

Memoirs of the Queensland Museum.

VOL. X, PART I.
Issued August 28th, 1930.

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KRONOSAURUS QUEENSLANDICUS. A GIGANTIC CