 to 7 mm. in diameter; each has an elevated margin, and a well-marked cribriform structure within the aperture. Internally the sponge presents an open cellular appearance, not unlike that of a fine-meshed species of *Euspongia*. The texture is soft, tough, and elastic; the colour yellowish stone. The skeleton consists of a series of well-defined horny fibres, about 0·1 mm. in diameter; these are connected by numerous secondaries, which rarely exceed 0·5 to 0·7 mm. in diameter; both are charged with very numerous spicules. Each spicule appears to have its own coating of spongin, and I found it most difficult to reduce the fibres by boiling in

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[2] Whitelegge—Rec. Aust. Mus., iv., 2, 1901.

nitric acid, two or three attempts resulting in a mass of short bits of fibres with the spicules still imbedded. The spicules agree with the description as regards form, *i.e.*, "oxystrongyla slightly curved in the middle, and very slightly tapering towards the ends; the ends are somewhat rounded, and from them a very narrow and sharp spine projects, which lies axially and renders the spicule sharp-pointed; the spicules are 0·33 mm. long and 0·011 mm. thick in the centre; the terminal spine is 0·006 mm. long." I failed to find any spicules of the above dimensions in the type, either *in situ* or by boiling. This result cast a doubt on my standard of measurement, and I at once made fresh tests with the micrometres, and also with the spicules of a well-defined sponge, *Siphonochalina annulata*, Ridley and Dendy.[3] In this species the spicules are given as measuring 0·1 mm. by 0·0065 mm. The length of the spicules is very constant, and might be used as a standard of 0·1 mm. The spicules of *H. clathriformis*, as measured *in situ*, and after boiling, are as follows:—0·09 to 0·11 mm. in length, and 0·002 to 0·0025 mm. in diameter; the most pronounced contracted points rarely exceed 0·004; frequently they do not attain to 0·002, and sometimes they are absent.

This species appears to be nearer to the Chalininæ than the Renierinæ.

The British Museum specimen appears to be a species of *Rhaphisia*, with oxea and raphides; the former are about 0·4 by 0·015 mm., and the latter 0·25 mm. in length.

Reniochalina stalagmites, *Lendenfeld.*

In habit and surface this form closely resembles *Echinodictyum rugosum*, Ridley and Dendy.[4] The spicules consist chiefly of oxea of various sizes, straight or curved, and somewhat swollen at the basal third, tapering to a rather abruptly pointed base, and also to the often acutely pointed apex; the extremities of the oxeote forms are frequently denticulated, or provided with a small cap tipped with minute spines. Megascleres (*a*) oxea, size 0·2 to 0·37 mm. by 0·004 to 0·01 mm.; (*b*) styli 0·15 to 0·2 mm. by 0·01 mm. A few slender oxea and styli are also present, which measure about 1 mm. in length, and 0·008 mm. in diameter.

Reniochalina lamella, *Lendenfeld.*

The spicular characters are identical with the above, the surface of the specimen also agrees, but the habit is slightly different. The locality given in the "Catalogue of Sponges," and also on the label, is evidently wrong. The specimen bears a registered number; the habitat given in the register is Western Australia, and the example was purchased from the late Mr. J. F. Bailey, of Melbourne.

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[3] Ridley and Dendy—Chall. Rep., Zool., xx., pl. vii., fig. 2, p. 21.

[4] Ridley and Dendy—Chall. Rep., Zool., xx., pl. xxxii., fig. 1.

Sub-family CHALININÆ.

Pachychalina tenella, *Lendenfeld.*

Pachychalina tenella, Dendy, Proc. Roy. Soc. Vict., new ser., vii., 1895, p. 242.

Chalinopora tenella, Lendenfeld, Zool. Jahrbücher, ii., 1887, p. 765.

The specimen bearing the above name (No. 249) consists of a series of main and secondary branches, which arise from a small but incomplete basal plate ; the example is 250 mm. in height and 200 mm. in width. The branching is dichotomous, and the ends are usually swollen ; they measure 10 mm. in their shorter, and from 15 to 25 mm. in their longer diameter. The oscula are confined to the summits and inferior surfaces of the branches ; they vary from 3 to 5 mm. in diameter. The dermis is very finely reticulated and minutely porous. The internal skeleton consists of a loose open network. In texture the sponge is soft, easily compressible, and elastic ; colour, in the dried condition, dull yellowish gray. The main fibres are 0·07 mm. in diameter, and 0·3 to 0·05 mm. apart ; the stouter secondaries are 0·03 to 0·04 mm. in diameter, and 0·03 to 0·04 mm. apart. The spicules in the main and secondaries fibres are numerous, closely packed, and occupy nearly the whole of the fibre. In the more slender connecting fibres the spicules vary from 1 to 6 in a row.

Megascleres—Oxea, size 0·09 to 0·1 mm. by 0·0015 to 0·0025 mm.

Pachychalina manus, *Lendenfeld.*

The named example (No. 282) consists of a series of primary and secondary branches, which usually attain to the same level. Apically they are somewhat dilated, and frequently anastomose. The oscula are about 1 mm. or less in diameter ; they are scattered over the branches generally ; at and near the summit they are situated in the centre of dimple-like depressions, which gives the upper aspect a peculiar appearance characteristic of the species. The example measures 110 mm. in height, 70 mm. in width, and 30 mm. in thickness ; the individual branches vary from 4 to 10 mm. in diameter.

The spicules are oxea 0·05 to 0·06 mm. in length, and 0·004 to 0·005 mm. in diameter.

No. 438 in the collection does not agree with the description.

The British Museum specimen exhibits numerous oxea in the fibres, and also in the ground substance ; those in the latter measure 0·07 by 0·004 mm., and in the former 0·08 by 0·005 mm.

Chalina globosa, *Lendenfeld.*

This species has been described in the report[5] previously referred to.

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[5] Whitelegge—Rec. Aust. Mus., iv., 2, 1901.

The British Museum specimen is evidently a bit from the exhibited example. A well-preserved spirit example from Jervis Bay exhibits numerous oxeote spicules in the ground substance.

CHALINA SUBARMIGERA, *Ridley*.

Chalinopora intermedia, Lendenfeld.

The only available specimen is from the British Museum, received under Lendenfeld's name, and it agrees with the description. The spicules are oxea and measure 0·08 by 0·0025 mm.

CHALINOPORA LAMELLA, *Lendenfeld*.

No. 373. Sponge pedunculate, 140 mm. high, with a hand-shaped lamina 70 mm. long, 65 mm. wide, and 5 mm. in thickness. The upper margin exhibits four or five digitations. The oscula occur on the margin, and also on the convex surface, extending on to the upper part of the peduncle; they are about 1 to 3 mm. in diameter and 5 mm. or more apart. The dermal membrane exhibits numerous circumscribed pore areas, which are separated by non-porous spaces. Texture in spirit close, soft, moderately tough and elastic; colour yellowish gray. The main fibres in the central region form trellised bundles, with oval or rounded mesh; they are 0·15 mm. in diameter and 0·5 mm. or less apart. The ground substance is charged with numerous spicules.

Megascleres—(*a*) oxea of the ground substance, size 0·08 by 0·004 mm.; (*b*) oxea of the fibres, 0·09 by 0·0025 mm.

The spicules in the fibres of the British Museum fragment agree with the above measurements.

CHALINOPORA SIPHONOPSIS, *Lendenfeld*.

The exhibited specimen (No. 342) does not agree with the description. The spicules are oxea 0·08 by 0·0055 mm. The British Museum fragment received under the above name appears to be identical with *Chalinopora tenella*, Lendenfeld, and possesses oxea 0·09 to 0·1 mm. by 0·0015 to 0·002 mm. Neither specimen exhibits any trace of "styli."

CLADOCHALINA EUPLAX, *Lendenfeld*.

No. 422. This form has already been dealt with in the "Report on Sponges from the Coastal Beaches of New South Wales,"[6] under *Chalina palmata*, Lamarck.

No. 373. *Chalinopora lamella*, Lendenfeld, is identical with *C. euplax*, Lendenfeld.

CHALINELLA TENELLA, *Lendenfeld*.

The example exhibited under this name (No. 421) is a horny sponge, with a highly conulose surface. The specimen from the

[6] Whitelegge—Rec. Aust. Mus., iv., 2, 1901, p. 73.

British Museum presents a series of very fine fibres, with distant uniserial hair-like oxeote spicules, varying from 0·17 to 0·2 mm. in length, which does not agree with the measurement given, *i.e.*, "0·033 mm. long and 0·0009 thick."

CHALINISSA ELONGATA, *Lendenfeld.*

This species is not represented in the collection except by the fragment from the British Museum, which agrees with the description.

CHALINISSA ELEGANS, *Lendenfeld.*

No. 219. The exhibited specimen in the collection, and the British Museum specimen, agree with the diagnosis.

CHALINISSA COMMUNIS, *Lendenfeld.*

This specimen is also in accord with the description.

CLADOCHALINA MOLLIS, *Lendenfeld.*

The exhibited specimen (No. 407), is flabellate and somewhat lobate, with low elevations, each of which bears an osculum from 4 to 10 mm. in diameter; a number of smaller oscula are distributed over the surface of the lamella; they exhibit thin elevated margins and a cribate surface interiorly. The dermal membrane is finely reticulated, and displays a series of porous areas separated by narrow non-porous spaces.

Texture in spirit soft, with very open mesh, elastic and rather tough. Colour brownish-grey. Height of specimen, 100 mm.; width, 140 mm.; thickness of lamella, 5 to 15 mm.

A longitudinal section of the lamina exhibits a series of densely spiculous main fibres 0·2 mm. in diameter, and about 0·5 mm. apart; these are connected by transversely arranged fibres, which are exactly like the primaries; the points of union are greatly dilated, and charged with numerous spicules, which are disposed in a regular fashion, and follow the trend of the fibres. The mesh in the central region is rounded or oblong; as the surface is approached the fibres rapidly diminish in diameter, and the mesh becomes square or angular; the dermis consists of a fine, meshed, unispicular network, the size of the mesh being in keeping with the length of the spicules.

The spicules in the fibres are straight oxea 0·1 by about 0·0025 mm. The ground substance exhibits numerous styli, oxea, and a few strongyla; these are about 0·08 mm. long and 0·004 mm. in diameter. Other spicules were observed in the sections examined and also in the mass of spicules obtained by boiling a piece of the sponge. These were elongated styli and small anisochœlæ. I am not in a position to say whether the latter are proper to the sponge, or are of foreign origin. The British Museum example appears to be quite distinct from the above, and to possess oxeote spicules 0·06 to 0·08 mm. in length by 0·0025 mm. in diameter, which is rather different from the measurements in the original description, *i.e.*, 0·077 by 0 0017 mm.

CERAOCHALINA MULTIFORMIS, var. DURA, *Lendenfeld.*

As previously stated the exhibited specimen bearing this name is *Thalassodendron viminalis*, Lendenfeld.

The specimen from the British Museum agrees with the description.

ANTHEROCHALINA DURA, *Lendenfeld.*

This species is misrepresented in the collection by a specimen (No. 355) of *Chalina globosa*, Lendenfeld. There is no example in Professor Dendy's donation.

PLACHOCHALINA PEDUNCULATA, var. DURA, *Lendenfeld.*

The example covered by the above name is probably *Pachychalina punctata*, Ridley and Dendy, as stated in my report.[7] There are many examples of *Pachychalina bilamellata*, Carter, in the collection, but there is no specimen named by Lendenfeld.

PLACHOCHALINA PEDUNCULATA, var. POCULA, *Lendenfeld.*

I failed to find this variety in the collection.

PLACHOCHALINA PEDUNCULATA, var. MOLLIS, *Lendenfeld.*

Two examples are exhibited under the above name, one (No. 335) is a young specimen of *Chalina palmata*, Lamarck, and the other (No. 352) is *Clathria tenuifibra*, Whitelegge. The latter example has been neatly perforated by a boring Isopod, and bears the manuscript name of *Plachochalina porosa*, Lendenfeld.

ANTHEROCHALINA PERFORATA, *Lendenfeld.*

This species is represented by two examples bearing the above name, and a third specimen is included in Professor Dendy's donation from the British Museum. No. 315 is certainly a specimen of *A. frondosa.* The British Museum fragment is quite distinct from *A. perforata.* The spicules of the fibres consist of (*a*) stoutish styli, 0·1 to 0·15 mm. long and 0·01 mm. thick; *(b)* abundant slender tylostyli of the ground substance, over 0·2 mm. long and 0·003 to 0 004 mm. in diameter. I have also observed what may be echinating styli, with smooth shaft and blunt apex, about 0·06 mm. long, but the material is too scanty to satisfactorily determine this point. The above is probably referable to the genus *Clathria.*

No. 292, from Port Phillip, accords with the figure and description in every character except one, *i.e.*, the spicules are styli 0·09 to 0·11 mm. long, and 0·003 to 0·004 mm. in diameter, and not *oxea* 0·09 mm. long and 0·003 mm. thick, as stated in the description.

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[7] Whitelegge—Rec. Aust. Mus., iv., 2, 1901, p. 70.

Family DESMACIDONIDÆ.

Sub-family ECTYONINÆ.

Clathria frondosa, *Lendenfeld.*

Antherochalina frondosa, Lendenfeld.

The exhibited specimen of this species (No. 321) agrees with the figure, and also with the description, and is identical with the example from the British Museum. The description of this species is very deficient, as regards the spicules, and the locality is wrong. According to the register this specimen was purchased from the late J. F. Bailey, of Melbourne, and is probably from Western Australia. A longitudinal section of the sponge exhibits a series of main fibres about 0·1 to 0·15 mm. thick; these give off on either side a number of secondaries, which are gracefully curved outwards, and end at the surface. The main and secondaries are joined by numerous slender connecting fibres; these are equal in length to the larger spicules, and have from one to four spicules in a row. All the fibres are echinated by minutely-spined styli, with blunt and often spiny apices. The fibres consist of stout curved styli, stout strongyla, and numerous slender oxea and styli are scattered in the ground substance. The horny matter investing the fibres is not very marked, except in the stout primaries.

Megascleres—*(a)* Stout curved styli 0·3 mm. long and 0·02 mm. thick; *(b)* curved strongyla 0·25 mm. by 0·02 mm.; *(c)* slender styli and oxea, 0·25 mm. long and 0·008 mm. in diameter; *(d)* minutely spined echinating styli, with blunt spinose apices, and often somewhat swollen at the base, 0·06 to 0·09 in length, and 0·008 in diameter.

No. 329 appears in the collection as *Antherochalina frondosa*, Lendenfeld, with the manuscript name of *A. levis*. This form is identical with *Reniera dendyi*, Whitelegge.

UNTIL after this paper was in type, and the number made up, I had not seen either Mr. J. Jenning's "Notes on the Exhibition of an Ethnological Collection from Santa Cruz, &c.," (Journ. Anthrop. Inst., i., n.s., 1899, p. 164); or Col. R. C. Temple's paper on "Beginnings of Currency," *(Ibid.*, ii., n.s., 1899, p. 99), in which the "Feather Money" is referred to.

R. E.

THE TAVAU, OR COIL FEATHER CURRENCY OF SANTA CRUZ ISLAND, SANTA CRUZ GROUP.

By R. ETHERIDGE, Junr., Curator.

(Plate xliv.)

"THE basis of money is at times a shell, a bead, a robe, a skin," says Mr. O. T. Mason,[1] but, adds Dr. G. B. Tylor,[2] "in this roughest kind of barter we do not yet find that clear notion of a unit of value which is the great step in trading."

An account of the currency used by the native races of the South Pacific has yet to be written, and when investigated a very fascinating study it will prove to be. A perusal of the curious and interesting list of objects given by Dr. T. de Lacouperie as "Shapes of Currency from Barter to Money,"[3] used throughout the world, will impress this fact on the reader. In a review of Dr. Lacouperie's list Dr. J. D. E. Schmeltz[4] adds some further important facts, including the "feather money" of Santa Cruz.

Feather money, according to the Rev. Dr. R. H. Codrington,[5] as a medium of exchange is also met with on Santa Maria, of the neighbouring Banks Group, and on Meralava (or Meralaba), the northernmost of the New Hebrides Group. A form of feather money is again said to occur in Samoa by Professor W. T. Brigham, who in his excellent "Preliminary Catalogue"[6] mentions "Feather currency from Samoa."

An opportunity was afforded the Trustees last year (1901) of acquiring by purchase a coil of the Santa Cruz currency, and it is now my purpose to describe this in detail, for, so far as I know, very little, with the exception of a passage in Codrington's work, has been written on the subject. This coil is twenty six feet ten

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1 Mason—Origin of Invention, 1895, p. 71.

2 Tylor—Anthropology, 1881, p. 282.

3 Lacouperie—Brit. Mus. Cat. Chinese Coins, vii. Cent. B.C. to A.D. 621, 1892, p. xx.

4 Schmeltz—Internat. Archiv. Ethnographie, vi., 1893, p. 57.

5 Codrington—The Melanesians, 1891, p. 324.

6 Brigham—Prelim. Cat. Bernice Pauahi Bishop Mus., 1, 1892, p. 18, No. 142.

inches long, and may be described as follows:—As a kernel or support to the coil are a few turns of stiff bark, nine inches in diameter when rolled, and joined by a cord of twisted beaten bark, two feet long, to the tongue-shaped end of the feather rope, which is a plaiting of the untwisted fibres of the rope, with an edging of Job's-tear (*Coix lachryma*) sections, covered with a plate of turtle shell, and a tassel of four lengths of strung *Coix* sections, each length terminated by pieces of Nautilus shell. The feathered portion succeeding this tongue consists of a flat rope, two and a quarter inches wide, by a quarter of an inch thick, and is to some extent flexible. The rope is transversely bound with fine beaten bark fibre, but of what it is composed internally I do not know; on one side this fibre is visible, but on the other it is completely hidden by the remains of the red feathers of a Lorikeet (*Trichoglossus massena*, Bonpt.) At thirteen feet two inches from the end are suspended from the edges of the rope two tassels of five strings each of *Coix* seed sections, each length terminated by pieces of Nautilus shell roughly broken into a triangular shape. On the inner side, at this point, a hexagonal panel-shaped device is worked by passing blackened Pandanus (?) leaf strips over and under a certain number of bark-fibre strands, producing a checkered pattern like a draught board. From this point the remainder of the rope measures thirteen feet eight inches, and the extreme end is simply a repetition of that already described, except that the terminal tassel has three lengths of *Croix* seed sections, two of them terminated by lanceolate pieces of Pearl shell, and the third by a Univalve (*Atys cylindrica*, Helbling.)

Edge-Partington figures[7] a coil of this money from Santa Cruz, but without the interior bark support, " made of a band of wood with parrot feathers sewn on to the outer surface." On another plate Edge-Partington figures,[8] instead of the bark coil, three forms of wooden frame supports of quite a different type, said to be used "for keeping the coils of native money in position," but it is not said the feather money, in fact I do not see how a semi-rigid body such as the latter is, could be coiled with advantage on at least two of these supports; possibly the native money meant may be the strings of shell sections so prevalent throughout the South Pacific, and employed in the dual capacity of personal ornament and currency.

Our specimen also lacks the "three armed piece of wood (cut out of the solid) invariably found with the 'parcel' of feather money" figured[9] by Edge-Partington.

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7 Edge-Partington—Album, 1st Series, pl. 165, f. 1.

8 Edge-Partington—*Loc. cit.*, pl. 163, f. 2-4.

9 Edge-Partington—*Loc. cit.*, pl. 165, f. 2.

The only account I am acquainted with of the manufacture and use of the Santa Cruz currency, is the following extract from Codrington's work,[10] already referred to:—

"*Feather money* is peculiar to Santa Cruz; it is made of the red feathers from under the wings of a parrot, *Trichoglossus massena*. The birds are caught in the deep bush, where they are very tame, with bird-lime smeared on a rod which a man carries in his hand, and on which they perch; he must take care not to eat anything hot or fat, or they will not come near him. The small red feathers are first gummed on to pigeon's feathers, and these are bound on to a prepared foundation in rows, so that only the red is seen. A length of this feather money, called *tavau*, about fifteen feet long, is coiled up and packed with peculiar ornaments. Short pieces are made for convenience in arranging about prices. On festive occasions the dancing ground *nava*, fenced round with huge discs of coral, is hung with the uncoiled feather-money of those who make the feast. The people say that formerly they had also shell-money. Though this feather money is peculiar to Santa Cruz, there is in the Banks' Islands, in Santa Maria and Meralava, where the *som* shells are not found, a medium of exchange of the same character. The little feathers near the eye of fowls are bound on strings, and generally dyed a fine crimson; these are used as necklaces or anklets, by way of ornament and distinction (*kole wetapup*), but also pass very much in the way of money."

This feather currency appears to be comparatively rare in collections, and I shall be glad to be informed of those cabinets possessing specimens. The following are known to me:—

1. Collection of the Rev. Alfred Penny (figured by Edge-Partington.)

2. Example obtained by Mr. John Jennings, in 1897, and now believed to be in the British Museum, London.

3. Australian Museum, Sydney.

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10 Codrington—*Loc. cit.*, p. 324.

SKELETON OF *LUVARUS IMPERIALIS*, RAFINESQUE.

(A Fish new to the Western Pacific Fauna).

By Edgar R. Waite, F.L.S., Zoologist.

(Plates xlv., xlvi., and Fig. 22).

Luvarus imperialis, *Rafinesque.*

Luvarus, known from the Mediterranean, the Atlantic (from Madeira northwards to the coast of Cornwall), and also off the Californian coast,[1] is now to be added to the Australian fauna.

On September 5th last, the Curator received information from Mr. J. A. Brodie, Chief Inspector of Fisheries for New South Wales, that a strange fish had been stranded at Bermagui. The communication was accompanied by a rough sketch, and the following particulars noted by Mr. Elias Laycock, one of the Fishery Inspectors:—"Length about six feet two inches, girth four feet eight inches, spread of tail two feet three inches, weight between two and three hundredweight, colour salmon and silver, flesh white."

Rough as was the sketch, it was so characteristic that we had no difficulty in recognising it as representing *Luvarus*. To have recorded the existence of this Atlantic form from the South Pacific on the evidence of a rough sketch would, under any circumstance, have been so unsatisfactory, that every effort was made to secure at least some portion of the original. Our best thanks are due to Mr. Brodie in this connection, for later in the month we received the skeleton, broken and incomplete, yet in sufficiently good condition to enable our articulator to prepare it for the Museum, and for me to add a little to our knowledge of this interesting form.

After this paper was written, we (on January 7th, 1902) received from Mr. Brodie further particulars: the information, contained in a letter from Inspector W. H. Newton, is as follows:—

"In the beginning of last August, Mr. Elias Laycock and his son, of Port Hacking, found a very large fish stranded on a beach at Bermagui, five hundred yards up the river, the fish being alive and in good condition, with the exception of one side fin, which had been broken. The colour of the fish, when alive, resembled that of the Nannygai *(Beryx affinis*, Günth.), and the flesh inside

[1] See page 297.

was very white and free from blood. It is supposed that the fish was in search of food, owing to the large quantity of 'Whale-food' (small shrimps) which was round the fish on the sand. The depth of water there was about four feet at high water and perfectly dry at low tide."

Our determination of the fish from the rough sketch of the outward form is rendered absolute by a comparison of the skeleton with the figure published by Günther under the synonym *Ausonia cuvieri.*[2] This figure, reproduced from a drawing by Rüppell, while apparently well representing the general form, indicates that the skull was very incomplete. Günther did not attempt any description of it, merely remarking:—"the configuration of the bones of the skull will be seen from the accompanying figure."

While the skull cannot be said to be perfect in our specimen, its condition warrants me in attempting to describe the principal features of such an interesting type.

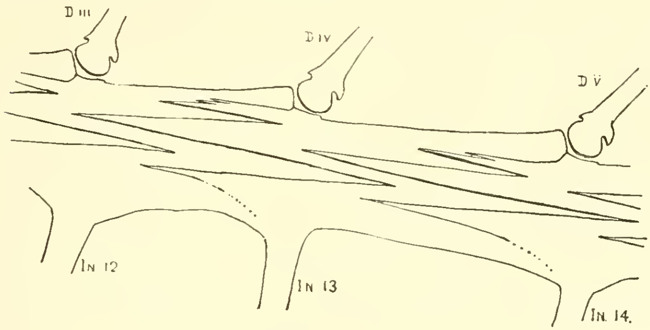

Fig. 22.

Owing to anchylosis in what is probably an old specimen, and also to fractures occasionally confusing the sutures, their exact limits cannot always be determined. I am not certain, for example, of the limits of the symplectic, mesopterygoid and metapterygoid bones.

A striking feature of the skeleton is presented by the union of the interneural spines into a complete bony arch, which extends from the union of the ethnoid and parietal bones backwards to the eighteenth vertebra; a similar arch is formed below by the union of the interhæmal spines, and extending from the pelvic girdle backwards also to the eighteenth vertebra. The union of the several interneural and interhæmal spines is effected by a very complex suture (Fig. 22). Each segment sends forward three long splints, and a similar number backwards; it is so encroached

[2] Günther—Proc. Zool. Soc., 1866, p. 337.

upon by splints from the adjoining segments that an illustration can only accurately convey the arrangement.

The accompanying figure shows the thirteenth interneural element, and portions of those in front and behind it. The dorsal spine, apparently corresponding to the thirteenth interneural, is the fourth; but the twelfth interneural also participates in forming the articular socket. All the other spines, and those of the anal also, similarly arise from two elements.

The portions of the dorsal and ventral arches in front of their respective spines have their elements rigidly joined, while those posteriorly are loosely articulated; the same arrangement is seen in the vertebræ, so that lateral motion for purposes of locomotion is permitted; and in this connection it is to be noticed that the posterior portions of both the arches and the vertebræ are much the stronger.

The upper and lower arches together form a very regular figure, divided longitudinally by the vertebral column, which, however, lies a little nearer to the dorsal than to the ventral arch. After its union with the skull in front, the upper arch gives off a strong flattened spine, which passing downwards and forwards reaches the occipital bone. The first neural spine is similarly flattened, and strong, and arises apparently from the occipital region of the skull, this portion should therefore be regarded as the first vertebra, though but for the spine its nature would be overlooked; it is anchylosed to the second vertebra by a thin plate of bone above, which encloses the second neural spine, this is thin and styliform; the second interneural spine is anchylosed to the plate of bone. The neural canal is closed above as far as the middle of the third vertebra, thence is an open canal formed by a thin ridge, the neural process, on each side.

The first hæmal and anterior interhæmals being imperfect, these parts have been restored from Günther's figure, I cannot therefore describe their arrangement. The first hæmal spine arises from the eleventh vertebra, but has a small bony support from the tenth. The ribs, seven in number on each side, commence on the the third vertebra, and are strong and sabrelike. The neurapophysis and hæmapophysis of the seventeenth vertebra, together with their spines, are directed forwards and broadly flattened to strengthen the attachment with the interneural and hæmal arches. These arches are vertically broadened posteriorly, and are received by modifications of the apophyses of the eighteenth vertebra. The nineteenth vertebra is short, circular in section, and the only one permitting rotation. The twentieth is square in section, produced posteriorly above and below to receive the next, which is similar in shape, and the first to actually support the base of the caudal rays. These segments are joined much as is the spliced handle of a cricket bat. The nineteenth to twenty-first form the peduncle.

Another vertebra intervenes between this and the hypural, making twenty-three in all. The caudal fin is short, but produced above and below into a powerful organ.

The first dorsal spine is situated above the neural of the tenth vertebra, and is preceded by a groove which recalls the condition described by Lowe.[3] The following spines, twelve in number, are weaker. The anal possesses fourteen spines, but owing to imperfections, as before remarked, their relationship to the interhæmals is not clear; there are generally two of the latter to each hæmal.

The skull has a peculiar aspect, produced largely by the low position of the orbit, it being much beneath the axis of the body; the small anterior mouth, the raised parietal crest, and the large opercular apparatus, are also noticeable features. The occipital is largely encroached upon by the first interneural and neural spines, the lower ends of which are apparently formed by union with an occipital crest. The parietals overlie the frontals and are deflected behind to join the upper limb of the post-temporal. The frontal is not so extensive as usual, and a large foramen occurs between it and the ethmoid. The interparietal crest arises partly from this bone. The connection of the pterotic with the post-temporal is not preserved in our specimen. Suborbital bones are not present, and are possibly not developed. The eye is strengthened by an osseous ring.

In the suspensorium, the hyomandibular is joined by suture with the metapterygoid the latter separated from the quadrate by the symplectic. The articular and dentary are both short. The dental margins of the premaxillary, vomer, palatine, and dentary are roughened, but teeth are not present.

The post-temporal is widely forked, and has a bony attachment to the skull. The suture between the clavicle and supraclavicle is very long. The post-clavicle is attached by ligament below to the hypocoracoid. The hypercoracoid has an oval foramen through its centre. Actinosts graduated, five in number, the uppermost anchylosed to the base of the first two pectoral rays.

The representative of the pelvic girdle is a weak bone, whose connection with the clavicle is destroyed. Anterior to the verticle of the base of the pectoral it expands laterally, leaving a foramen for the vent. It is continued as a narrow vertical plate to join the base of the first interhæmal spine. Anterior to the vent is the unpaired ventral fin, represented only by the spine, which is a lanceolate plate, articulated at its base, and forming an operculum for the vent.

The bones, on the accompanying plate of the skull, are numbered according to the list published by Starks,[4] "Synonomy of the Fish Skeleton." This excellent compilation supplies a distinct want,

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3 Lowe (Günther)—Cat. Fish. Brit. Mus., ii., 1860, p. 414.

4 Starks—Proc. Wash. Acad. Sci., iii., 1901, pp. 507 – 539.

and a desirable uniformity would be secured by Ichthyologists adopting the nomenclature and numerals of the "Synonomy." I shall be pleased, if by setting the example, I have contributed to this end. Disagreement with the author's homologies might affect the names but not the numbers applied to the several elements.

The bones herein illustrated are as follows:—

1.	Vomer	27.	Interopercle
2.	Ethmoid	28.	Articular
3.	Prefrontal	30.	Dentary
4.	Frontal	31.	Maxillary
5.	Sphenotic	32.	Premaxillary
6.	Parietal	33.	Ceratohyal
7.	Epiotic	36.	Basihyal
8.	Supraoccipital	37.	Glossohyal
9.	Pterotic	38.	Urohyal
13.	Parasphenoid	53.	Post-temporal
17.	Hyomandibular	54.	Supraclavicle
18.	Symplectic	55.	Clavicle
19.	Quadrate	56.	Postclavicle
21.	Palatine	57.	Hypercoracoid
22.	Mesopterygoid	58.	Hypocoracoid
23.	Metapterygoid	60.	Actinosts
24.	Preopercle	61.	Pectoral rays
25.	Opercle	62.	Pelvic girdle
26.	Subopercle	63.	Ventral spine

Our specimen of *Luvarus* is probably the largest known; the type was five feet in length, subsequent examples smaller. The skeleton yields the following dimensions:—

	Mm.		Ft.	in.
Total length	1855	=	6	1
Height of body	540	=	1	9¼
Length of head	407	=	1	4
Length of caudal	280	=	0	11
Base of dorsal fin	610	=	2	0
Base of anal fin	635	=	2	1

As remarked by Day,[5] "The habits of *Luvarus* are scarcely known: the young have been captured near the surface at sea. Its intestines would seem to point to its being a vegetable feeder, which probably does not live at any great depths in the ocean."

Mr. Laycock's observation may throw a little light on the subject. The fish is evidently of pelagic habit, and when stranded was apparently following up the stream of pelagic life which engaged the attention of the Basking Shark, taken within a few miles of the same locality and at the same time. As I have described (p. 261), this pelagic flux consisted largely of *Munida*

[5] Day—Fishes Gt. Britain and Ireland, i., 1880–4, p. 122.

subrugosa; and the characterising of Whale-food as "small shrimps" by the Fisheries Inspector in connection with *Luvarus*, leaves little doubt as to the nature of the food of this fish.

Day's opinion as to its being a vegetable feeder was deduced only from an inspection of the intestines; the entire absence of teeth in the adult is another factor in favour of its habit as a feeder on pelagic organisms.

The author last writing on *Luvarus* is G. Kolombatovic'; but not having access to his paper,[6] I am unaware if he deals with the skeleton.

Since writing the paper I have seen the account and picture of this fish published in the *Scientific American*,[7] a notice of which, by Dr. D. S. Jordan, reads as follows[8]:—"In the *Scientific American* for December 21, Mr. C. F. Holder publishes a photograph of *Luvarus imperialis*, a large and rare fish of the Mediterranean, lately taken at Avalon on Santa Catalina Island, off the coast of California. There is no question as to the identity of the species with the genus Luvarus, and no specific difference appears in Mr. Holder's photograph, a copy of which the writer has seen."

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6 Kolombatovic—Druge. Zool. Vijest. iz Dalmaciji, 1900.

7 Holder—*Scientific American*, lxxxv., 1901, p. 415.

8 Jordan—*American Naturalist*, lxxxvi., 1902, p. 336.

On SOME SPECIMENS of CHIASTOLITE from BIMBOWRIE, SOUTH AUSTRALIA.

By C. Anderson, M.A., B.Sc., Mineralogist.

(Plate xlvii.)

The Trustees of the Australian Museum have recently acquired from Mr. G. R. Howden, by donation and purchase, some exceptionally good specimens of chiastolite. In addition to those in the Museum, I have been enabled, through the courtesy of Mr. E. F. Pittman, Government Geologist, and Mr. G. W. Card, Curator of the Mining and Geological Museum, to examine some fine specimens in the Survey collection. Mr. W. S. Dun, Palæontologist to the Survey, was also kind enough to lend me some specimens which he has in his possession. All the minerals examined came from the same locality, Mt. Howden, ten miles north of Bimbowrie, South Australia. The crystals are distinguished by large size, they shew the characteristic markings very distinctly, and some exhibit features which, so far as I know, have not hitherto been described.

Chiastolite is a variety of andalusite, and is only distinguished from it by the constant occurrence of carbonaceous or clay-slate inclusions, disposed in the form of a cross. Andalusite and chiastolite are characteristic of the metamorphic schists, and are usually found in the contact zones of clay slates, near granites, syenites, and diorites. The crystallographic system is orthorhombic, the forms being very simple, usually shewing only (110) and (001). The pattern of the dark inclusions seen on a cross section varies considerably, even in different segments of the same crystal, but two chief types are apparent—(*a*) The crystal has a dark rhomb in the centre, the outlines of which are parallel with the crystal boundaries, and, from the angles of this rhomb, dark laminæ pass to the prism angles of the crystal (*macle tetragrammé* of Haüy); (*b*) further the angles of the prism may be occupied by four dark rhombs, corresponding in form with that in the centre (*macle pentarhombique* of Haüy.)

According to Mr. Howden, the Bimbowrie mineral occurs either embedded in argillaceous schist, or as rolled pebbles, along with quartz, jasper, aventurine, etc. Towards the surface, where atmospheric influences are at work, the crystals are fairly easy of extraction, and all the more perfect specimens obtained were weathered out. Mr. Howden states that embedded crystals occur with the long axis parallel to the foliation. The crystals are columnar in habit, elongated in the direction of the vertical axis. Some specimens reach a length of five to six inches, and one, (Pl. xlvii., fig. 1), has a diameter of about two inches. None shew well defined crystal outlines, the edges being more or less rounded. When complete the crystals taper to either end, the relation of length to breadth being about 4 : 1. They have a brownish crust, and the surface is spangled with flakes of mica. The two cleavages parallel to the prism faces are usually followed by lines of inclusions. The specimens are altered in a greater or less degree, hence the physical characters vary considerably. The hardness is about 3 to 4, and the specific gravity, determined on the freshest material obtainable, selected as free as possible from inclusions, was found to be 2·99. The fracture is uneven. The colour of a cut crystal varies, grey predominating, but some are reddish brown, and some have a pinkish tinge. Slightly translucent. Difficultly fusible on the edges before the blowpipe.

Professor T. W. E. David, of Sydney University, and Mr. H. Stanley Jevons, the University Lecturer in Mineralogy, have made a detailed examination of sections under the microscope, and have obtained some interesting results, which Professor David has kindly communicated to me. " With a view to ascertain whether these chiastolites are normal as regards optical properties, and whether they are really single crystals and not twinned forms, a section was cut at an angle of 48°, measured from the vertical axis, and in a direction parallel to the macro-diagonal axis, so that the plane in which the section was cut made an angle of 42° with the basal plane. It was found that this section cut one of the optic axes at right angles, which is evidence in favour of the acute bisectrix being parallel to the vertical axis of the crystal. This fact having been established, a section of the crystal cut at right angles to the vertical axis was examined, and the optic sign was found to be negative. The optic axial plane was found to lie in a plane about normal to that of the macropinacoid. The optic axial plane, however, does not lie parallel to the dark plane, crossing the crystal diagonally and shewing the morphological direction for the plane of symmetry parallel to the brachypinacoid, but makes an angle of about 12° with it. From this it is obvious that this morphological plane, indicated by the black lamina, is not normal to the macropinacoid, but, in the crystal examined, makes angles of about 102° and 78° with it. This distortion of the morphological plane, which should be the plane of symmetry parallel to the brachypinacoid, is, however, not accompanied by a similar distortion of the direction of the planes of prismatic cleavage. The optic axial plane, being normal to the macropinacoid, bisects the obtuse angles of the prismatic cleavage. Mr. Jevons suggests that perhaps very minute, numerous, parallel, fault-, or gliding-planes[1] may have led to the distortion of the *morphological* plane, which should be parallel to 010. The parallelism of the optic axial plane, in all the quadrants of the crystal, proves that the crystal is optically continuous, and not twinned."

From the arrangement of the inclusions the Bimbowrie mineral may be described as a modified *macle pentarhombique.* Instead of having a solid dark rhomb in the centre, the core is usually of light-coloured material, and is surrounded by four dark lines, forming a rectangle or lozenge, according to the direction of cutting. Moreover, the inclusions appear on the prism angles as roughly triangular areas and not as rhombs. In some cases the central rhomb is very small or absent, and, as a rule, the angular patches of inclusions are well developed; occasionally, as in Fig. 2, reaching almost to the centre.

A few typical specimens have been selected for particular description; some are the property of the Trustees, the others belong to the Geological Survey collection.

Fig. 1.—On the cross section this specimen measures $2\frac{1}{4}$ inches, and is undoubtedly one of the finest chiastolites discovered. On the polished surface the colour is brownish-red, which unfortunately prevents the photograph from doing justice to the mineral. The triangular areas are dark in colour, but the rest of the inclusions are mostly reddish-brown, and are possibly oxide of iron. The cleavages, crossing at approximately 90°, are indicated by lines of inclusions, parallel to the prism faces.

Fig. 2 is a photograph of one of the Geological Survey's specimens, and represents a typical Bimbowrie chiastolite. Its greatest breadth is $1\frac{1}{2}$ inches. The central rhomb and the dark patches are well defined, the latter being differentiated into two areas, the inner being darker in colour, while the outer is greyish. The latter portion is very evidently clay-slate, and externally shews the schistosity clearly. These included wedges of clay-slate can be distinguished without reference to the cross section by the presence of this schistosity, and by the absence of mica in the crust.

Fig. 3 was originally five inches long, but was cut into seven segments, in order to see how the inclusions varied in different parts of the crystal. The result was not conclusive, but seemed to shew that the central rhomb increased in size from the middle towards either end. Before cutting, a depression was noticeable running from end to end on either side. These depressions are occupied by soft and friable clay-slate, and have evidently resulted

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[1] Rosenbush—Micr. Phys. of the Rock-making Minerals, trans. Iddings, 4th edit., 1900, p. 196, states that such gliding-planes exist in andalusite parallel to 100, and give rise to mechanical deformation of the crystal. Such gliding planes would account for the mechanical deformation of the chiastolite crystals described in this paper.

from weathering. Only two of the clay-slate wedges are affected in this way. The central inclusion figure is very small in this specimen.

Figs. 4 and 5.—Here the weathering effect is still more pronounced, the transverse section resembling a penetration twin. That the form is not the effect of twinning is apparent, since it differs in no respect from an ordinary crystal, save that the included wedges of clay-slate have been removed. Fig. 5 gives a longitudinal view, from which it is seen that the surface is homogeneous, presenting no clay-slate wedges, yet the transverse section shews the remains of the dark triangular areas, corresponding no doubt to the inner areas of inclusions in fig. 2. Fig. 5 also shews a peculiar feature which I have not seen alluded to in any description of chiastolite. Nine specimens shew this structure out of thirty-eight examined, hence it is a well-marked feature of the Bimbowrie mineral. In all cases where the removal of the clay-slate has proceeded to a considerable extent, this phenomenon occurs, and the appearance in all cases is strictly analogous. The cross has two longer and two shorter arms, the former alone shewing this peculiarity, which consists of a series of grooves, alternating with ridges, which proceed from the junction with the shorter arms to the boundary of the crystal, and these grooves and ridges are always curved in opposite directions, as shewn in fig. 5, where those on the right side have the concavity downwards, while those on the left have the concavity upwards. In most cases another peculiarity is noticeable, namely, the longer arms are slightly bent in opposite directions, as if a shearing stress had acted on the crystal in a direction perpendicular to the vertical axis. Thus, in fig. 5, the right side is bent away from the observer, the left side towards him. This deformation is well-marked whenever the grooving is most apparent. In one specimen the arms are nearly straight and the grooving is but slightly developed, hence it may be that the two phenomena are related. In two cases the clay-slate wedge has persisted in alternate reëntrant angles, and, assuming the action of the stress referred to, the phenomenon in these two cases may be not inaptly compared to "crag and tail" of geologists, the wedge being scooped out on the side exposed to this hypothetical force, while it still remains on the other.

Fig. 6 furnishes a notable example of parallel growth. The foreign matter occupies roughly parallel positions in the two individuals, while one patch of inclusions is common to both. The included areas are of uniform dark color, and shew no differentiation such as is apparent in fig. 2, and the crust is homogeneous.

Rohrbach[2] explains the peculiar structure of chiastolite crystals by supposing the growth to proceed unequally, the crystal

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[2] Rohrbach—Zeitschr. Deuts. Geol. Ges., 1887, 39, 635.

increasing more rapidly in the direction of the prism faces than towards the angles. The structure of many of the Bimbowrie specimens is such as to favour this view. According to Lehmann crystals forming in a solution grow most rapidly on the edges, as diffusion currents promote more rapid growth of the angles. But chiastolite is formed by the agency of metamorphism in a presumably solid rock, permeated, no doubt, by heated water and gases, and quite different laws of crystal growth may prevail in such cases. Referring to fig. 2, where the foreign matter forms nearly one half of the entire mass, it seems scarcely admissible, considering the large amount of inert matter, to speak of the crystallising force "constraining" the inclusions to assume a certain regular position. But, by irregular growth, reëntrant angles are formed, and in these a considerable amount of clay-slate is caught up, some being incorporated in the body of the crystal, but the bulk being more nearly related to the containing rock mass. Further metamorphic action may render the union of mineral and "inclusion" more intimate, but that each is semi-independent is apparent from the result of weathering seen in fig. 4.

Prof. Liversidge[3] states that chiastolite occurs in granite rock at Arnprior, Boro, near Goulburn ; in small crystals in slate near Modbury, Shoalhaven ; and near Tumut, in micaceous slate or schist. Mr. E. F. Pittman has found it occurring as small crystals in slate, at the Euriowie Tin Field, Barrier District.

Chiastolite slates, containing small crystals of that mineral, are also known from Queensland, Victoria, and Tasmania. It is interesting to note that the Geological Survey of New South Wales possesses a microscopic section of an aboriginal stone axe, from Strathbogie, Scone, Co. Gough, New South Wales, containing small crystals of chiastolite, some of them very well formed.[4]

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[3] Liversidge—Min. New South Wales, 1888.
[4] David—Proc. Linn. Soc. N.S.W., (2), ii., 4, 1887, p. 1084.

NOTES ON SOME OF THE MORE RECENT ADDITIONS TO THE ETHNOLOGICAL COLLECTION, AUSTRALIAN MUSEUM: No. 1.

By R. Etheridge, Junr., Curator.

(Plates xlviii., xlix.)

1.—Knuckle Dusters.

The use of "Knuckle-dusters" (Plate xlviii., figs. 2, 3) on some of the Pacific Islands is noteworthy. They are made of thick plaited and knotted sinnet cord, roughly shaped to the outline of the backs of the hands clenched, stiff and rigid, and answer more to the Roman *cestus* than to the modern boxing-glove. The positions corresponding to thumbs and index finger knuckles are raised into hard and formidable protuberances Each "duster" is held in position on the hand by a thumb loop, and loops for the first and second fingers, placed along the front edge, through which the fingers are passed before the hand is clenched, and a long wrist cord, which wraps round the wrist several times. The weight is five and a half ounces. These were purchased as coming from Santa Cruz, but later information induces me to believe that they are from the Ellice Group. Cook described[1] boxing matches as indulged in by both sexes on the island of Hapalee in the Tongan or Friendly Group. It appears the boxers held a piece of cord in one hand, which they wrapped firmly about it when they proceeded to box. Mariner, in his "Account of the Natives of the Tongan Islands,"[2] beyond quoting Cook, makes no remark on the subject. Ellis says[3] that amongst the Tahitians, *moto-raa*, or boxing, was conducted with the open fist. On the Ellice and Tongan Groups, a much more formidable hand-cover was used, but on the palm. Mariner describes it[4] as a glove set with shark's teeth, the latter "being fixed in three rows on the palm and fingers of a species of glove made of the plaited bark of the *heábo;* and both hands being armed in this manner, every man endeavours to come to a close scuffle with his antagonist, and to tear open his bowels, with these horrid weapons."

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1 Cook—Voy. to Pacific Ocean, 1776-80, 2nd edit., i., 1785, pp. 246 and 302, pl. xv.

2 Mariner—Natives Tongan Isds., ii., 1817, pp. 306 and 326.

3 Ellis—Polynesian Researches, i., 1832, p. 208.

4 Mariner—*Loc. cit.*, i., p. 320.

2.—Pregnancy Mat.

A curious custom exists on the island of Santa Cruz, Solomon Group, where the women, when pregnant, and appearing in public, wear a specially ordered mat on the abdomen. It is ten and three-quarter inches square, made of Pandanus leaf plaited in alternate zones of different colour, a white zone, and a chequered zone (white and black). A border is sewn on of thinner strips, and finished off with thin black runners in three lines, held in position by passing-under one ribbon of the plaiting at regular intervals. Around the edges are attached as ornaments a series of Money Cowries (*Cypræa moneta*, Linn.), mouths upwards. The shells are made fast by passing a string through two bored holes. At the four corners the free ends of the plaiting are extended as tags, bound with sinnet, and to each two Cowries are made fast. Mr. A. Mahaffie, Deputy British Resident, Solomon Islands, informed me that it would be a great breach of etiquette for the pregnant woman to appear in public without this mat.

3.—Wooden Gold-prospecting Dishes.

Wooden Gold-prospecting dishes from Sœpajang, Sumatra, may be regarded as a novelty. They are broad-oval shallow dishes, obtusely pointed at one end, but coming to a sharp point and flat shelf-like protuberance at the other; they are round below. The largest is twenty-one and a half inches long, by fifteen inches wide, and three and three-quarter inches deep. Whether these dishes are indigenous, or as used by the Chinese gold-washers, I am unable to say. The dishes were presented by Mr. E. V. Bensusan.

4.—Trophy Skull and Bag.

Trophy Skulls from British New Guinea are not uncommon in collections, but the method of carrying these, or at any rate one of the methods, is not so commonly seen. It consists of an oblong bag, fifteen inches long and thirteen inches wide, made of strips of split Pandanus leaf, loosely plaited, smoke dried, and discoloured; plaited loop handles are attached round the mouth. The skull carried in this, although to some extent broken in the malar and zygomatic regions, is a good example of an incised trophy skull, with a narrow pannel carved across the frontal region, and the former incised with roughly executed rhombs. It is from the Fly River Estuary, and was presented by Mr. P. G. Black.

5.—Shell Money.

The manufacture of Shell Money has always been a subject of much interest to Ethnologists, and specimens illustrating the process are always welcome in collections. To the courtesy of Mrs. E. E. Kolbe, of Rallum, New Britain, we are indebted for a series of specimens illustrating the method employed in that district. The shell used is *Chama pacifica*, Brod., and the portion employed is chiefly the red intermarginal ventral area, although the white inner layers of the valves are also utilised. The shells are first broken up into conveniently sized pieces of about three-sixteenths of an inch diameter, and roughly circular. The latter are then smoothed on a flat stone, with a piece of stick eighteen inches long, and three eighths of an inch diameter, having at its distal end a depression to prevent the shell piece from slipping away. When ground down and finished-off the discs are a trifle less in size than the measurements just given. They are next pierced through the middle by a drill, consisting of a shaft twenty-one inches long and formed from a small reed, rather thicker at one end than the other, to which is attached a fragment of chert, as a bit, and bound on by fine twine. The entire exhibit consists of—(*a*) Samples of *Chama pacifica*, Brod.; (*b*) piece of chert for preparation of bits; (*c*) smoothing stick; (*d*) two drill sticks, with chips mounted; (*e*) shell discs in two stages of preparation; (*f*) the same completed ready for stringing; (*g*) string of money ready for use. It is presumed that the drills are rotated with the finger and thumb, as there does not appear to be any contrivance similar to the bar and string of the pump-drill. Compared with some shell-money discs in our collection, and figures of others in various works, these discs are small. This form of shell-money is referred to by Dr. O. Finsch[5] in his "Ethnologische Erfahrungen und Belagstücke aus der Südsee,"—here it is called *Kokonon*, and like the better known *Dewara*, is still powerful as a means of commercial interchange. According to Dr. Finsch, the red beads are the most valuable, or of the first grade, and the white of the second grade. Both are used by the women at Nusa, New Ireland, for purchasing purposes. The beads figured by Finsch are quite similar to those presented by Mrs. Kolbe.

6.—Cuirass or Corselet.

In the "Annual Report for 1900,"[6] I described two of these body protectors from the Kingsmill or Gilbert Islands. Another specimen (Plate xlviii., fig. 1) has now been presented by Mr. A. E. Finckh, from Nikunua, in the same group.

The front of the ventro-thoracic shield is ornamented by a median longitudinal line of three black diamond-shaped figures only, with three similar lines on the inside of the tergal shield, but six diamonds in each row. On the back, or outside of the tergal shield are four lines of like figures, each with six diamonds, and one line of two figures on each side below the axillæ. The tergal shield is high and upstanding, without a collar of any kind,

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5 Finsch—Ann. K. K. Naturhist. Hofmus. Wien., iii., 1888, p. 127, pl. iii, (1), f. 4 and 5.

6 Etheridge—Rec. Aust. Mus., iv., 4, 1901, p. 164, pl. xxii.

the occipital edge being chequered with black spaces. From the arm-holes onwards the cuirass is open at both sides, with overlaps of the tergal shield forwards over the ventro-thoracic shield. The margins of the former have large coir loops, through which the lacing for drawing the two flaps together passes. This lacing is made fast in the centre of the ventro-thoracic shield, each lace being composed of two plaited parts, ending in a free twisted end. The neck or cervico-clavicular opening is pentagonal, and follows the arched outline of the shoulder-pieces. All the diamond-shaped figures are made of human hair. The height of the tergal shield is three feet two inches, the ventro-thoracic is eighteen inches and a half, the width across the shoulders seventeen inches, and the depth across the cervico-clavicular opening nine and a half inches. The circumference around the overlap is three feet nine inches, and the weight seventeen pounds. The execution of the knitting is remarkably good, and the general characters are a combination of those of the two corselets described last year.

7.—Ancestral Drum, or Gong.

The Rev. F. Paton, of Mallicollo, New Hebrides, forwarded to the Museum one of the Ancestral Drums met with in parts of that island, similar in many respects to another received from the Rev. T. Watt Leggatt a year or two ago. The present drum (Pl. xlix.) is a log seven feet four inches long, of teak wood, and in its reduced state two feet six inches in circumference. The slit-like aperture is two feet seven inches long, and one and a quarter inches in width, swelling out a little at the extremities; it is rather nearer the lower than the upper end of the drum. The interior is hollowed out to a shell for the length of the aperture, but the ends of the drum are solid. The front of the upper part of the drum is carved to represent a grotesque human face, with large staring eyes and prominent nostrils, very lateral in position. The nose is in relief, the remainder of the face intaglio; the nose and cheeks are red, the eyes with the irides blue, and the pupils white, the nostrils blue. The face is surmounted by a kind of head-dress, with above it two leaf-like ornaments, one on each side.

This drum represents one of the two types of upright drum, being planted in the ground, and is evidently ancestral in character, of the same type as that presented by the Rev. T. Watt Leggatt already referred to. The latter was from the village of Aulua, Mallicollo, and in forwarding it the Reverend donor supplied the following information, which, I have no doubt, equally applies to Mr. Paton's gift:—"These drums, made of teak-wood *(Na-ka-mu)* are carved into the conventional figure of a deceased ancestor *(Temes)*, by men who make such their profession, and then purchased by any man who wishes to add to his importance. The latter then erects it in the village square *(Amil)*, and it is used in signalling or calling the people in the event of war; or, announcing the deaths of men (not women); or, also used along with others of different timber to supply music for dances.

War Call *(Naburra)*—

teen teen, teen teen, teen.

Death Announcement *(Memisien)*—

teen, teen, teen teen teen, teen teen teen.

Dr. H. B. Guppy suggests[7] the name of "Melanesian Drum" for those made of a portion of tree trunk, hollowed and placed lengthwise on the ground. He says:—"Similar drums are employed by the inhabitants of the New Hebrides." I have already stated that there are *at least* two types in the New Hebrides, both upright drums (we have examples in this Museum), and probably possessing an entirely different significance to Dr. Guppy's horizontal drum, hence his proposed term cannot be accepted to embrace the whole series, as he evidently desires it should.

The two types may be summarised as follows:—

Upright drums or gongs.

(*a*) Enlarged somewhat upwards, and carved into the semblance more or less of a human head and face.

(*b*) Tapering more or less upwards, and without human representation; either plain, or perhaps carved into the rough semblance of a shark.

A village scene is depicted at Lakarere, Aurora Island, by the late Capt. W. T. Wawn,[8] showing upright drums, with these remarks:—"In an open space at one end of the village, stood half-a-dozen native drums—hollow logs, having an opening cut in one side—planted on end in the ground. This was the 'sing-sing' ground, where dances and festivities were carried on."

The drums on Fila Island, off Vate Island, are referred to by Mr. F. A. Campbell[9] as "groups of hollowed-out trunks of trees or posts, fixed in the ground in a circle, a space being cleared all round them . . . . . upon the largest one of the circle some rude kind of figure was generally traced."

An example of the non-facial upright hollow log drum is figured by Edge-Partington[10] as a "gong" from Fila Island, and is similar

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7 Guppy—The Solomon Islands and their Natives, 1887, p. 143.

8 Wawn—The South Sea Islands and the Queensland Labour Trade, 1893, p. 59.

9 Campbell—A Year in the New Hebrides, Loyalty Islands, and New Caledonia, n.d [1873], p. 108, sketch, p. 111.

10 Edge-Partington—Album, 2nd ser., pl. lxxvii., fig. 6.

to one we possess from Mili Point, on Vate Island, presented by Mr. P. G. Black,[11] except that ours is more ornate in carving. It is evidently intended to represent a shark.

The treatment and method of carving on Mr. Paton's drum is similar to that on an object figured by Edge-Partington[12] from the New Hebrides, and termed by him a "fetish post, with head carved and coloured red and green."

In New Britain again, similar upright drums are used. Mr. W. Powell[13] says:—"There is also a larger drum, called 'garamoot,' made of a trunk of a tree, hollowed out, I believe, by dropping small red-hot stones continually into the inside through a small slit on one side. The cylinder is struck with a long stick just below this slit, and produces a deep note that can be heard for an immense distance in fine weather."

"Drums of this kind are heavy, and therefore are seldom moved from the dancing-ground, which is generally an open space in front of a chief's house, and is kept swept and clean by women specially appointed to look after it. The 'garamoot" is also used for alarm signals, in case of war, when it is struck so as to give a sharp quick sound, also for calling the people together." The similarity of this description to that given by the Rev. T. Watt Leggatt needs no comment.

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11 Etheridge—Aust. Mus. Ann. Report Trustees for 1897 (1898), p. 7.

12 Edge-Partington—*Loc. cit.*, pl. lxxxi., f. 1.

13 Powell—Wanderings in a Wild Country, 1883, p. 71.

A NEW AUSTRALIAN VOLUTE.

By Charles Hedley, Conchologist.

Voluta perplicata, *sp. nov.*
(Fig. 23).

Shell broadly fusiform, concave beneath the suture, angled at the shoulder, tapering to the base, solid, glossy. *Colour.*—On a white ground are disposed numerous distant waved narrow longitudinal orange lines; beneath the shoulder and periphery are faint broad suffused spiral bands of the same colour. *Sculpture.*–About nine longitudinal ribs gradually arise in the centre of the whorl, enlarge rapidly, and terminate suddenly in blunt tubercles on the shoulder. These tubercles are continued on the upper whorls, and, becoming finer and closer, pass into the ribbing of the apex. Basal funicle distinct, distorting the colour pattern and entering the aperture between the third and fourth fold. Whorls six, of which three are apical, the latter oblique to the axis of the remainder and causing the first adult whorl to be more immersed at one side. Aperture narrow, columella with six plications, the topmost doubled in one example, becoming smaller and more transverse as they ascend. Length, 75 mm.; breadth, 32 mm.

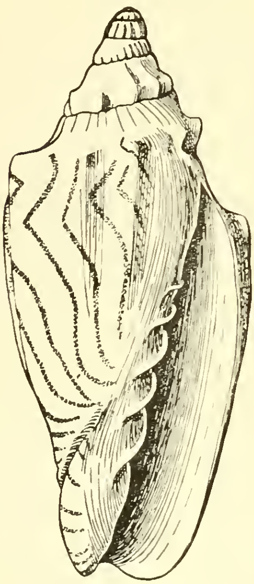

Fig. 23.

I purchased three specimens from a *bêche-de-mer* fisherman in Cairns, Queensland, in August, 1901. The seller had forgotten the exact locality, but said he had taken them either on the neighbouring reefs of the Great Barrier, or on one of the atolls of the Coral Sea.

Among known species, *V. perplicata* is only akin to *V. thatcheri*, McCoy. It resembles that species in the remarkable multiplication of the columella plaits, and in general size, shape, and colour. The novelty is shorter and broader than its fellow. In my species the colour pattern is narrow flexous stripes, in McCoy's a network. *V. perplicata* is especially distinguished by a low ribbed apex, whereas that of *V. thatcheri*, as shown in Prevost's figure,[1] is smooth and elevated.

[1] Prevost—Journ. de Conch., xxi., 1873, pl. i., fig. 1.

DESCRIPTION OF THE EGGS OF THE KAGU, *RHINOCHETUS JUBATUS*, VERREAUX ET DES MURS.

By ALFRED J. NORTH, C.M.Z.S., Ornithologist.

(Plate l.)

RECENTLY Mr. H. E. Finckh presented to the Trustees two eggs of the Kagu that were laid in confinement at Mosman, Sydney. Two of these birds, which he received from New Caledonia over three years ago, started at the beginning of April, 1902, to form a nest of dried twigs and leaves at the bottom of a box in their aviary, and on the 6th April an egg was laid. This was sat on for three weeks, one bird occasionally relieving the other, from which Mr. Finckh concluded they were a pair, but as there was no sign of a chick in the egg it was removed. Another egg was deposited in a small wooden shelter-house in their aviary on the 1st of May, twigs and leaves afterwards being collected and placed around it; the birds sat closer on this egg, but without any success. A third egg was laid on the 25th May, and sat upon for three weeks, but with a similar result. One egg, presented, unblown, showed no trace of fertilisation; neither has Mr. Finckh noticed any actions of the birds, which are alike in plumage, that would furnish undoubted proof that they were male and female.

Of their habits, Mr. Finckh writes:—"From personal observations of the two birds I have had in confinement for over three years, the Kagu is fond of seclusion, but withal the one I regard as the male shows fight at the slightest provocation. Holding itself quite erect, with spread wings, pouting breast, raised crest, and tail brought almost between its legs, the aspect of the bird appears very stately when prepared to give battle. A peculiarity shewn when fighting is that it only attacks its opponent low down, so that when one holds a hand to the height of its body, it misses aim, but if held near the ground it administers a severe nip. When quarreling over a delicacy, the two birds peck at each other's legs."

One egg is oval, the other a blunt ended ellipse in form, the shell being close-grained, smooth, and slightly lustrous. Before they were emptied of their contents, their ground colour was of a warm buffy-brown, but now the shells are dry they are of a uniform pale brown, over which is distributed small dots, blotches, and broad, irregular-shaped longitudinal, and oblique streaks of reddish-umber and umber-brown, intermingled with similar but larger underlying markings of a paler tint, and of different shades of inky-grey which predominate, especially on one specimen, at the thicker end. Many of the markings overlie one another, some very distinct, others having a blurred look as if the colour had been laid on with a brush, and had run or been smeared. On one specimen the surface markings are more numerous, on the other the underlying streaks and blotches; in both, the latter in some places form large confluent patches. Length:—(A) $2{\cdot}45 \times 1{\cdot}84$ inches; (B) $2{\cdot}35 \times 1{\cdot}86$ inches.

So much do these eggs resemble in colour and character of markings those of a Gull or Tern, that had I not known otherwise, I should have unhesitatingly pronounced them to be one or the other. An accurate idea, however, of the markings on the eggs of the Kagu will be gained on reference to the accompanying Plate l., where they are figured of the natural size.

NOTES ON THE ARCHITECTURE, NESTING-HABITS, AND LIFE-HISTORIES OF AUSTRALIAN ARANEIDÆ, BASED ON SPECIMENS IN THE AUSTRALIAN MUSEUM.

By W. J. Rainbow, F.L.S., Entomologist.

(Figs. 24 – 27).

Part III.—THE ECRIBELLATÆ: Haplogynæ.

The Ecribellatæ have been divided into two sub-sections or groups, viz., the Haplogynæ and Entelegynæ, and of these the former contains six families: Sicariidæ, Leptonetidæ, Oonopidæ, Hadrotarsidæ, Dysderidæ, and Caponiidæ. In Australia, the Haplogynæ are represented by the first, third, fourth, and fifth families here enumerated. None of these spiders is provided with a *cribellum* or *calamistrum*, and the majority have only six eyes. In external appearance, and simplicity, their sexual organs closely approach the Theraphosæ. The genital orifice is situated in both sexes in the epigastric fold, between the pulmonary sacs, and is a simple transverse slit. In the male the last joint of the maxillary palpi is more or less cylindrical, and slightly modified in form, and differs but little in general appearance from that of the female; the copulatory organ consists of a cylindrical or globose lobe, with a more or less prolonged extension, and this may be either straight, curved, or twisted, and acts as the conductor of the styli, the orifice of which is situated at the tip.

Family SICARIIDÆ.

This family is divided by Simon into six sub-families, only one of which—Scytodinæ—is represented in Australia. One genus only, *Scytodes*, Latr., is associated by E. Simon with this sub-family, and its geographical range is given as:—"Europa et Regio mediterranea; ins. Atlanticæ; Africa tropica et austr.; ins. Madagascar; Acia occid., centr., orient et merid.; Malaisia et Polynesia; America septr., centr., merid. et antillana."[1]

Three species of this genus are known to me as occurring in Australia, viz., *Scytodes marmorata*, L. Koch, originally recorded from Upolu and Rarotonga; and *S. striatipes*, L. Koch, originally recorded from Upolu, Tonga, and Viti Islands; the third species is apparently *S. thoracica*, Walck , a well-known European form.

[1] Simon—Hist. Nat. Araignées, 2nd edit., i., 1892, p. 276.

The interior of buildings, caves, fissures of rocks, under stones, herbage, and trunks of trees (near the ground), are the favourite haunts of *Scytodes.* They are very slow in their movements. The webs are small, very irregular, and composed of a few loose lines apparently thrown out at random. *S. thoracica* carries its cocoon, which is globular and of a brown colour, under its sternum, where it is held in place by the falces and palpi.

According to Simon, some Malaysian species, notably *S. pallida*, Dal., which is very common in the Philippines, are somewhat different in their spinning habits, and are frequently found on the leaves of trees, which they roll much after the manner of the Clubionidæ and Theridiidæ.[2]

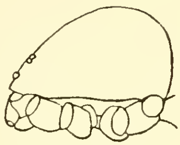

Fig. 24.

Fig. 25.

I have collected *S. marmorata* and *S. thoracica* (?) both in rock shelters and buildings. In these spiders the cephalothorax is very high behind, convex, and sloping sharply forward; the eyes (six) are arranged in three series of two each, and of these each lateral pair is placed obliquely, and the third or median pair are situated well forward; the falces are very weak (Figs. 24 and 25).

Family OONOPIDÆ.

Simon has divided this family into two sections, viz., Oonopidæ molles and Oonopidæ loricatæ,[3] and of these the latter only occurs, so far as is at present known, in Australia. It would not be at all surprising, however, if species referable to the first section should hereafter be discovered upon this continent. *Orchestina*, E. Sim., for instance, is a genus that may reasonably be expected, seeing that it is so widely distributed, species having been recorded from the Mediterranean region and Central Arabia, South Africa, Island of Taprobane, the Philippines, New Zealand, and Venezuela. *Oonops*, Templ., is another widely distributed genus, the range of which is Europe and the Atlantic Islands, the Antiles and Venezuela, Egypt and South Africa, the Islands of Maderia and Taprobane.

Oonopidæ molles embrace all those spiders the abdomen of which is wholly soft and devoid of plates or scales; sometimes,

---

[2] Simon—*Loc. cit.*, p. 276.
[3] Simon—*Loc. cit.*, pp. 292 and 296.

however, the abdomen is rather tough or leathery beneath in the epigastric region. The first two genera in this section, of which *Orchestina* is one, differ somewhat from the normal type of the family, but their characters are not considered by Simon sufficient to warrant the creation of a sub-family. *Oonops pulcher*, Templ., a European species, is included in our collection. These spiders are, as a rule, of a uniform tint, and generally yellowish or orange-red, but the abdomen is always of a lighter colour than the other parts of the body.

Oonopidæ loricatæ contain all those species in which the abdomen is armed with hard plates or scales. In typical forms, such as those of *Gamasomorpha*, *Dysderina*, etc., the entire superior surface of the abdomen is completely covered with a dorsal plate, oval, and more or less convex; the inferior surface is also provided with a *scutum* or plate, which is narrowest in front, where it surrounds the pedicle, and is dilated a little above at the point of its insertion; the plate is prolonged to the rear, and is truncated immediately in front of the base of the spinnerets.

The teguments, which are very hard, are often smooth and brilliant, sometimes granulated, finely striated, or punctated; they are furnished with isolated hairs or bristles, which are at times fine and cylindrical, sometimes depressed and lanceolate, but very rarely plumose.

The Oonopidæ loricatæ embrace eleven genera, only one of which—*Gamasomorpha*, Karsch,—is at present known to occur in Australia. There are others, however, so widely distributed, that it is only reasonable to assume they may hereafter be recorded from this continent.

Fig. 26

Gamasomorpha has a wide geographical range. It is as follows[4]:—"Arabia petræa; ins. Taprobane; Singapore; Birmania; Sumatra; ins. Philippinæ; Japonia; Nova-Hollandia; Antillæ et Venezuela." It also occurs in the South Sea Islands. *G. loricata*, L. Koch, is found in Australia, but it was originally recorded from the Island of Upolu. It has six eyes, in three series of two each; they are arranged as delineated in the figure herewith (Fig. 26).

The Oonopidæ are all small, never exceeding 4 mm. in length. *G. loricata* is only 3 mm., and some species are even less. They are usually found amongst vegetable *débris;* one European species has been recorded as dwelling in the interior of houses, its presence having been noted in herbaria and entomological collections, where it doubtless preys upon minute Acarids.[5] This species, although it has not been recorded from Australia, has probably been

[4] Simon—*Loc. cit.*, p. 301.
[5] Simon—*Loc. cit.*, p. 291.

introduced into this country, for old and dirty collections, although free from *Anthrenus*, have frequently specimens covered with fine cob-web. These tiny spiders run quickly, but with a succession of jerks; sometimes they progress by leaps. They do not construct a web for the capture of prey. The cocoons are very simple, white, sub-globose, and composed of flocculent silk, the threads of which are irregular, yet nevertheless sufficient to cover the rather large eggs. Several cocoons are fabricated by the female, and these are always within the vicinity of her retreat.

Family HADROTARSIDÆ.

This family contains only two genera: *Hadrotarsus*, Thor., and *Gmogala*, Keys. Their systematic position is uncertain.[6] In some respects they approach the Oonopidæ; whilst, on the other hand, they display strong affinities to some of the Theridiidæ, notably species of the genera *Pholcomma*, Thor., *Paculla*, E. Sim., and *Tetrablemma*, Camb. Each genus is represented by a single species, viz., *Habrotarsus barbirussa*, Thor., from Yule Island, New Guinea; and *Gmogala scarabeus*, Keys., from Sydney. These spiders are very minute, and nothing is known of their spinning-work or life-history. I have not seen *Hadrotarsus*, but the Museum collection contains a single female specimen of *Gmogala scarabeus*, Keys. The Hadrotarsidæ are furnished with eight eyes, and those of *G. scarabeus* are figured herewith (Fig. 27).

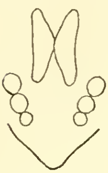
Fig. 27.

Family DYSDERIDÆ.

The Dysderidæ is split up into two sub-families: the Dysderinæ and Segestriinæ, and each is represented in Australia—the first by a single species, and the latter by three.

The genus *Dysdera*, Latr., is recorded by Simon,[7] as occurring in "Europa et regio mediterranea; Africa sept. et max. austr.; ins. Atlanticæ; Asia centr.; America sept. et austr.," and I have since recorded it from Sydney,[8] and described a species under the name *Dysdera australiensis*. The Dysderids are nocturnal spiders, lurking under stones, in cracks of walls, or dark, damp, mossy situations. In such places as these they construct tubes of white silk, the texture of which is very close and strong; scraps of dead leaves are sometimes incorporated in the structure. Those I have examined from under stones and from fissures, have been free from all extraneous materials, whilst those constructed in

[6] Simon—*Loc. cit.*, p. 305; and Thorell—Ragni Malesi e Papuani, iii., 1881, p. 194.

[7] Simon—*Loc. cit.*, p. 318.

[8] Rainbow—Proc. Linn. Soc. N.S.W., xxv., pt. 3, 1900, pp. 483 and 485, pl. xxiii., figs. 1, 1*a*.

situations abounding in vegetable *débris* have always had foreign matter, in the shape of dead leaves, woven into the texture. Unfortunately I have never succeeded in collecting a cocoon. These spiders obtain their prey by hunting, or by laying in wait; they can run fast, and will rush rapidly out of their hiding places in pursuit of passing insects. The *Dysdera* have six eyes, arranged in two rows, and in the form of a transverse oval; the pair comprising the front row are somewhat the largest, and are widely separated from each other; the four constituting the second row are pro-curved, and of these the median pair are not only sensibly the largest, but are also the closest together.

The genus *Ariadna*, Aud. *in* Sav., (sub-family Segestriinæ) occurs in "Regio mediterranea; Africa austr.; ins. Taprobane; ins. Samatra; Japonia *(lateralis*, Karsch); Nova-hollandia et Tasmania *(segmentata*, E. Sim.); America sept.; Antillæ; America merid.: Venezuela, Colombia, Brasilia, Resp. Argent. et Chili."[9]

These spiders are not so active as those of the preceding sub-family. Their white silken tubes are constructed in nooks and crannies, such as the fissures of rocks, holes in walls, depressions in the trunks of trees, or under bark. The texture of the tubes is very close and strong; the orifice is round, and strengthened by a girdle of white silk irregularly woven. The cocoons are white, and lenticular; the eggs numerous, but not agglutinated. *Ariadna* has six eyes, of which the laterals are much the smallest and the widest apart.

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9 E. Simon—*Loc. cit.*, p. 322.

The SYSTEMATIC POSITION of the GENUS *FOSSARINA*, A. ADAMS and ANGAS, and of *FOSSARINA VARIA*, HUTTON.

By H. Leighton Kesteven.

Part I.—The Genus Fossarina.

Some time ago I found that *Fossarina patula*, Adams and Angas, had a rhipidoglossate dentition and a multispiral operculum. I mentioned the discovery to Mr. Hedley, and he at once drew my attention to the genus *Minos*, Hutton, and gave me dried specimens of the type (*M. petterdi*, Crosse), and of *Fossarina varia*, Hutton. The examination of these has been productive of rather curious results.

The genus *Fossarina* was described by A. Adams and Angas in 1863,[1] their type being *F. patula*, from Sydney Harbour. A short description of the shell is followed by the statement, "Operculum corneum, subspirale," and "this genus constitutes a peculiar littoral form allied to *Fossar*, from which it differs in the curvature of the inner lip and circular aperture." It is also compared with *Conradia*, A. Ad , and *Isapis*, A. Ad., and here I might draw the attention of those more fortunately placed than myself, to the fact that none of the six species of the former of these two genera have been figured. When dealing with the Japanese species (*Fossarina picta*, A. Ad.),[2] Dunker questioned the correctness of the systematic assignment of the species.[3]

Stearns and Pilsbry, when recording the same species, placed it between *Littorina* and *Echinella*, removing it from the family Fossaridæ.[4]

The statement of Adams and Angas that the operculum was subspiral has proved disastrous. Hutton obtained specimens of *Fossarina petterdi*, Crosse,[5] to compare with his *F. varia*, and found that it had a multispiral operculum and a dentition like *Cantharidus*,[6] and in 1885 made the genus *Minos* for its reception.[7]

1 A. Adams and Angas—Proc. Zool Soc., 1863, p. 423, pl. xxxvii , f. 9, 10.
2 A. Adams—Proc. Zool. Soc., 1867, p. 312, pl. xix., f. 26.
3 Dunker—Mar. Moll. Jap., i., 1882, p. 113.
4 Stearns and Pilsbry—Cat. Mar. Moll. Jap., 1895, p. 62.
5 Crosse—Journn. de Conch., (3), x., 1870, p. 303; (3), xi., 1871, p. 323, pl. xii., f. 1.
6 Hutton—Proc. Linn. Soc. N.S.W., vii., 1883, p. 66.
7 Hutton—*Loc. cit.*, ix., 1881 (1885), p. 369.

His description of the operculum and dentition was dismissed by Tryon with the remark that the species had not the pearly nacre of a *Trochus*.[8]

The dentition of *F. patula* is shown in Fig. 28 (*a*), as also the rachidian of *F. petterdi* (*b*), which seems to differ from that of the former in having an expanded root, but this difference probably does not really exist, for it was only seen with great difficulty, owing to its transparency, in a dismembered ribbon, and it is likely that it exists, unseen, in *F. patula* also; there is no other difference between the two ribbons. The opercula of both species are so typically trochoid, that it has not been thought necessary to figure them; the form also of the shells is congeneric, and it was on a supposed anatomical difference that Hutton separated them. The carelessness of the authors of *Fossarina* has led to the making of the genus *Minos*. The necessity for Part II. of this paper is another result of that carelessness. That the shell which I have regarded as *F. patula*, is correctly identified there can be no doubt. It agrees perfectly with the description and figures, with the exception of the operculum; moreover it is the shell which has been so identified by every local Conchologist, including Messrs. Hedley and Brazier.

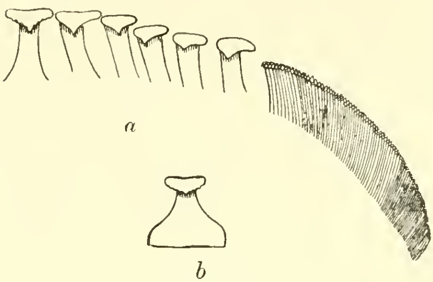

Fig. 28.

Tate and May, in dealing with the genus *Minos*, remark :—"The author founded this genus on the Tasmanian shell *Fossarina petterdi;* he placed it in the family Stomatidæ, but the 'horny multispiral operculum, the dentition resembling *Cantharidus*,' and the porcellaneous, somewhat iridescent interior, induce us to place it in the vicinity of *Gibbula*."[9] The complete closure of the aperture by the operculum strengthens this classification. Its right place seems to be between *Gibbula* and *Margarita*, with which the internally iridescent species *Fossarina legrandi*, Petterd,[10] seems to connect it, and with which it may even prove synonymous.

The result of the these investigations, then, is that *Minos* is a synonym of *Fossarina*, and that the genus should be placed in the Trochidæ, between *Gibbula* and *Margarita*.

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8 Tryon—Man. Conch., ix., 1887, p. 275.

9 Tate and May—Proc. Linn. Soc. N.S.W., (2), xxvi., 1901, p. 403.

10 Petterd—Journ. Conch., 1879; Tate and May—*Loc. cit.*, p. 404, pl. xxiv., f. 21, 22.

A second species, *F. brazieri*,[11] was described by Angas from Sydney Harbour; the differences between the two are slight, and all the intermediate forms are obtainable; the name must therefore be regarded as a synonym of *F. patula*, though it may be retained by pedants as a cabinet variety.

PART II.—FOSSARINA VARIA.

Hutton's mistake in making the genus *Minos* was practically unavoidable, because his *F. varia* answered in every way to the description of *Fossarina*; it has a subspiral operculum, and the dentition shows it to be related to *Littorina*. His tenative reference of the species to *Risella*,[12] seems to show that he was well aware of these facts, consequently he had no reason to doubt the correctness of Adams and Angas' description; but in these points, as we have seen, it differs widely from that genus. It, therefore, devolves on me to make a genus for the reception of the species.

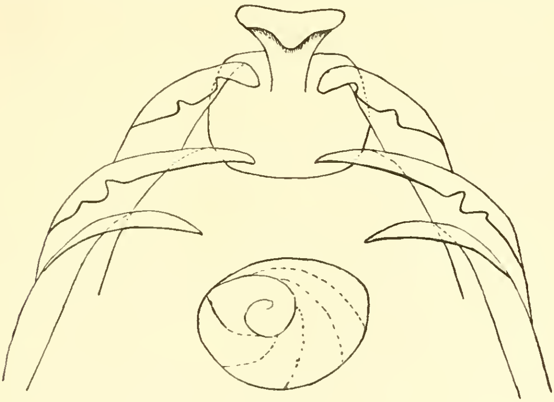

Fig. 29.

RISELLOPSIS, *gen. nov.*

A genus closely allied to *Risella*.[13]

Shell.—Comparatively small; stomatiform or depressed trochoid, perforate, rather solid, spirally ribbed or carinated transversely, growth striate; aperture oval (subject to modifications caused by sculpture), oblique, interior porcellaneous, outer lip sinuated according to sculpture, columella short, curved; operculum corneus subspiral (Fig. 29).

11 Angas—Proc. Zool. Soc., 1871, p. 18, pl. i., f. 24.
12 Hutton—Journ. de Conch., 1878, p. 27.
13 Hence the name.

Animal.—As only dried material was obtainable, nothing but the radula could be deciphered.

Dentition—Fig. 29. 3 + 1 + 3. The rachidian is bluntly unicusped, provided with a broad root; the first lateral has three blunt cusps, the centre one broadest; the second, has one cusp on the distal attached end, and a long scythe-like blade as the proximal end; the third lateral is a simple scythe-like blade; all three are provided with long narrow roots.

Type.—Fossarina varia, Hutton.[14]

The porcellaneous interior, and indeed the general texture of the shell, are strikingly like *Risella*, so much so that I was inclined to assign it subgeneric rank under that genus, but the contour of the shell, and the difference in dentition are, it seems, sufficient justification for giving it full generic value.

A comparison of my figure of the dentition with that of *Adeorbis*, by Fischer,[15] suggests that perhaps Hutton's reference of his species to that genus was much more correct than his reference of it to *Fossarina*; it may be that *Risellopsis* forms a connecting link between *Risella* and *Adeorbis*. The fact of the operculum being corneus in the one and calcareous in the other, need not be considered antagonistic to this, as evidenced by the close relationship of *Polinices* and *Natica*.

It is possible that *Risella (Peasiella) caledonica*, Crosse,[16] is referable to *Risellopsis*, but as I am unable to examine either the radula or the operculum, I refrain from saying definitely that it is.

To the more thoroughly appreciate the characters of *Risellopsis*, it was found necessary to obtain the radula of *Risella*; while doing so, anatomical differences between it and *Littorina* were observed. I hope shortly to describe these differences at length in a paper devoted to the subject.

As *Risellopsis varia* has been but briefly described, and never figured, I append the following descriptions and figures:—

RISELLOPSIS VARIA, *Hutton.*

(Figs. 30, 31, 32).

Adeorbis varia, Hutton, Cat. Marine Moll., Col. Mus. and Geol. Surv. N.Z., 1873, p. 35.

Fossarina varia, Hutton, Man. N.Z. Moll., Col. Mus. and Geol. Surv. N.Z., 1880, p. 79.

Shell rather solid, opaque with translucent spaces, turbinate, perforate, of three and a half whorls; whorls rounded.

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[14] Hutton—Cat. Marine Moll., Col. Mus. and Geol. Surv. N.Z., 1873, p. 35, (as *Adeorbis*); Man. N.Z. Moll, 1880, p. 79, (as *Fossarina*).

[15] Fischer—Journ. de Conch., 1885, p. 166, pl. ix., f. 1 - 4.

[16] Crosse—Journ. de Conch., 1874, p. 206; 1875, p. 139, pl. vi., f. 6 (as *Fossarus*); Tryon—Man. Conch., ix., 1886, p. 263 (as *Peaseiella*).

Colour—Ground colour brown, with a few splashes of grey on the spire; on the body whorl the grey predominates; umbilical region white.

Sculpture.—Spirals: superiorly there are two riblets, the first (and smaller) close to the suture, the other median; there are two equal sized riblets on the periphery, the lower of which is seen

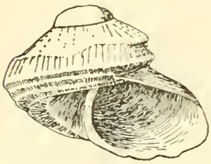

Fig. 30.

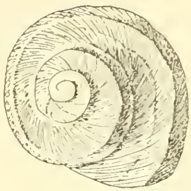

Fig. 31.

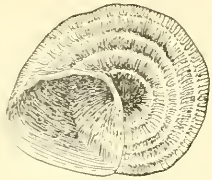

Fig. 32.

just above the suture on the whorls of the spire; this sculpture decreases in size till it is lost on the apical whorls. The base is sculptured with three equal ribs, and a smaller one defining the umbilical region. Longitudinally the shell is covered with oblique growth striæ. Mouth oval, oblique, outer lip sharp, sinuated by the basal ribs; columella short, curved, and reflected over the perforation; inner lip defined by a thin transparent callous.

Dimensions.—Max. diam., 8·5; minim., 7; height, 4·66 mm.

Epidermis—None.

For operculum and dentition see generic description.

RISELLOPSIS VARIA, *var.* CARINATA, *var. nov.*
(Figs. 33, 34, 35).

Shell rather solid, slightly translucent, depressed trochiform, perforate, of three and a half whorls.

Colour.—Ground colour pale yellow; viewed from above the yellow is, on the spire, splashed with brown; on the body whorl these splashes become confluent, the area between the carinæ is marked like the top of the body whorl, on the base there are a few pale brown streaks at the circumference; the umbilical region is white.

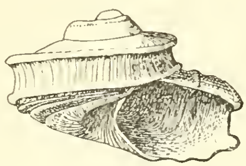

Fig. 33.

Contour.—Depressed trochiform, tabulate.

Sculpture.—Spirals: two prominent carinæ divide the shell into a superior, a peripheral, and a basal area; there are on the superior area two small riblets, one, the smaller, at the suture, the other a little less than a third of the breadth of the area from the suture;

on the base there are three riblets of about equal size, and a smaller one defining the umbilical region. Longitudinally the shell is covered with oblique growth striæ. Mouth oval, oblique, outer lip sharp, sinuated by the carinæ and basal ribs; columella short, curved, and reflected over the perforation. Seen from below the mouth is somewhat rhomboidal, with one rounded side (the basal margin); the callus is projected on the body whorl.

Epidermis.—None.

Dimensions.—Max. diam., 5; minim., 4·3; height, 3 mm.

Operculum and dentition as in the type form.

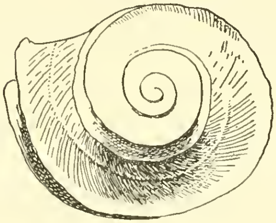

Fig. 34.

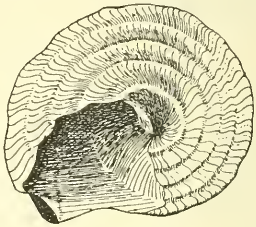

Fig. 35.

Differs from typical examples in the development of the two keels, to which is due the difference in contour.

To the kindness of Mr. H. Suter, I am indebted for spirit specimens of *Minos rimata*, Hutton.[17] The dentition I find to be that of a *Fossarina.*

Adendum.—Since writing the above, Part 2 of Vol. xiv. of the Proceedings of the Royal Society of Victoria (1902), has come to hand. In it,[18] Pritchard and Gatliff recognise *Minos* as a synonym of *Fossarina*, and regard *F. funiculata*, Ten. Woods,[19] as a synonym of *F. brazieri.*

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[17] Hutton—Proc. Linn. Soc. N.S.W., ix., 1884 (1885), p. 369.
[18] Pritchard and Gatliff—Proc. Roy. Soc. Vict., xiv., 2, 1902, p. 24.
[19] Ten. Woods—Proc. Roy. Soc. Vict., xvii., 1881, p. 81, pl. i., f. 6, 7; Tate and May—Proc. Linn. Soc. N.S.W., (2), xxvi., 1901, pl. xxiii., f. 9.

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RECORDS

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Curator.

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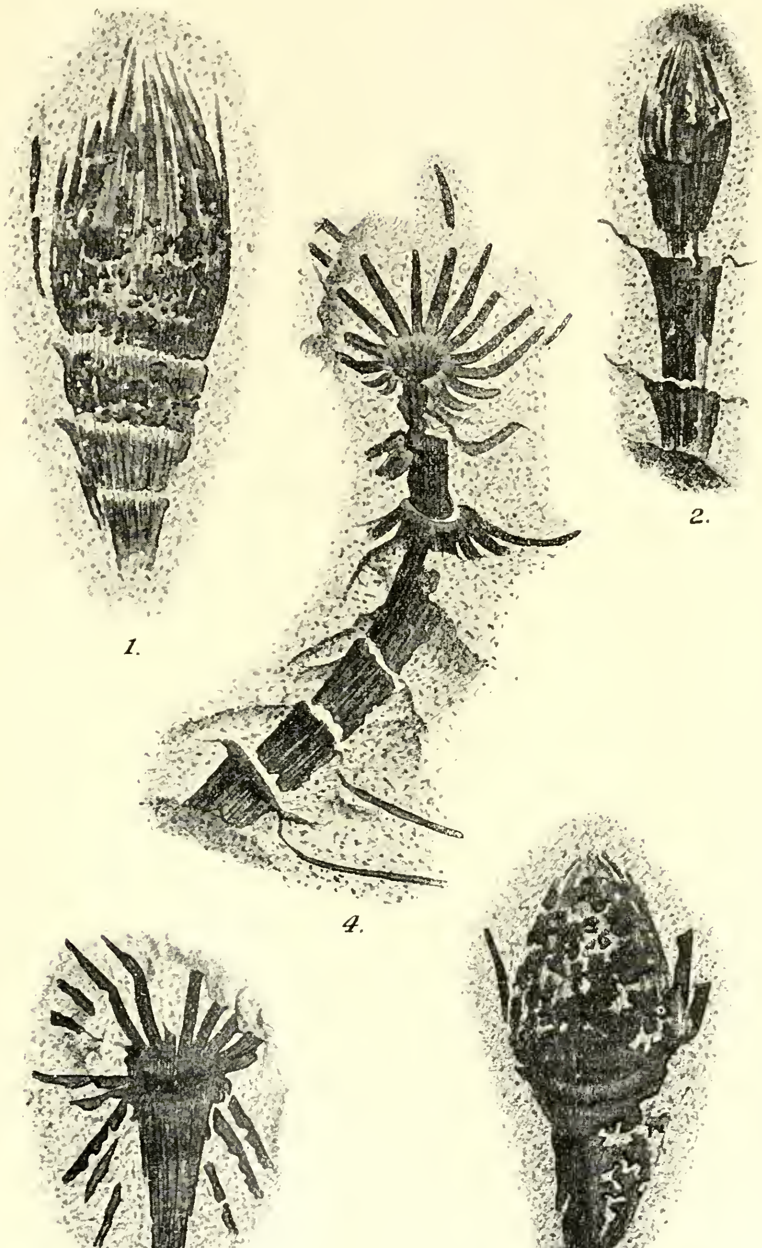
" 3. A medium-sized cone, with constrictions, remains of leaves, and a peduncle-like base. × 4.

Foliage, &c.

" 4. Portion of a stem or branch, comprising at least six internodes. At the distal end is seen a portion of a collar and sheath, with radiating leaves somewhat stouter than those clothing the cones (Figs. 1 – 3), whilst below are parts of two other sheaths reversed. × 2.

" 5. Portions of a sheath with similar but stouter leaves.



1. 2. 4. 5. 3.

FRANK R. LEGGATT, Del.

EXPLANATION OF PLATE II.

Strobili.

Fig. 1. The larger of the two largest cones, exhibiting delicate acicular leaves springing from the nodal lines. × 2.

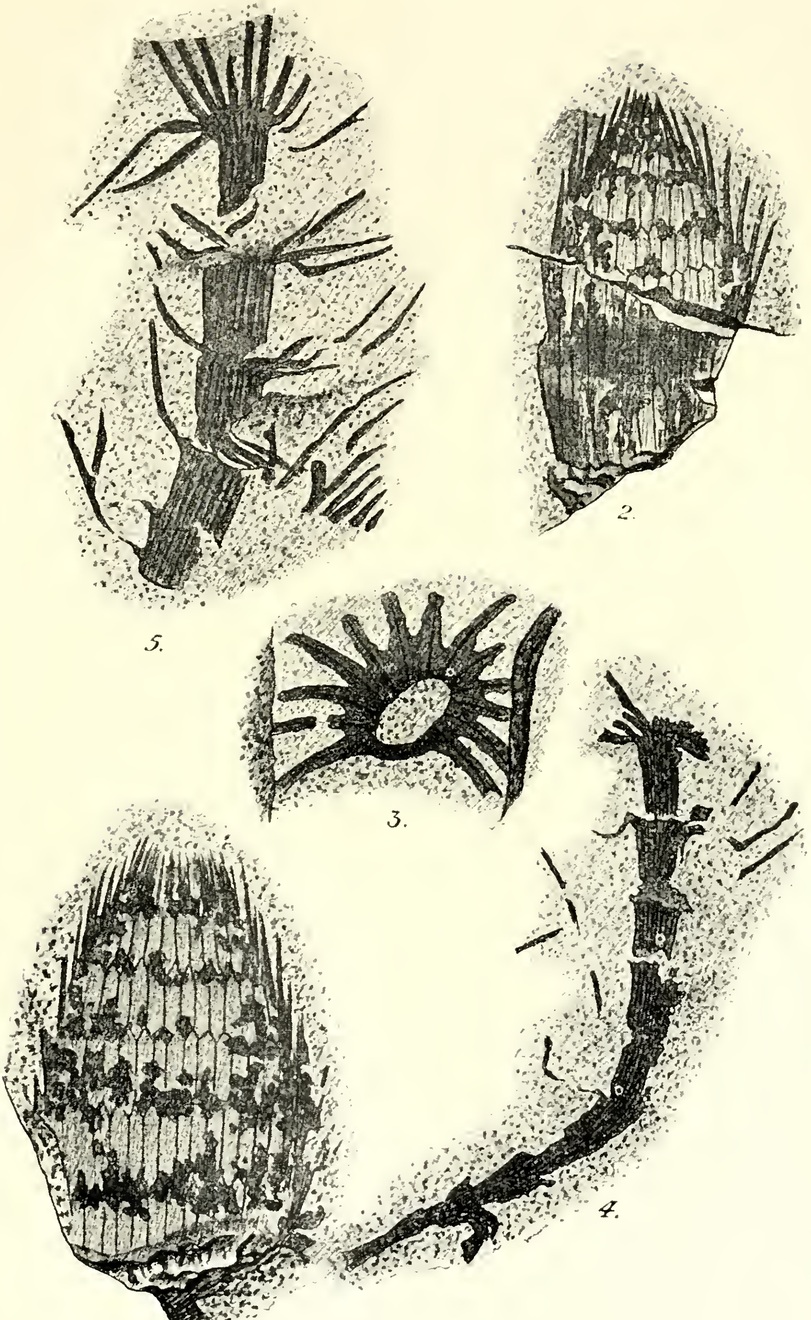
,, 2. The smaller cone, exhibiting similar features, but the marginal leaves are more apparent. × 2.

Foliage, &c.

,, 3. Portion of a sheath, seen obliquely from above, with stout uninervate leaves. × 3.

,, 4. Portion of a stem or branch, of eight internodes more or less, gradually diminishing downwards, and presenting a somewhat vase-like outline. × 2.

,, 5. Portion of a more robust stem or branch, of five internodes, more or less, with leaves attached. × 2.



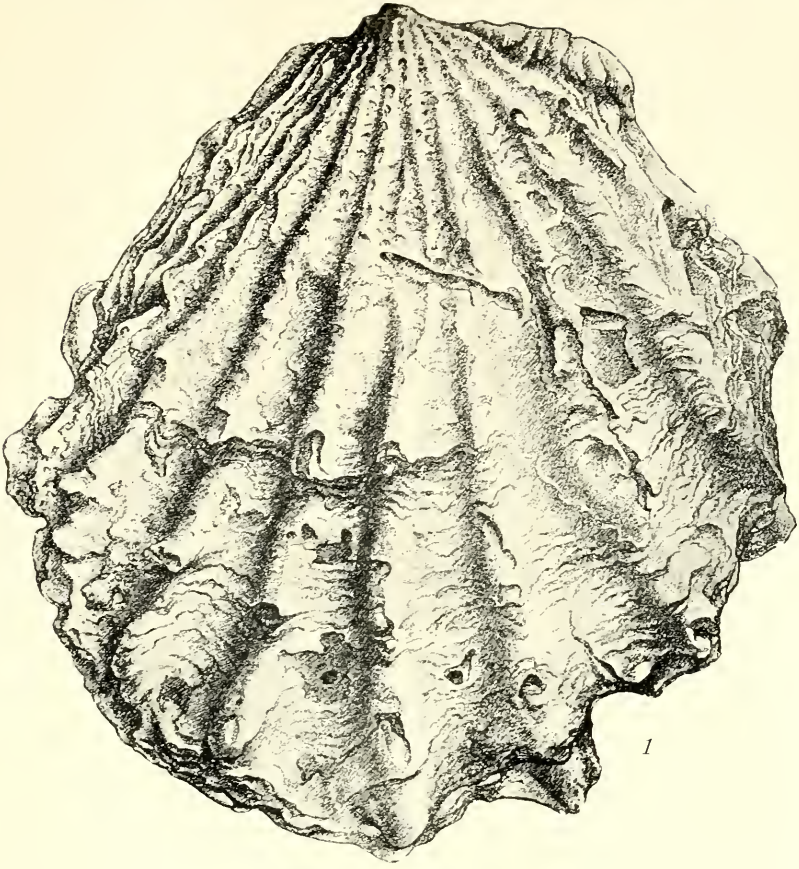
FRANK R. LEGGATT, Del.

EXPLANATION OF PLATE III.

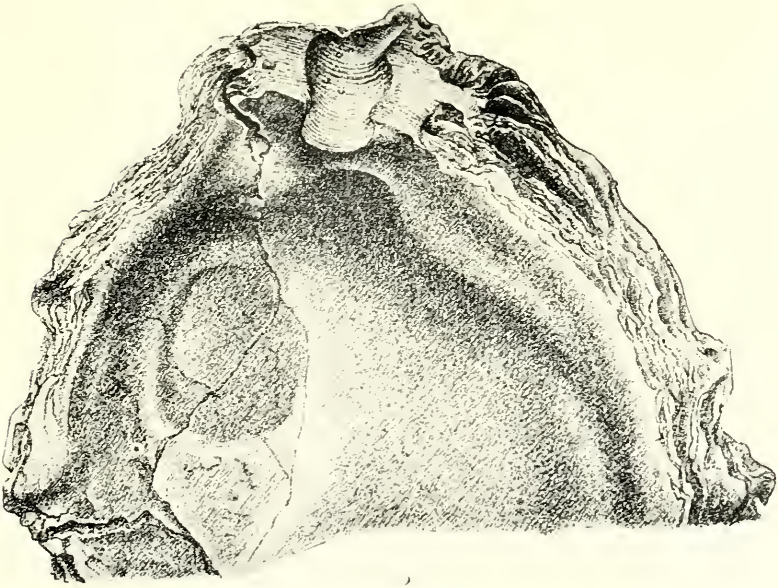
Ctenostreon pectiniformis, Schl., sp.

Fig. 1. Right valve viewed from the exterior, exhibiting nine well developed costæ.

,, 2. Interior of the dorsal portion of the same specimen, exhibiting the cardinal area, chondrophore, and adductor impression.



1



2

FRANK R. LEGGATT Del.

EXPLANATION OF PLATE IV.

Fig. 1. *Hemiscyllium modestum*, Günther.
Fœtus, natural size.

Fig. 2. *Squalus megalops*, Macleay.
Fœtus, natural size.

[Reproduced from drawings by the author].

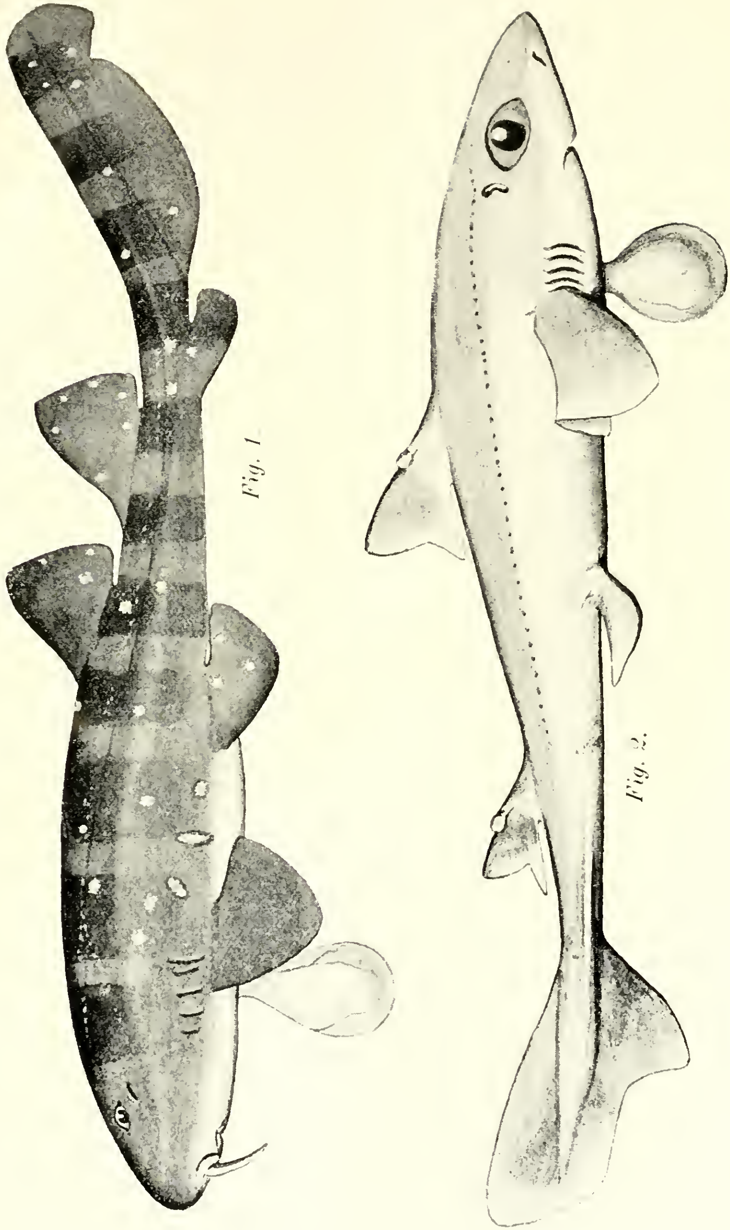


Fig. 1

Fig. 2.

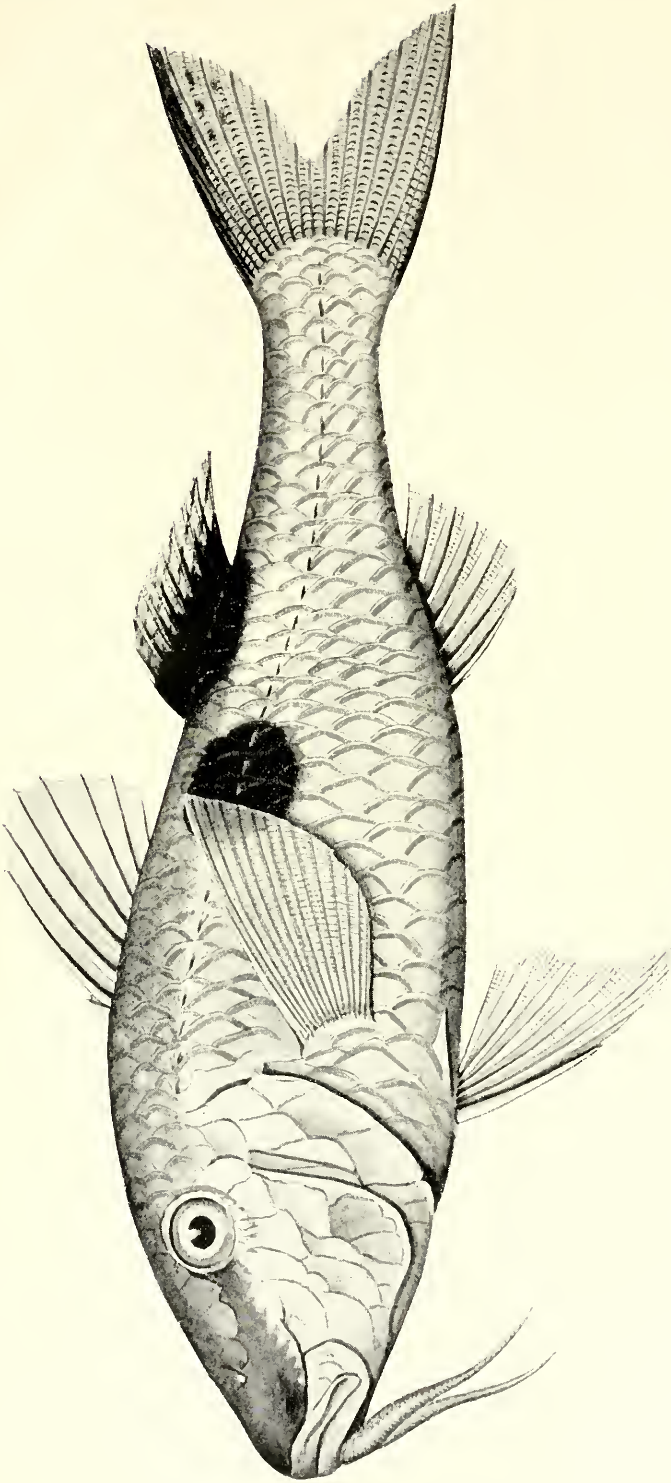
EDGAR R. WAITE, Del.

EXPLANATION OF PLATE V.

Upeneus pleurostigma, Bennett.

About two-thirds natural size.

[Reproduced from a drawing by the author].

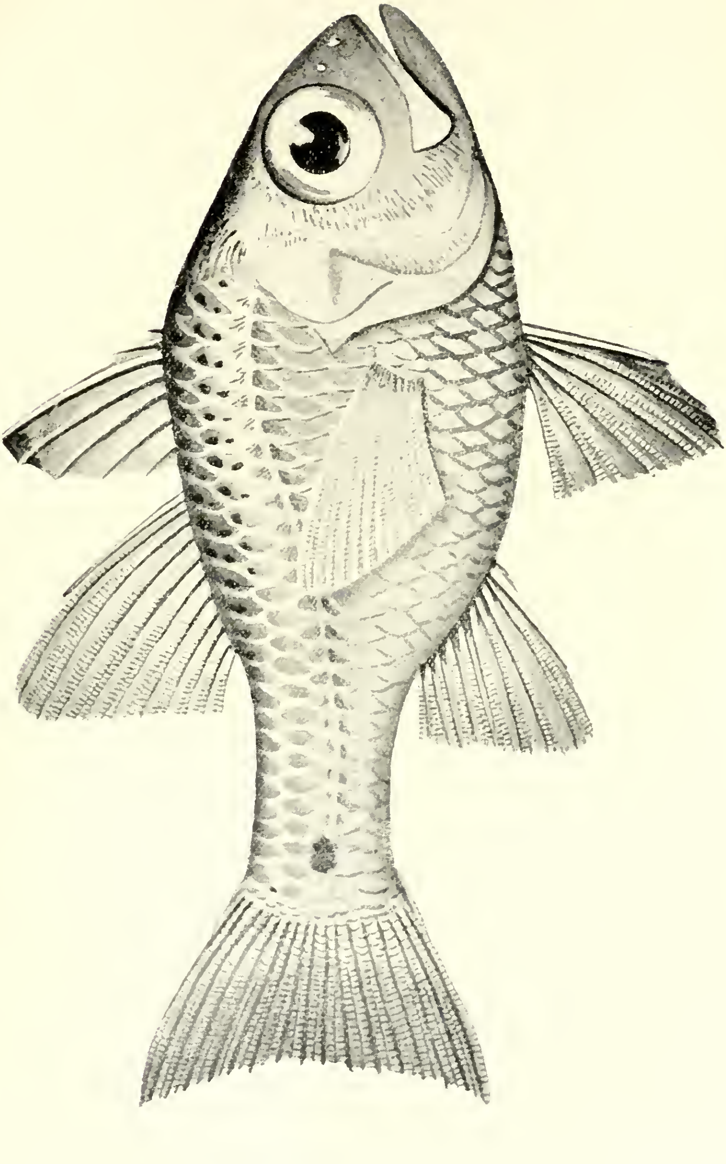


EDGAR R. WAITE, Del.

EXPLANATION OF PLATE VI.

Apogon norfolcensis, Ogilby.
Natural size.

[Reproduced from a drawing by the author].



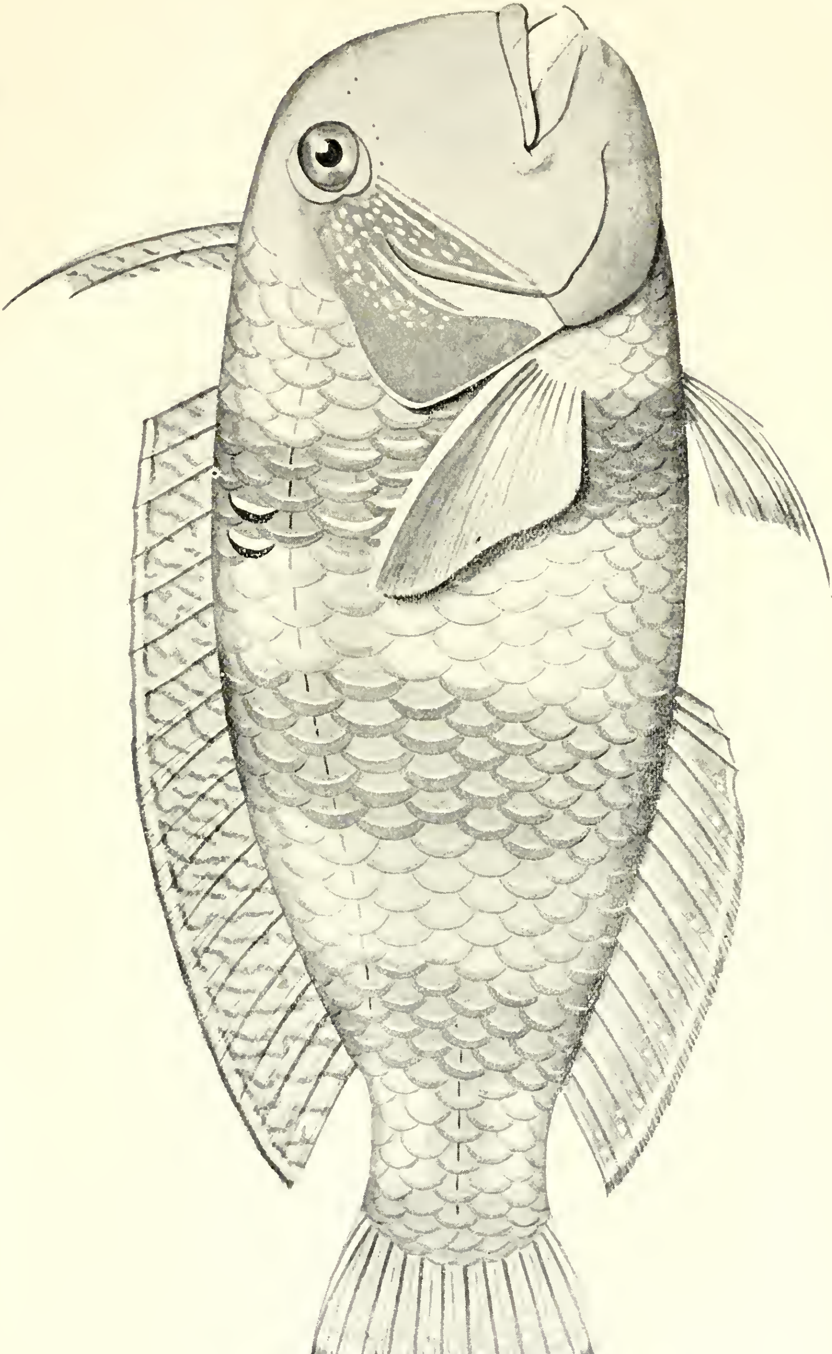
EDGAR R. WAITE, Del.

EXPLANATION OF PLATE VII.

Iniistius cacatua, Waite.

Three-fifths natural size.

[Reproduced from a drawing by the author].



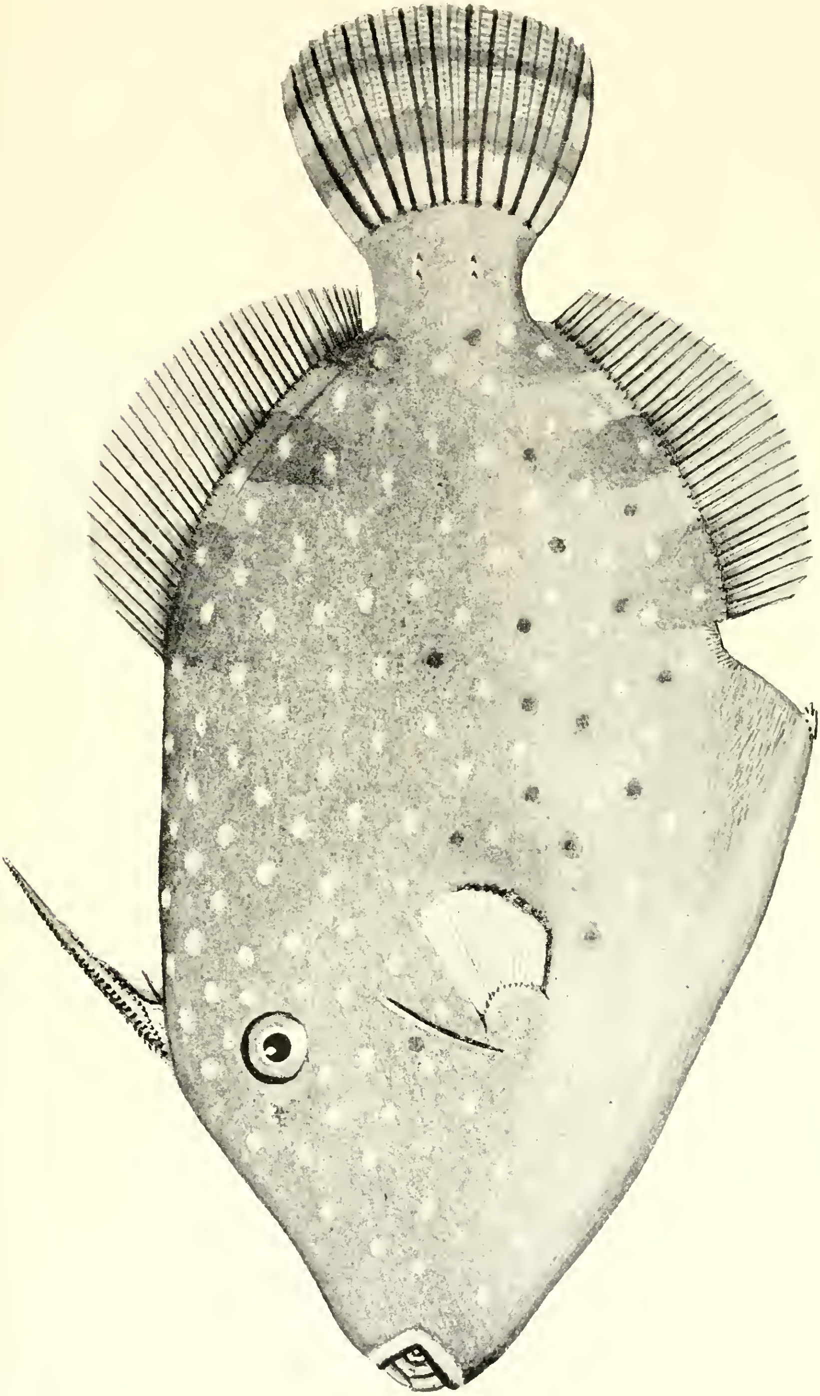
EDGAR R. WAITE, Del.

EXPLANATION OF PLATE VIII.

Monacanthus howensis, Ogilby.

Natural size.

[Reproduced from a drawing by the author].



EDGAR R. WAITE, Del.

EXPLANATION OF PLATE IX.

Calcinus imperialis, sp. nov.

Fig. 1.	Adult male. About natural size.		
,, 2.	Half-grown male. About natural size.		
,, 2*a*.	Right chelipede.	,,	,, ,,
,, 2*b*.	Second leg.	,,	,, ,,
,, 2*c*.	Third ,,	,,	,, ,,
,, 2*d*.	Fourth ,,	,,	,, ,,

T. WHITELEGGE, Photo.

EXPLANATION OF PLATE X.

Fig. 1. *Reniera dendyi*, Whitelegge.
,, 2. *Reniera corticata*, Whitelegge.
,, 3. *Pachychalina aurantiaca*, Lendenfeld.
,, 4. *Chalina globosa*, Lendenfeld.
,, 5. *Chalina spiculifera*, Whitelegge.
,, 6. *Chalina ligulata*, Whitelegge.
,, 7. *Arenochalina mirabilis*, Lendenfeld.
,, 8. *Pseudohalichondria fibrosa*, Whitelegge.
,, 9. *Desmacidon dendyi*, Whitelegge.

All the figures are reduced to about one-fourth the natural size.

T. WHITELEGGE, Photo.

EXPLANATION OF PLATE XI.

Fig. 10. *Clathria tenuifibra*, Whitelegge.

,, 11. *Clathria dura*, Whitelegge.

,, 12. *Clathria australiensis*, Carter.

,, 13. *Clathria rubens*, Lendenfeld. The type (No. 286) of *Thalassodendron rubens*, Lendenfeld.

,, 14. *Plumohalichondria australis*, Lendenfeld. The type (No. 267) of *Clathria macropora*, Lendenfeld.

,, 14*a*. *Plumohalichondria australis*, Lendenfeld. The type (No. 278) of *Echinonema levis*, Lendenfeld.

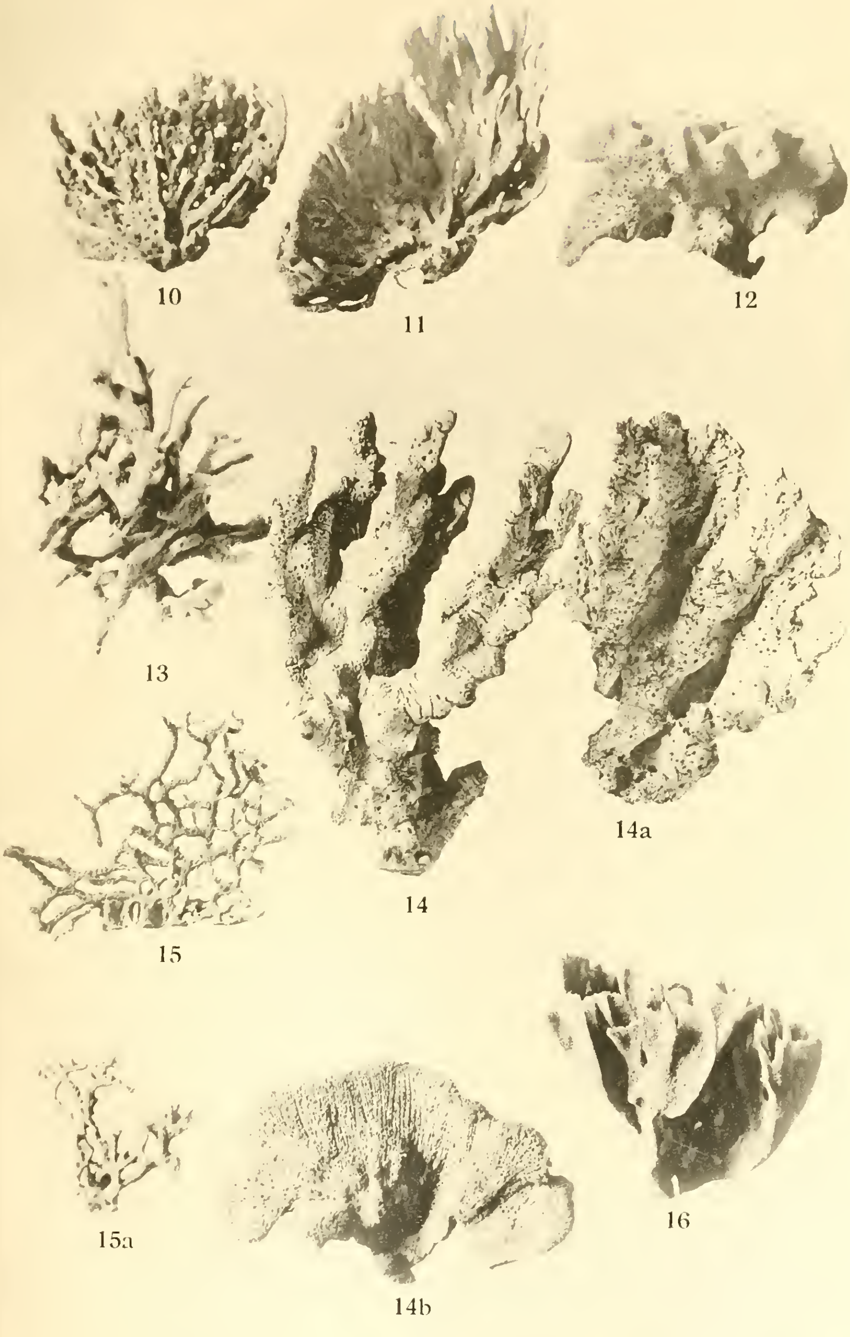
,, 14*b*. *Plumohalichondria australis*, Lendenfeld. The type (No. 285) of *Clathria australis*, Lendenfeld.

,, 15. *Clathria arborea*, Lendenfeld.

,, 15*a*. *Clathria arborea*, Lendenfeld. The type (No. 346) of *Plectispa arborea*, Lendenfeld.

,, 16. *Ciocalypta compressa*, Carter.

All the figures are reduced to about one-fourth the natural size.



T. WHITELEGGE, Photo.

EXPLANATION OF PLATE XII.

Fig. 17. *Euspongia irregularis*, var. *silicata*, Lendenfeld.

,, 17*a*. ,, ,, ,, ,, ,,

,, 18. *Euspongia irregularis*, var. *areolata*, Whitelegge.

,, 19. *Euspongia illawarra*, Whitelegge.

,, 20. *Euspongia officinalis*, var. *dura*, Lendenfeld.

,, 21. *Euspongia pikei*, Hyatt (No. 351).

,, 21*a*. *Euspongia pikei*, Hyatt.

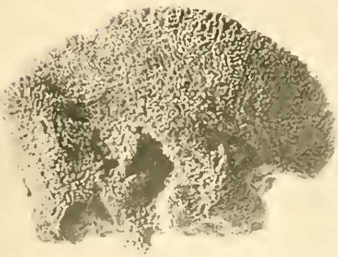
,, 22. *Hippospongia equina*, var. *elastica*, Lendenfeld.

All the figures are reduced to about one-fourth the natural size.


17


18


17a


19


20


21a


21


22

T. WHITELEGGE, Photo,

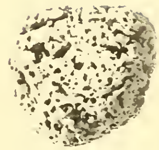
EXPLANATION OF PLATE XIII.

Fig. 23. *Hippospongia mollissima,* Lendenfeld.
,, 24. *Coscinoderma densa,* Hyatt.
,, 24*a*. ,, ,, ,,
,, 25. *Thorecta palmata,* Hyatt.
,, 25*a*. ,, ,, ,,
,, 26. *Thorecta radiatus,* Lendenfeld.
,, 27. *Coscinoderma lanuginosa,* Carter.

All the figures are reduced to about one-fourth the natural size.

24

24a



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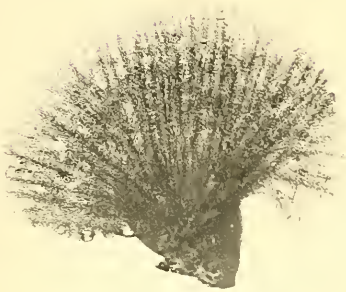
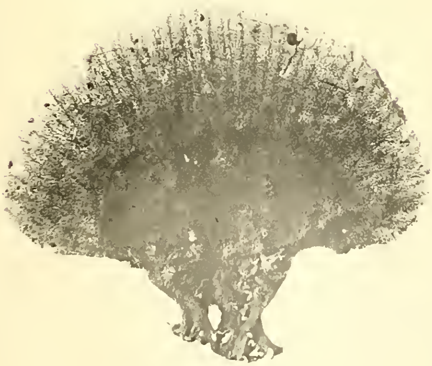


25

26



25a

27

T. WHITELEGGE, Photo.

EXPLANATION OF PLATE XIV.

Fig. 28. *Thorecta tenuis*, Hyatt.

,, 28*a*. *Thorecta tenuis*, Hyatt. One of the types (No. 70) of *Thorecta exemplum*, var *secunda*, Lendenfeld.

,, 28*b*. *Thorecta tenuis*, Hyatt.

,, 29. *Thorecta erecta*, Hyatt.

,, 29*a*. ,, ,, ,,

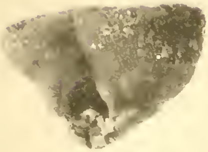
,, 29*b*. ,, ,, ,,

,, 29*c*. ,, ,, ,,

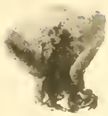
,, 29*d*. ,, ,, ,,

,, 29*e*. *Thorecta erecta*, Hyatt. The type (No. 75) of *Thorecta exemplum*, var. *tertia*, Lendenfeld.

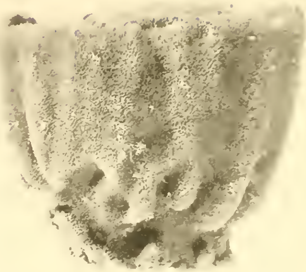
All the figures are reduced to about one-fourth the natural size.



28



28a



28b

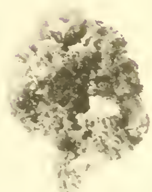
29

29a

29b

29c

28d



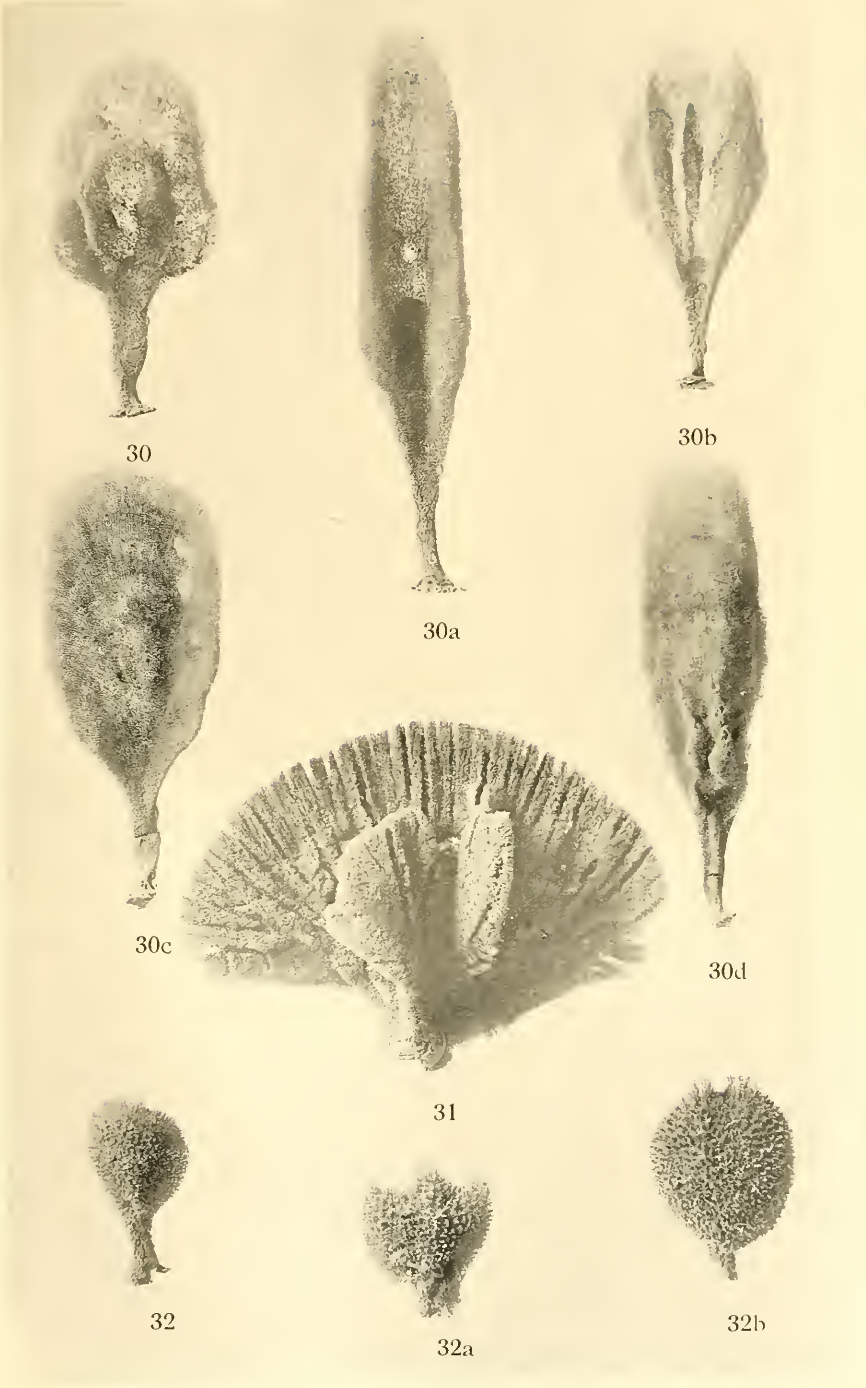
29e

T. WHITELEGGE, Photo.

EXPLANATION OF PLATE XV.

Fig. 30.	*Thorecta marginalis*, Lendenfeld.	
,, 30*a*.	,, ,, ,,	
,, 30*b*.	,, ,, ,,	
,, 30*c*.	,, ,, ,,	(concave surface).
,, 30*d*.	,, ,, ,,	(convex surface).
,, 31.	*Stelospongia canalis*, Lendenfeld.	
,, 32.	*Stelospongia levis*, Hyatt.	
,, 32*a*.	,, ,, ,,	
,, 32*b*.	,, ,, ,,	

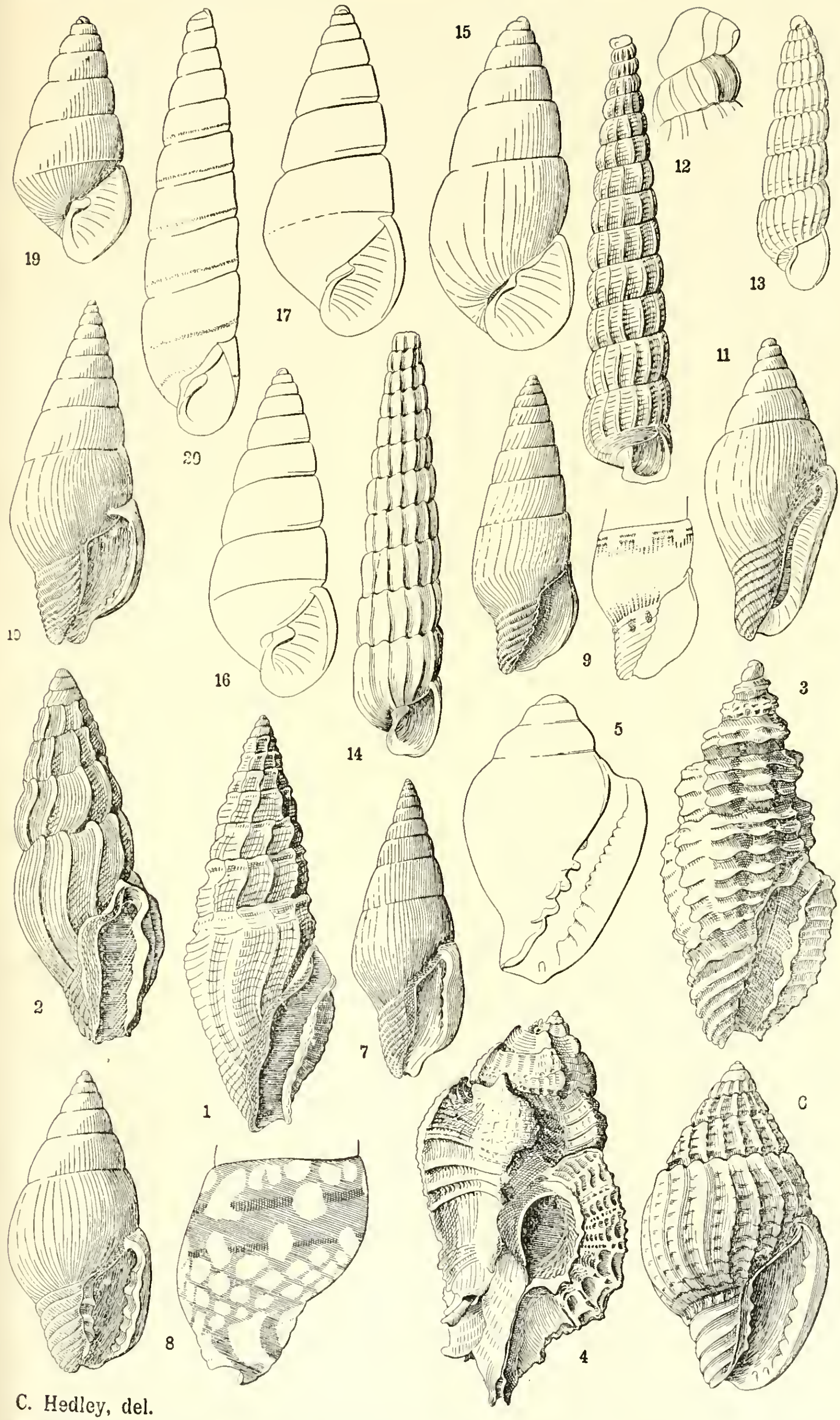
All the figures are reduced to about one-fourth the natural size.



T. WHITELEGGE, Photo.

EXPLANATION OF PLATE XVI.

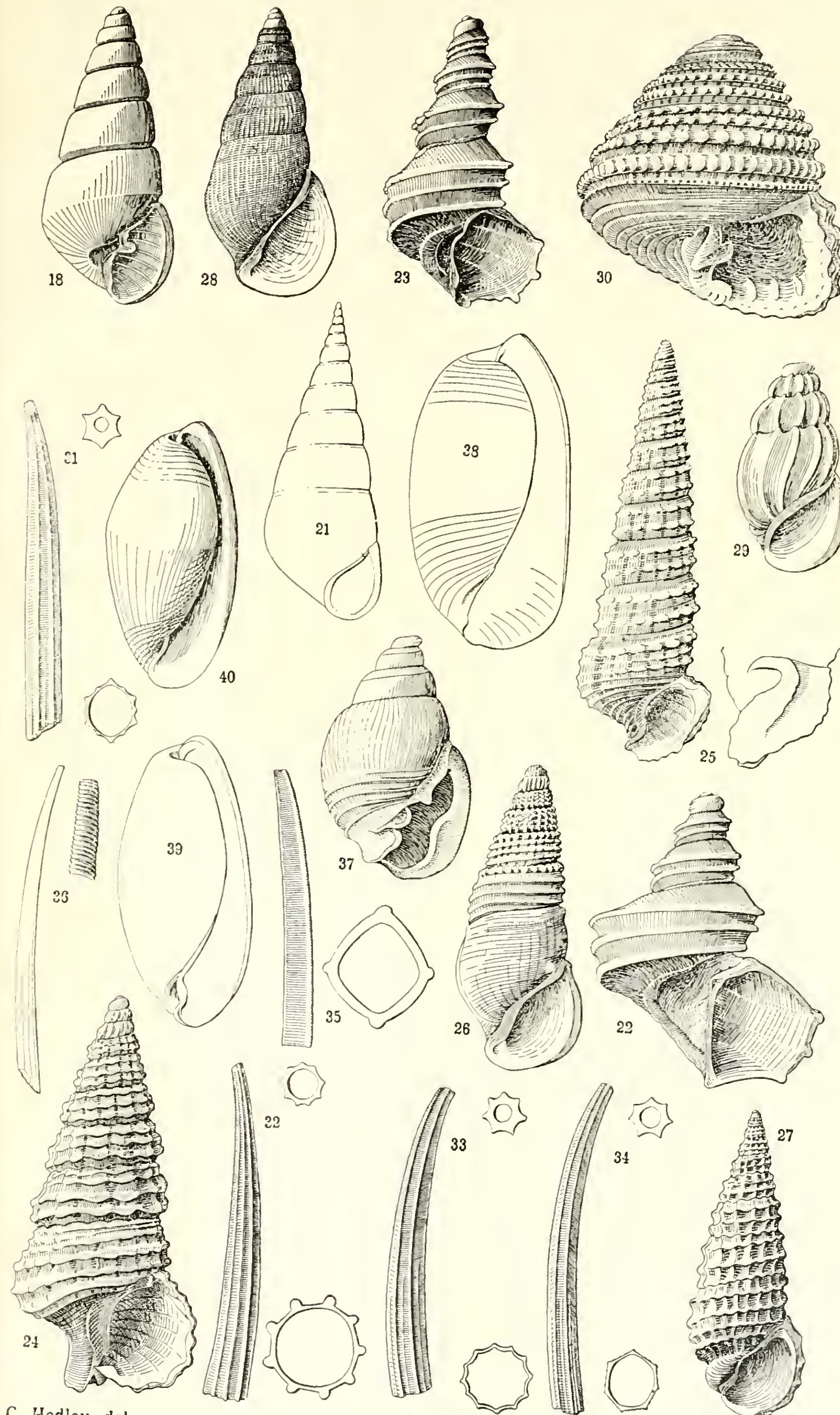
Fig. 1. *Drillia spaldingi,* Brazier.
„ 2. *Clathurella macleayi,* Brazier.
„ 3. *Glyphostoma tricolor,* Brazier.
„ 4. *Murex confusus,* Brazier.
„ 5. *Marginella lævigata* Brazier.
„ 6. *Columbella clathrata,* Brazier.
„ 7. „ *mariæ,* Brazier.
„ 8. „ *moleculina,* Duclos.
„ 9. „ *merita,* Brazier.
„ 10. „ *pudica,* Brazier.
„ 11. „ *læta,* Brazier.
„ 12. *Turbonilla darnleyensis,* Brazier.
„ 13. „ *cheverti,* Hedley.
„ 14. „ *aplini,* Brazier.
„ 15. *Odontostomia clara,* Brazier.
„ 16. „ *compta,* Brazier.
„ 17. „ „ var. *affinis,* Brazier.
„ 19. „ „ var. *parvula,* Brazier.
„ 20. *Syrnola pulchra,* Brazier.



C. Hedley, del.

EXPLANATION OF PLATE XVII.

Fig. 18. *Odontostomia compta*, Brazier, var. *polita*, Brazier.
,, 21. *Eulima nitens*, Brazier.
,, 22. *Separatista separatista*, Dillwyn.
,, 23. ,, *gracilenta*, Brazier.
,, 24 *Ataxocerithium abbreviatum*, Brazier.
,, 25. *Cerithium bicanaliferum*, Brazier.
,, 26. *Rissoina efficata*, Brazier.
,, 27. ,, *teres*, Brazier.
,, 28. ,, *inermis*, Brazier.
,, 29. ,, *inconspicua*, Brazier.
,, 30. *Euchelus granosus*, Brazier.
,, 31 *Dentalium duodecimcostatum*, Brazier.
,, 32. ,, *robustum*, Brazier.
,, 33. ,, *katowense*, Brazier.
,, 34. ,, *cheverti*, Sharp and Pilsbry.
,, 35. ,, *quadricostatum*, Brazier.
,, 36. ,, *annulosum*, Brazier.
,, 37. *Ringicula abyssicola*, Brazier.
,, 38. *Atys decora*, Brazier.
,, 39. ,, *darnleyensis*, Brazier.
,, 40. ,, *cheverti*, Brazier.



C. Hedley, del.

EXPLANATION OF PLATE XVIII.

Macropus isabellinus, Gould.

Fig. 1. Skull from above (reduced).

,, 2. Skull from below (reduced).

[From photographs by the Author.]

Fig. 1.

Fig. 2.

EDGAR R. WAITE, Photo.

EXPLANATION OF PLATE XIX.

Macropus isabellinus, Gould.

Skull, in profile, (natural size).

[From a photograph by the Author.]

EDGAR R. WAITE, Photo.

EXPLANATION OF PLATE XX.

Fig. 1. Nest of the Mouse (*Mus musculus*, Linn.).

Fig. 2. Nest of a *Gymnorhina* chiefly made of fence lacing-wire.

Fig. 1.

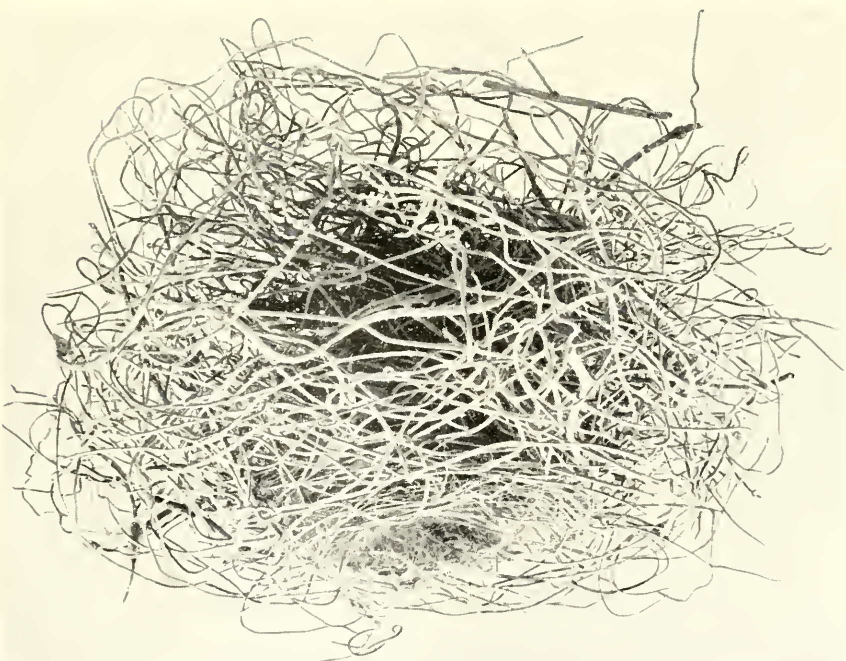
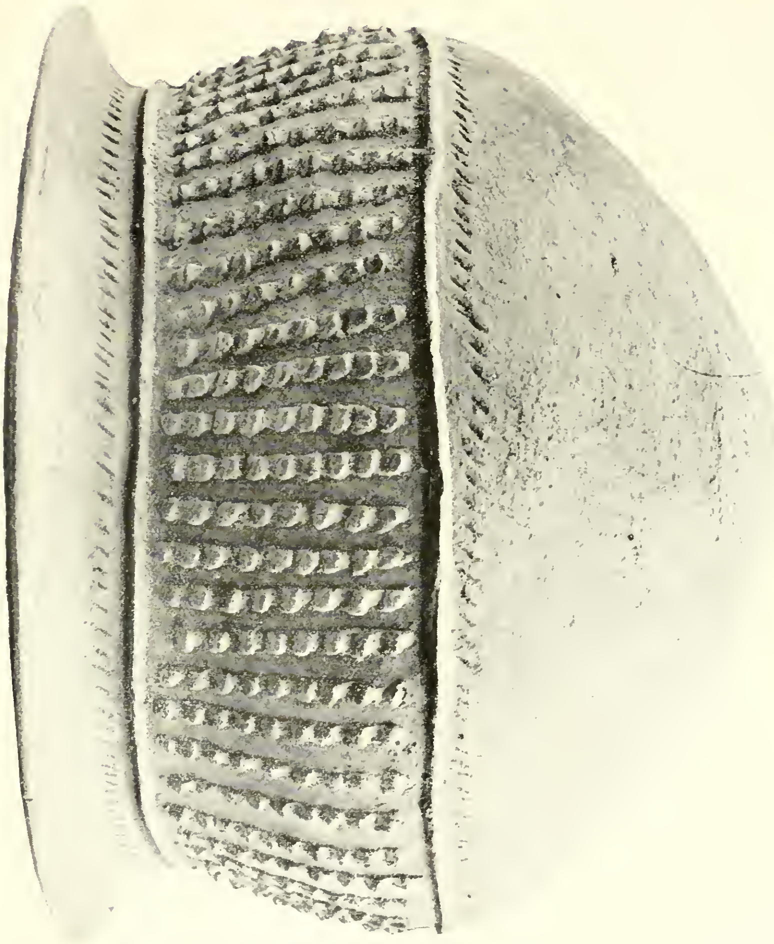


Fig. 2.

H. BARNES, Junr., Aust. Mus., Photo.

EXPLANATION OF PLATE XXI.

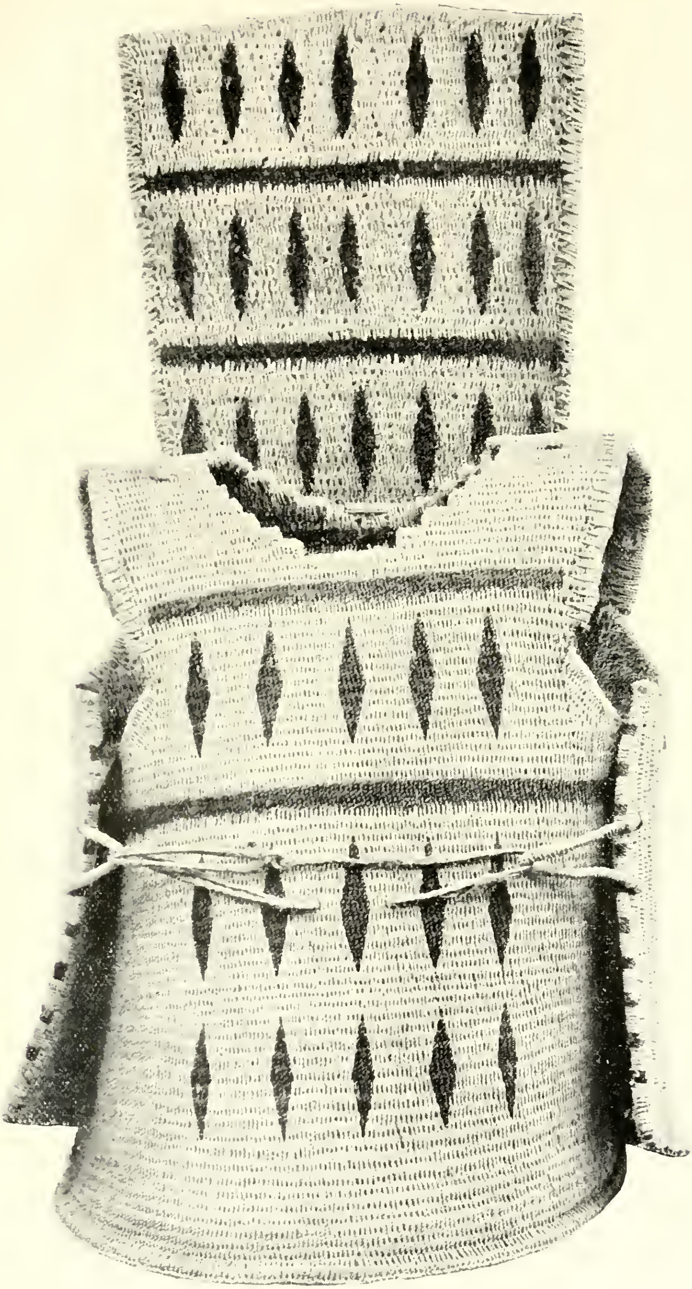
Cooking Pot from Santo, New Hebrides.



H. BARNES, Junr., Aust. Mus., Photo.

EXPLANATION OF PLATE XXII.

Cuirass from the Gilbert, or Kingsmill Islands.



H. BARNES, Junr., Aust. Mus., Photo.

EXPLANATION OF PLATE XXIII.

Fig. 1 Cáva in "gift form," from Tonga.

Fig. 2 " Dancing board " from Boulder District, West Australia.

Fig. 1.

Fig. 2.

H. BARNES, Junr., Aust. Mus., Photo.

EXPLANATION OF PLATE XXIV.

Child's Doll, Mallicollo, New Hebrides—full face.

H. BARNES, Junr., Aust. Mus., Photo.

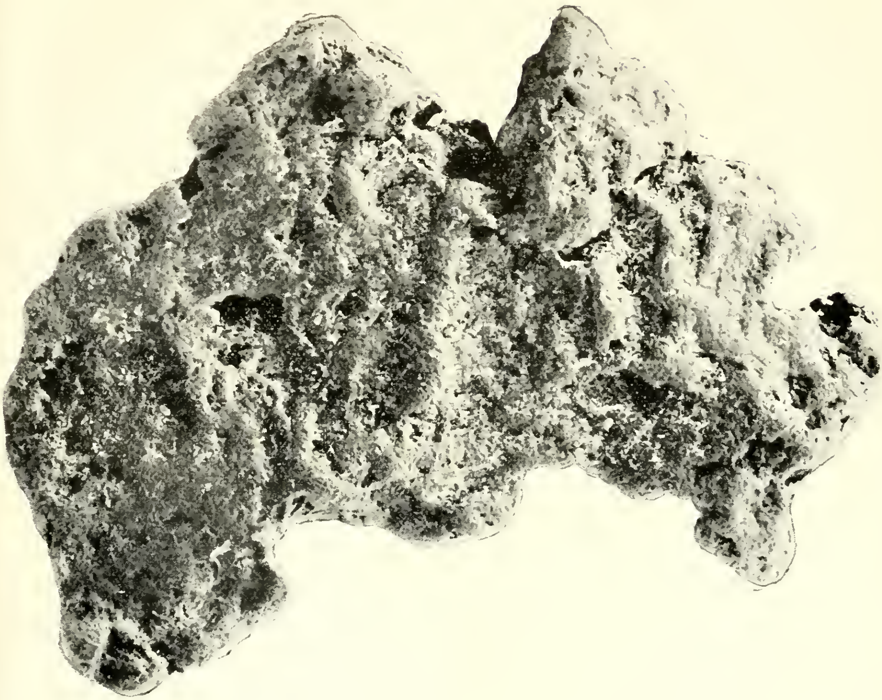
EXPLANATION OF PLATE XXV.

Child's Doll, Mallicollo, New Hebrides—profile.

H. BARNES, Junr., Aust. Mus., Photo.

EXPLANATION OF PLATE XXVI.

The "Map of Australia" Nugget.



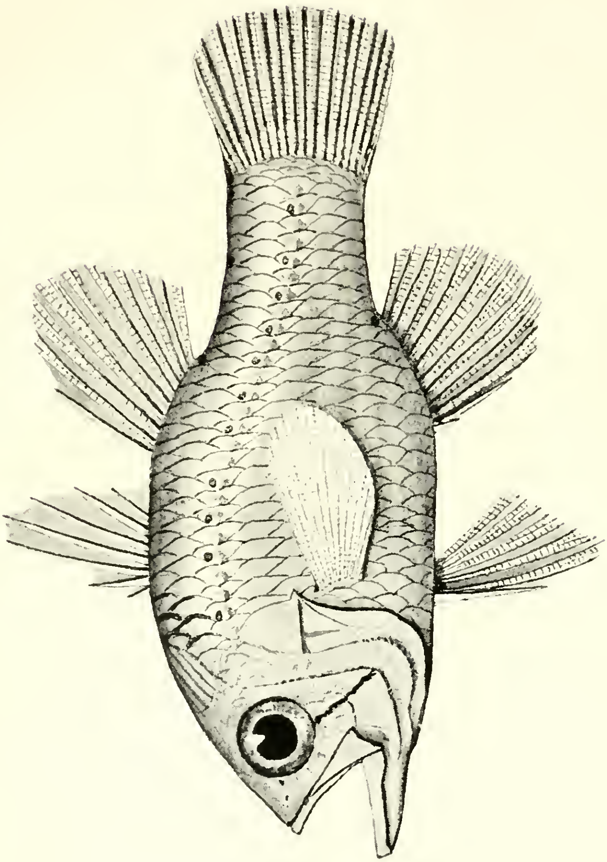
H. BARNES, Junr., Aust. Mus., Photo.

EXPLANATION OF PLATE XXVII.

Apogon rüppellii, Günther.

Natural size.

[Reproduced from a drawing by the author.]



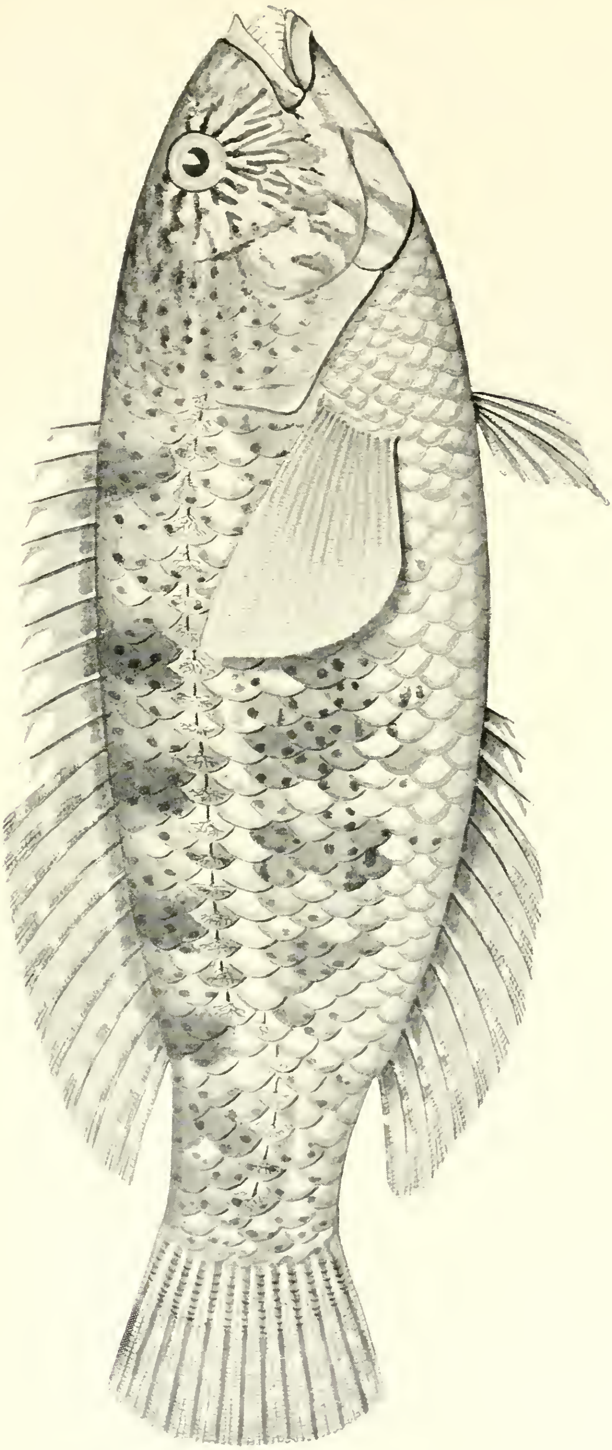
EDGAR R. WAITE, Del.

EXPLANATION OF PLATE XXVIII.

Pseudolabrus ruber, Castelnau.

Two-thirds natural size.

[Reproduced from a drawing by the author.]



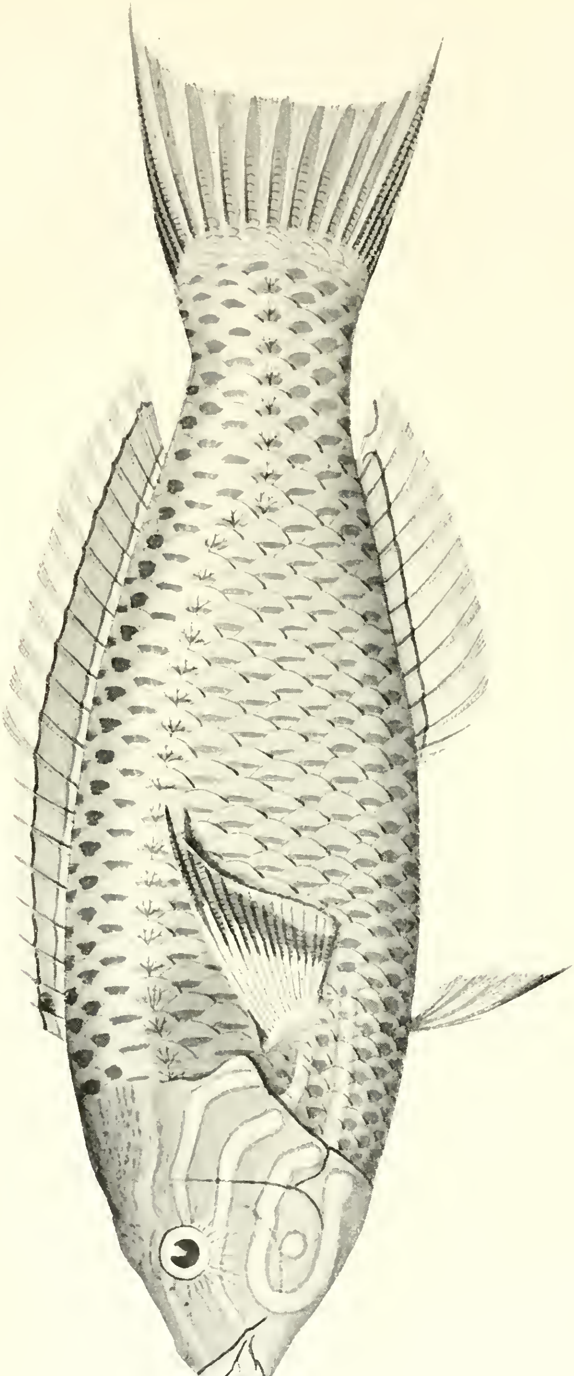
EDGAR R. WAITE, del.

EXPLANATION OF PLATE XXIX.

Thalassoma aneitense, Günther.

Seven-tenths natural size.

[Reproduced from a drawing by the author.]



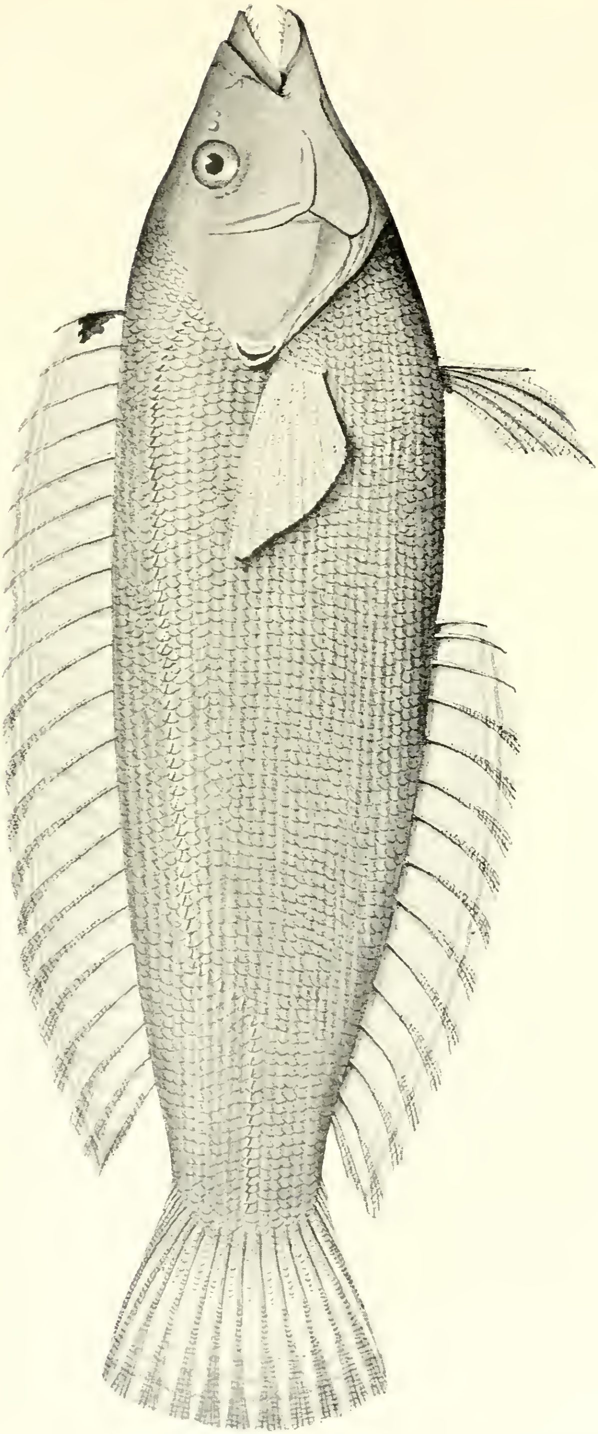
EDGAR R. WAITE, del.

EXPLANATION OF PLATE XXX.

Coris auricularis, Cuvier and Valenciennes.

Three-fourths natural size.

[Reproduced from a drawing by the author.]



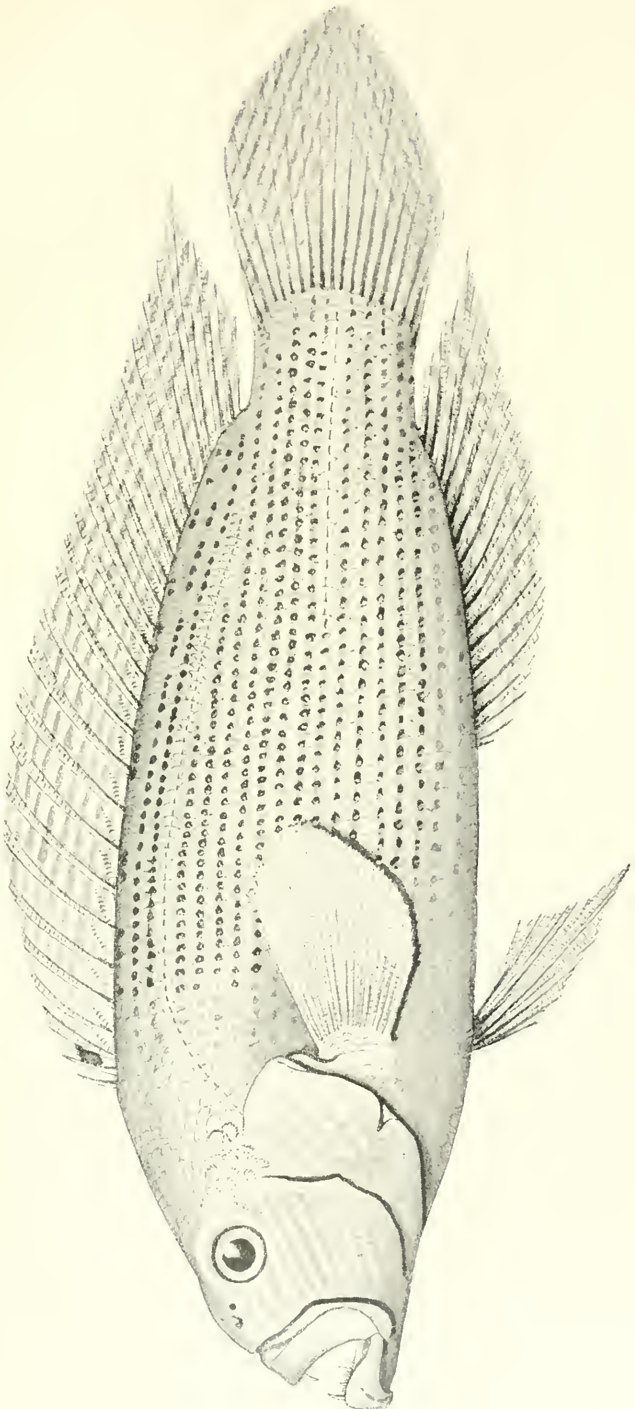
EDGAR R. WAITE, del.

EXPLANATION OF PLATE XXXI.

Cichlops lineatus, Castelnau.

Three-fourths natural size.

[Reproduced from a drawing by the author.]



EDGAR R. WAITE, del.

EXPLANATION OF PLATE XXXII.

Keeneia platyschismoides, Eth. fil.

Fig. 1. Whorls partly decorticated, seen from the back, showing the peripheral band on the body-whorl only and bent striæ of the former.

,, 2. Another specimen seen from the front, showing the mouth, band on the body-whorl only, and the umbilicus filled with matrix.

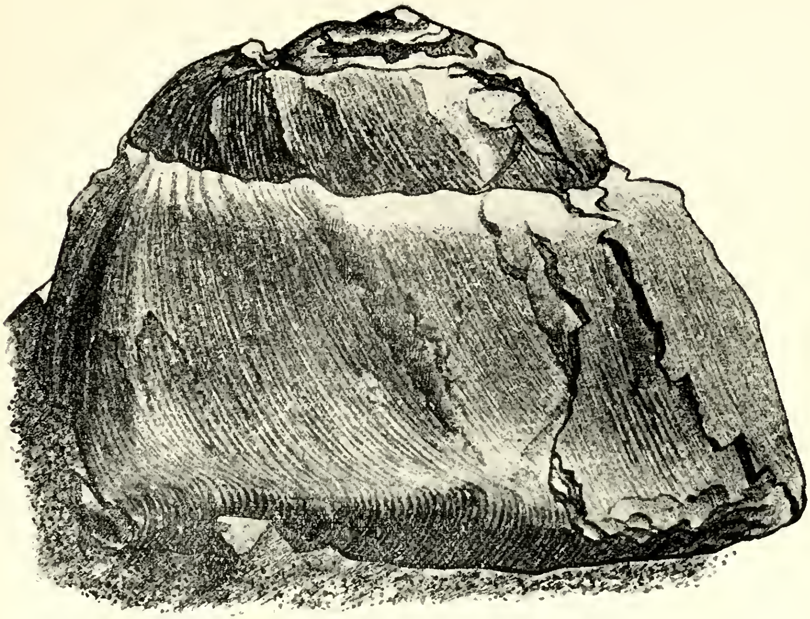


Fig. 1.

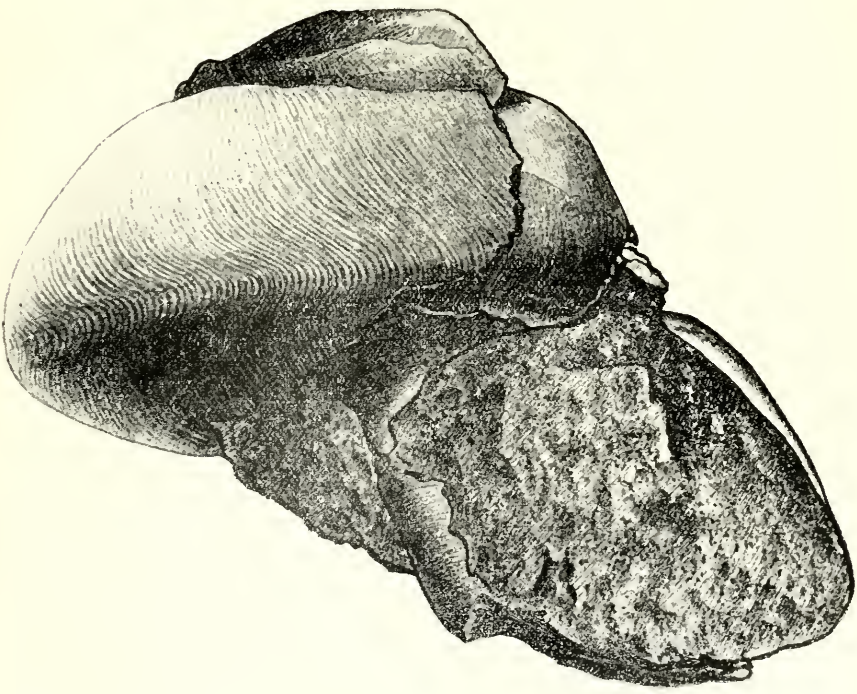


Fig. 2.

EXPLANATION OF PLATE XXXIII.

Straparollus ammonitiformis, Eth. fil.

Fig. 1. Upper surface of an internal cast, showing the depressed spire.

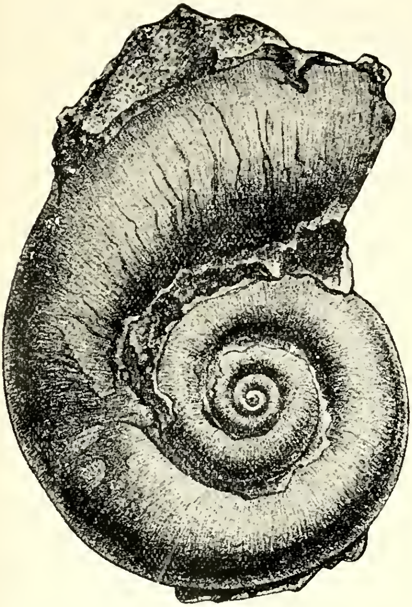
,, 2. Side view of the same specimen, with sectional outline of the younger whorls.

Keeneia platyschismoides, Eth. fil.

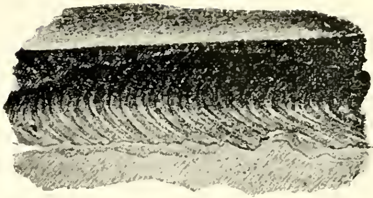
,, 3. Portion of the band of Fig. 1, Plate xxxii., showing the deeply-bent striæ—enlarged.

,, 4 Portion of the band of another and somewhat younger specimen —enlarged.

,, 5. Portion of the concealed band of the penultimate whorl of yet another example—enlarged.



1



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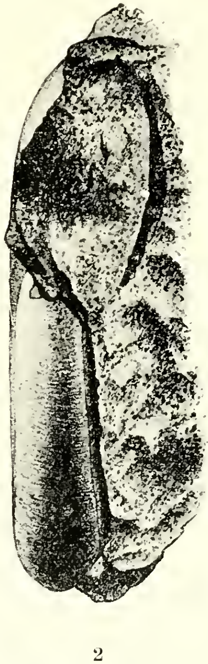

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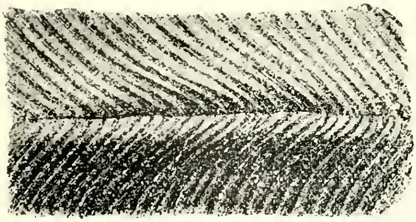

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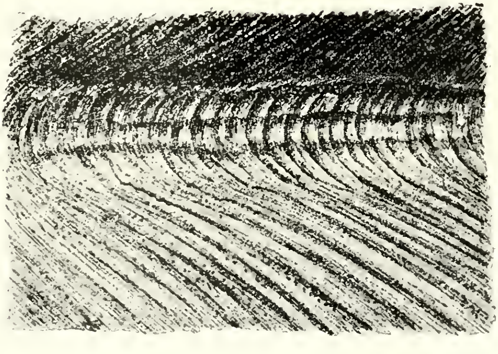


3

EXPLANATION OF PLATE XXXIV.

Teredo vastitas, Eth. fil.

Mature individuals boring wood.

About two-fifths natural size.

~~T. WHITELEGGE, Photo.~~
H. BARNES, Junr., Photo.

Australian Museum.

EXPLANATION OF PLATE XXXV.

Teredo vastitas, Eth. fil.

Young individuals boring wood.

About two-fifths natural size.

~~T. WHITELEGGE, Photo.~~

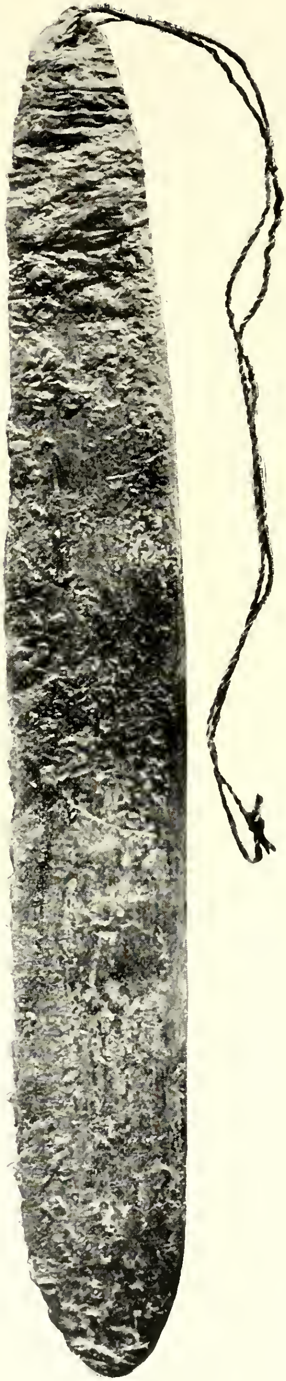
H. BARNES, Junr., Photo.

Australian Museum.

EXPLANATION OF PLATE XXXVI.

Aboriginal Knife.

About half natural size.



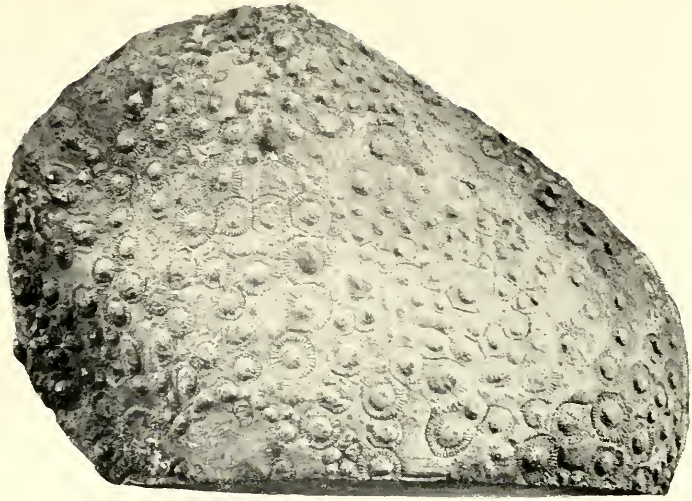
EXPLANATION OF PLATE XXXVII.

Diphyphyllum gemmiformis, Eth. fil.

Fig. 1. The corallum exhibiting sub-compound and single corallites, seen from above.

Syringopora spelæanus, Eth. fil.

,, 2. Corallites seen protruding from a mass of limestone.



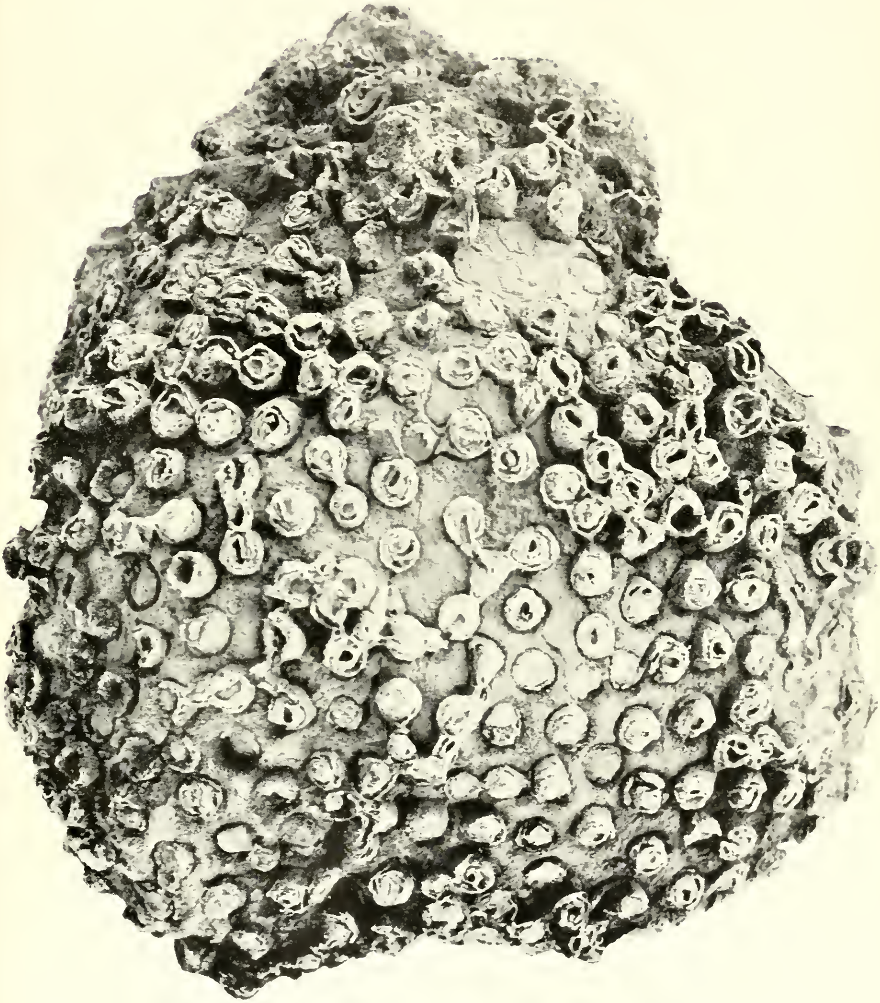
1

2

EXPLANATION OF PLATE XXXVIII.

Syringopora spelæanus, Eth. fil.

A large colony, seen from above.



H. BARNES, Junr., Photo. Australian Museum.

EXPLANATION OF PLATE XXXIX.

Diphyphyllum gemmiformis, Eth. fil.

Fig. 1. Transverse section of a corallite, exhibiting the septal and tabulate areas. In the former the interseptal loculi are seen to be filled with both forms of tissue. In the latter, cut edges of tabulæ are visible. x 4.

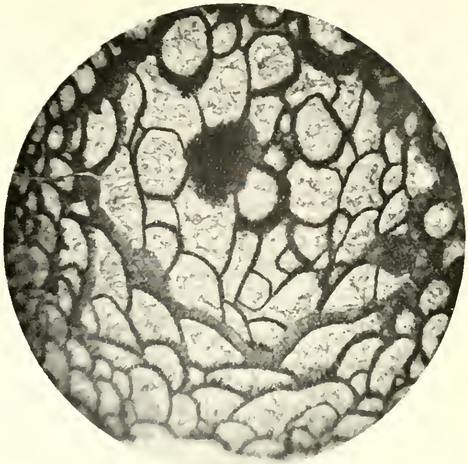
,, 2. Longttudinal section exhibiting the peripheral vesicles, and the tabulæ. x 4.

Cystiphyllum (? Microplasma) australasica, Eth. fil.

,, 3. Transverse section of a corallite. A few septal spines are visible. x 4.

,, 4. Transverse section of a corallite with very large central vesicles. Around the edge are the conjoined thick protuberances. x 4.

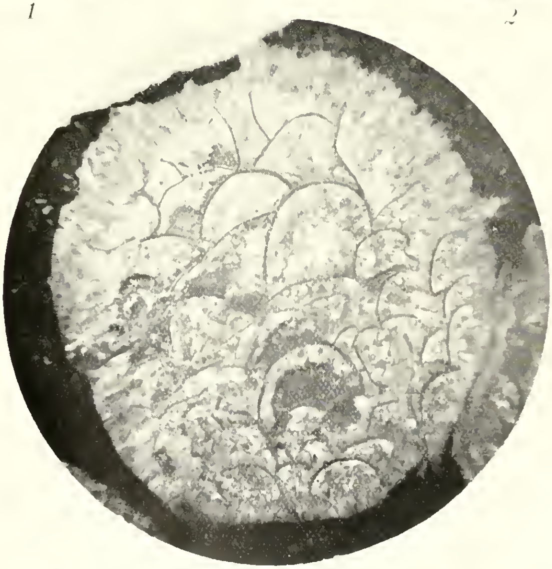
[Reproduced from microphotographs by Mr. E. R. Waite].



3

1

2



4

EDGAR R. WAITE, Micro. photo. Australian Museum.

EXPLANATION OF PLATE XL.

Diphyphyllum gemmiformis, Eth. fil.

Fig. 1. Transverse section of a corallite, with a comparatively small amount of tissue in the interseptal loculi. x 4.

Desmidopora nicholsoni, Eth. fil.

,, 2. Transverse section of part of a corallum exhibiting the characteristic calices. x 4.

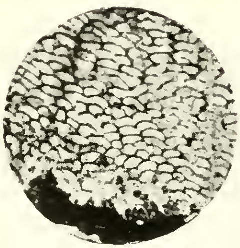
Cystiphyllum (? Microplasma) australasica, Eth. fil.

,, 3. Longitudinal section (in part) of a corallite. x 4.

,, 4. Transverse section of a corallite. 4.

[Reproduced from microphotographs by Mr. E. R. Waite.]

3



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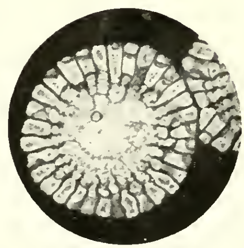

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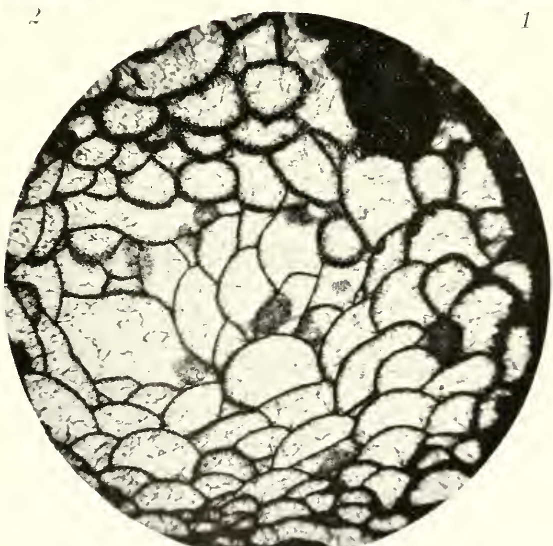

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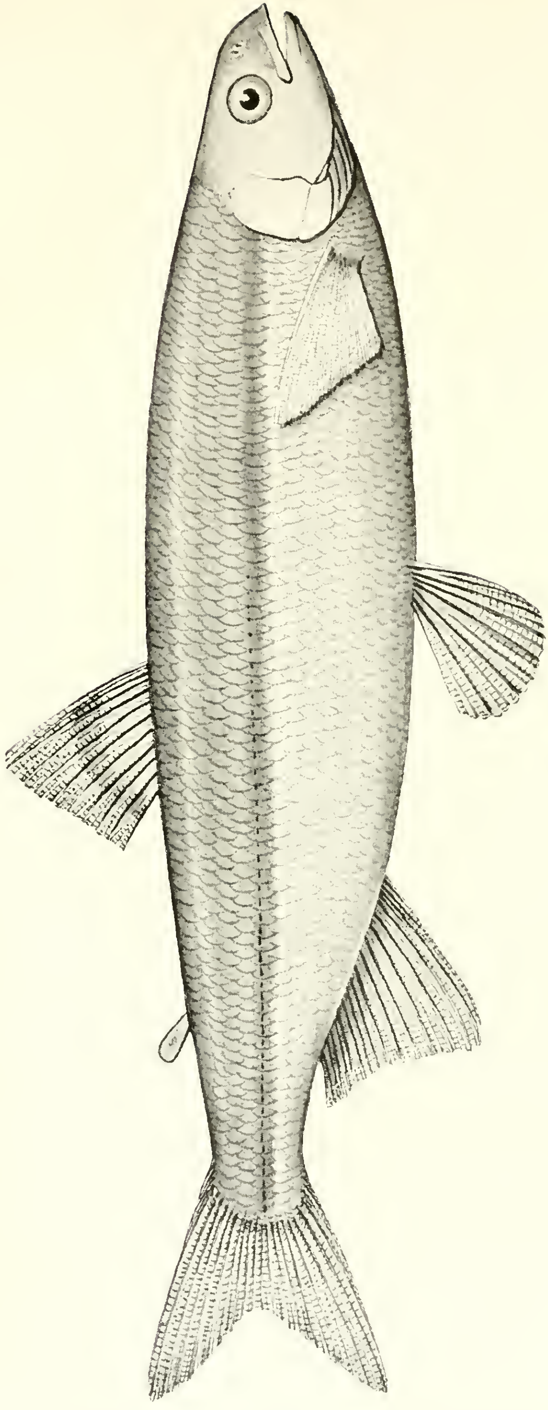
EDGAR R. WAITE, Micro. photo. Australian Museum.

EXPLANATION OF PLATE XLI.

Prototroctes maræna, Günther.

Nine-tenths natural size.

[Reproduced from a drawing by the Author.]



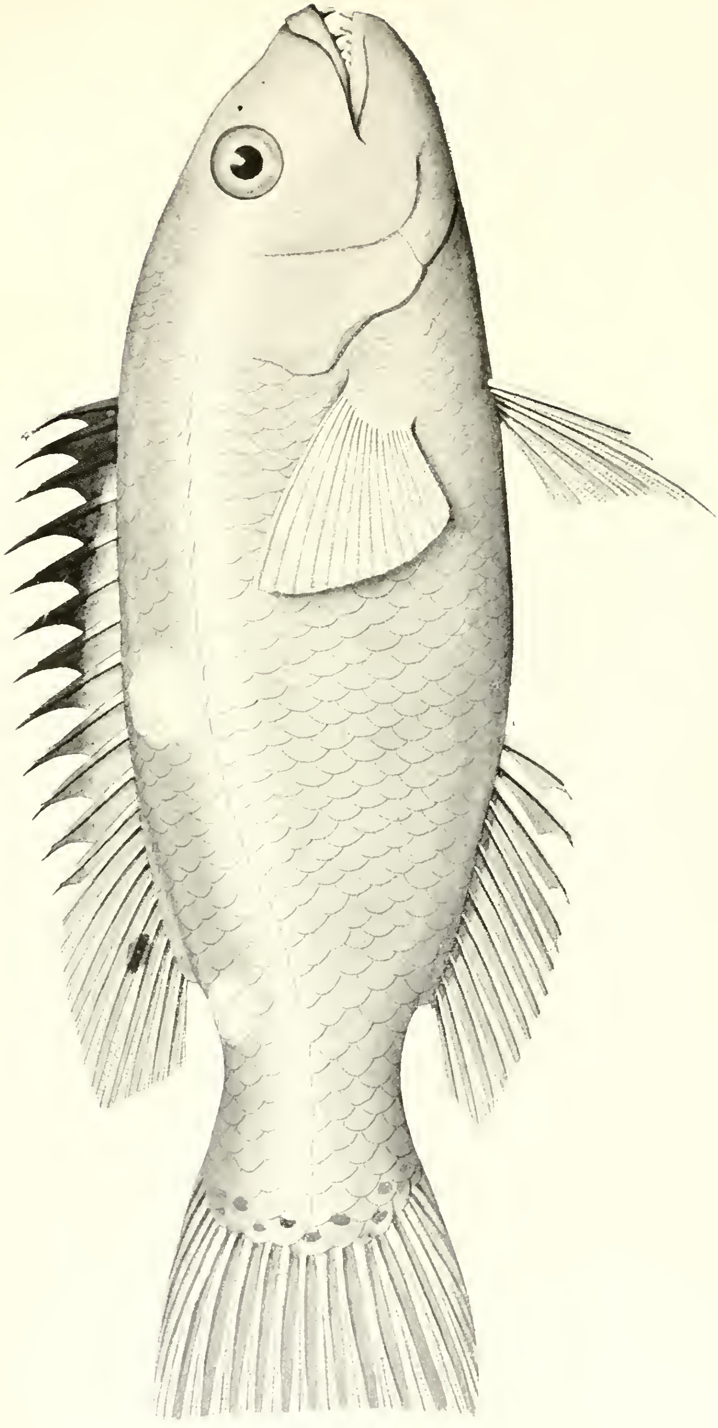
EDGAR R. WAITE, del.

EXPLANATION OF PLATE XLII.

Harpe vulpina, Richardson.

One-half natural size.

[Reproduced from a drawing by the Author.]



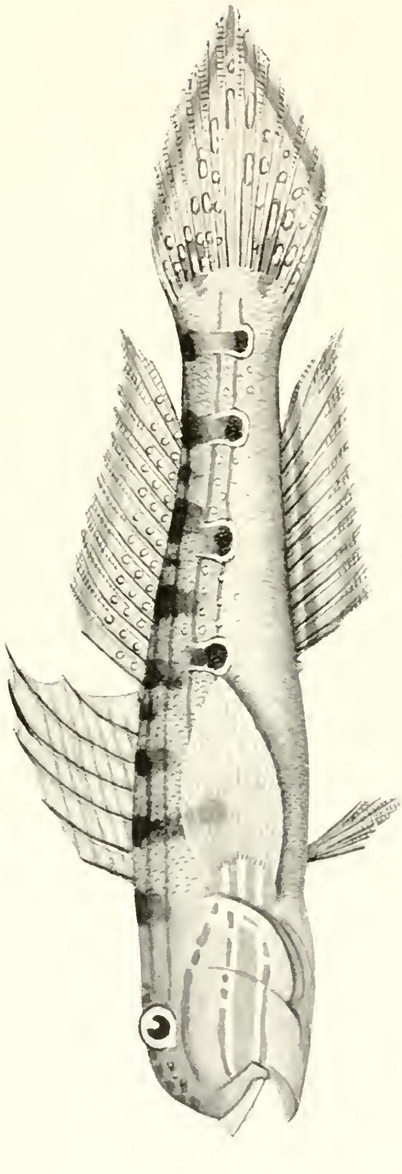
EDGAR R. WAITE, del.

EXPLANATION OF PLATE XLIII.

Valenciennia longipinnis, Bennett.

Natural size.

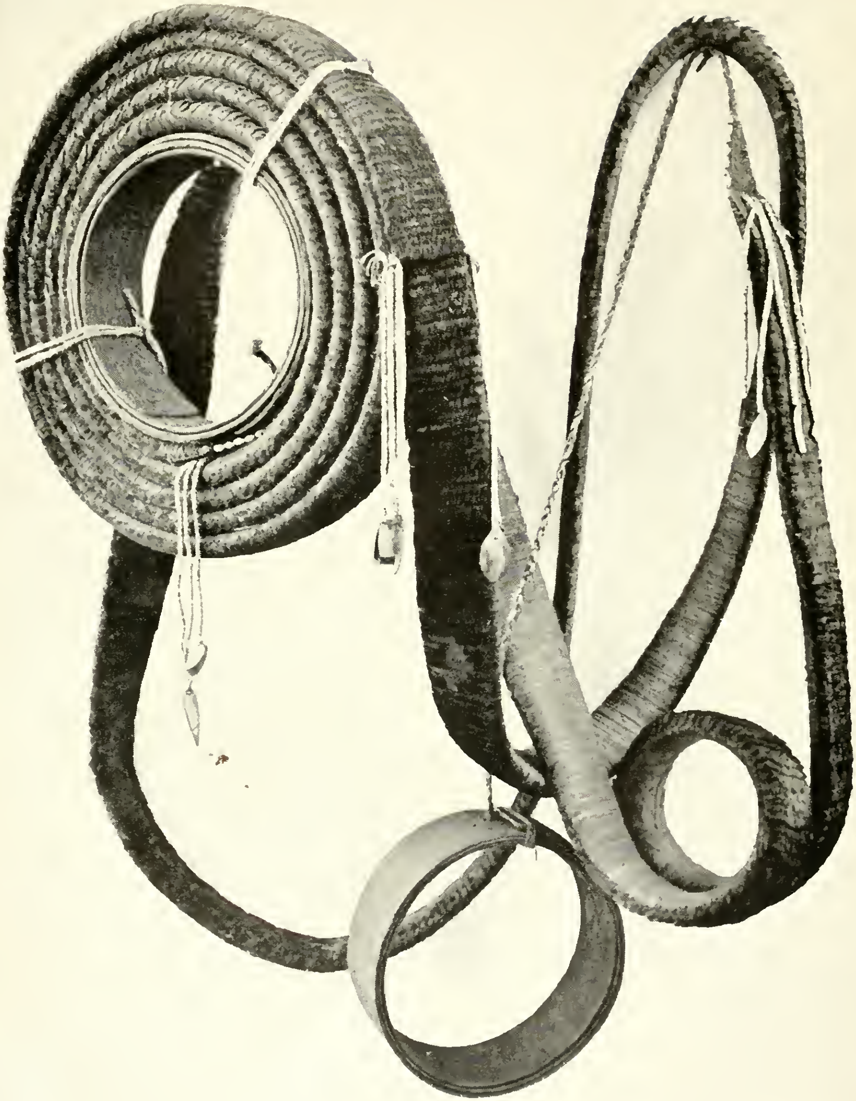
[Reproduced from a drawing by the Author.]



EDGAR R. WAITE, del.

EXPLANATION OF PLATE XLIV.

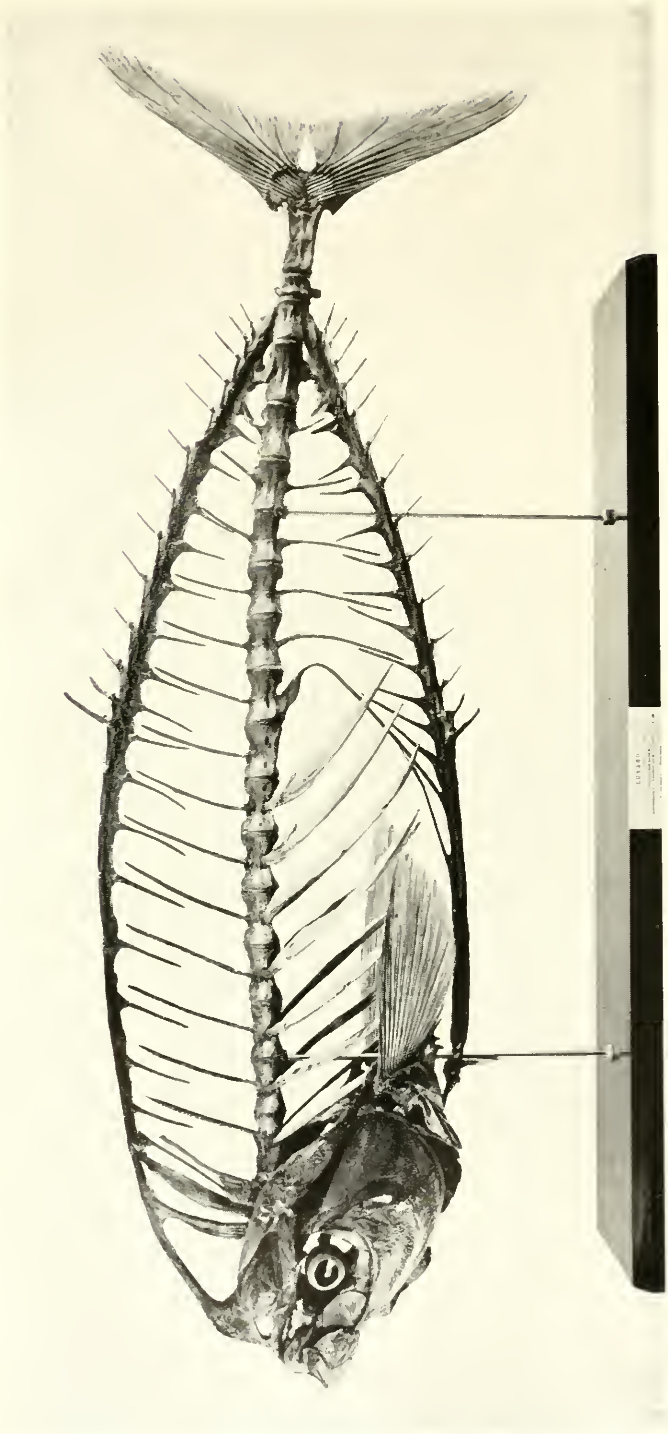
The *Tavau*, or Feather Currency of Santa Cruz, uncoiled.



H. BARNES, Junr., Photo. Australian Museum.

EXPLANATION OF PLATE XLV.

Luvarus imperialis, Rafinesque.

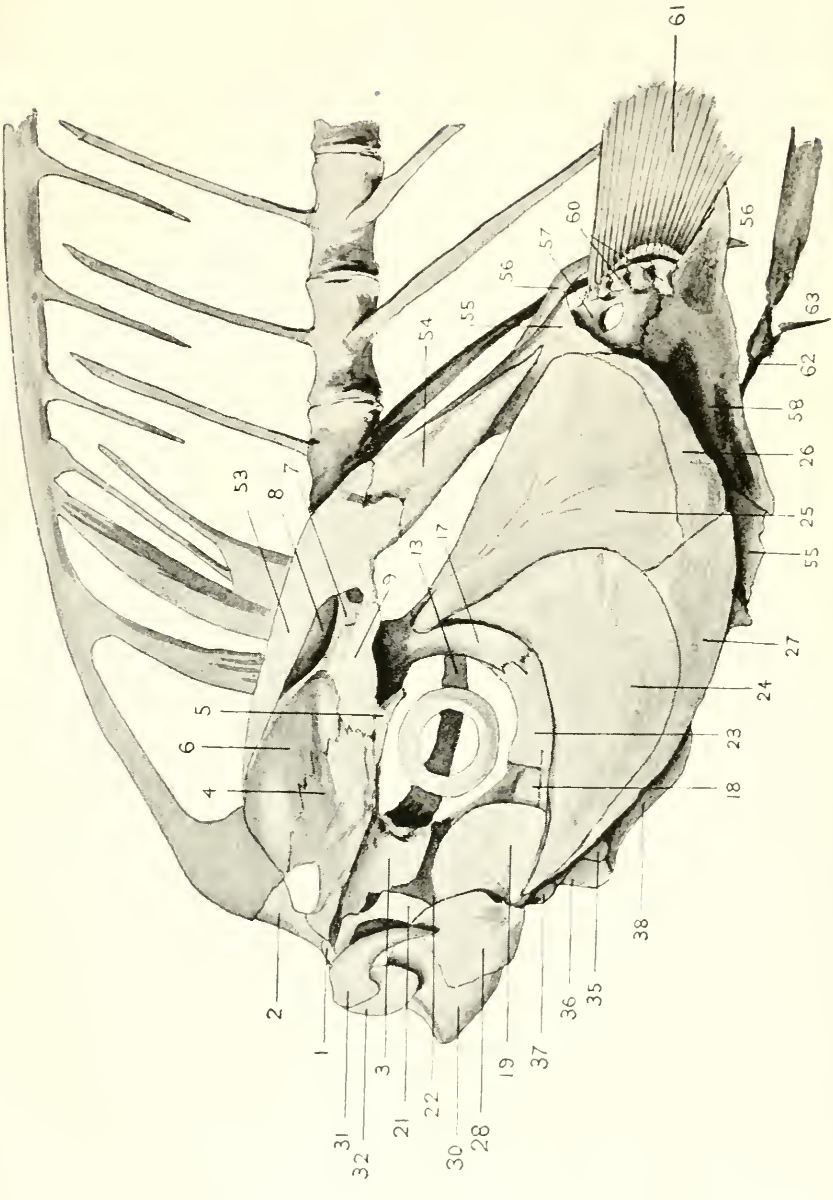


H. BARNES, Junr., Photo. Australian Museum.

EXPLANATION OF PLATE XLVI.

Luvarus imperialis, Rafinesque.

Skull.



EDGAR R. WAITE, del. Australian Museum.

EXPLANATION OF PLATE XLVII.

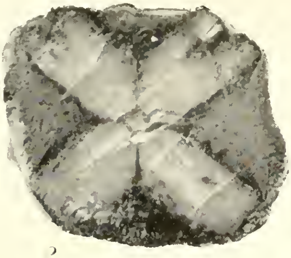
Chiastolite.

Figs. 1, 2, 3, 4 and 6. Sections at right angles to the vertical axis.

Fig. 5. Longitudinal view of Fig. 4.

Natural size.

Bimbowrie, S. Australia.



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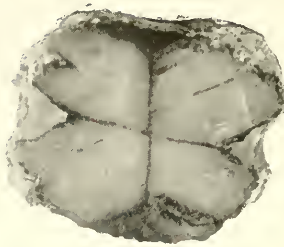

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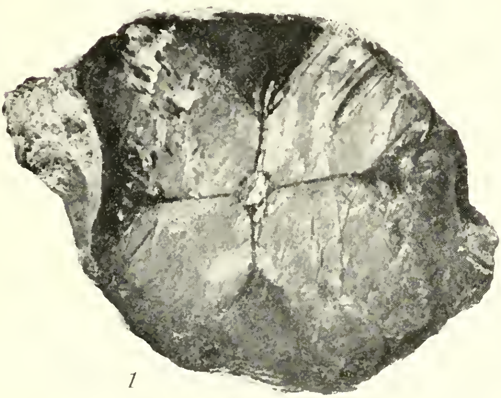

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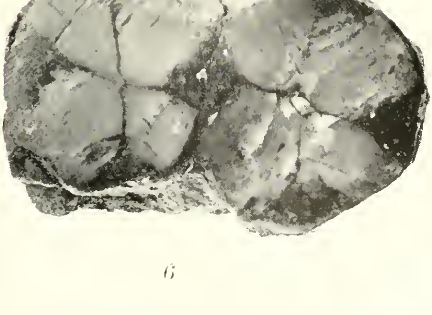

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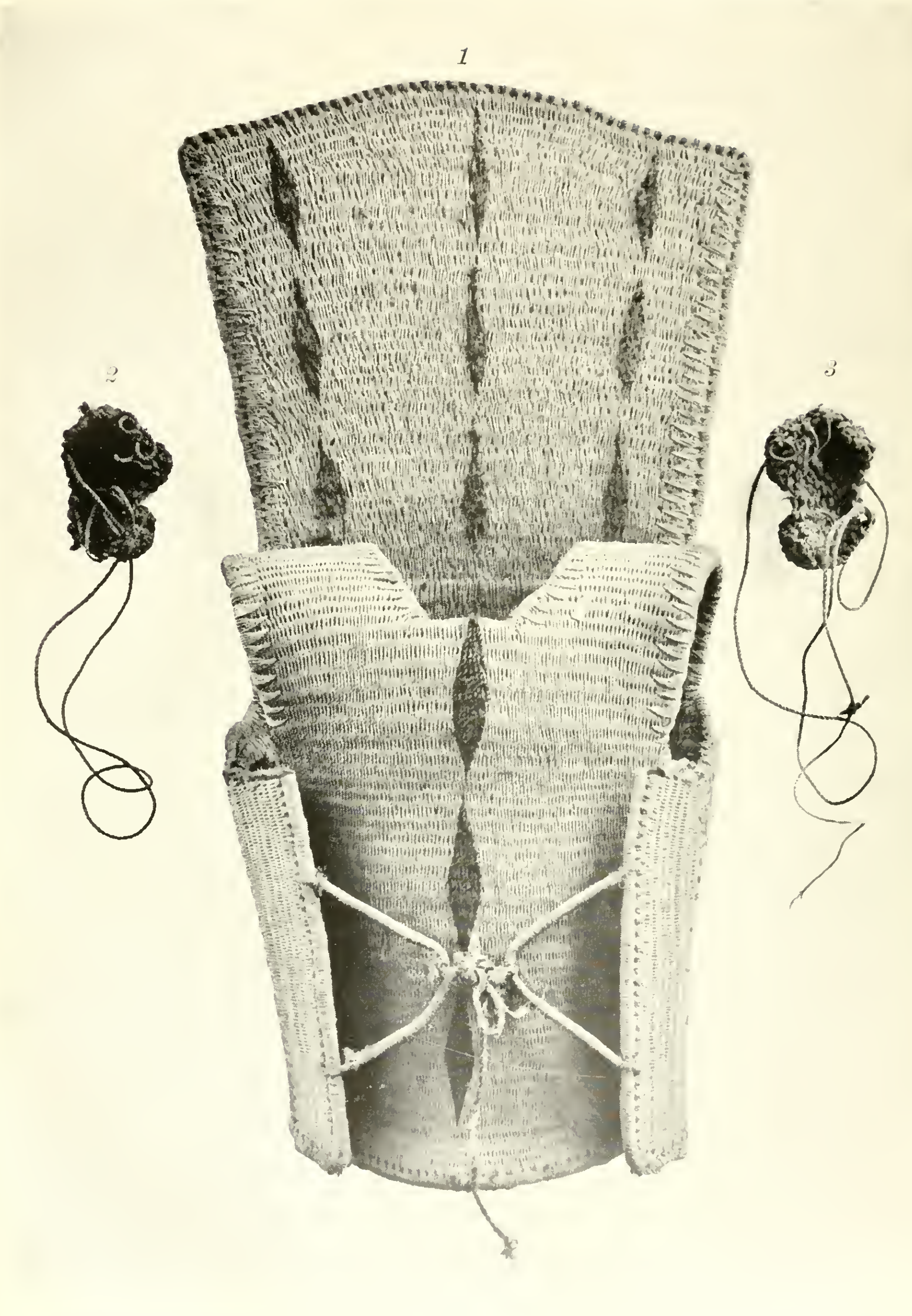
H. BARNES, Junr., Photo. Australian Museum.

EXPLANATION OF PLATE XLVIII.

Fig. 1. Cuirass or Corselet, Gilbert Group.

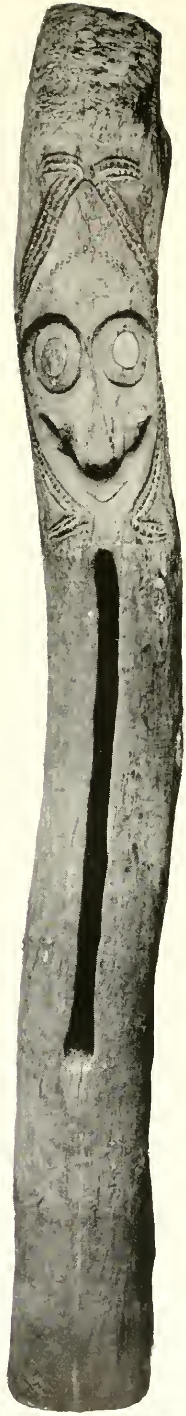
Figs. 2 and 3. Knuckle Dusters, Ellice Group.



H. BARNES, Junr., Photo.
Australian Museum.

EXPLANATION OF PLATE XLIX.

Ancestral Drum, from Mallicollo, New Hebrides.



H. BARNES, Junr., Photo. Australian Museum.

EXPLANATION OF PLATE L.

Eggs of the Kagu, *Rhinochetus jubatus*, Verreaux et Des Murs.

Natural size.

H. BARNES, Junr., Photo. Australian Museum.

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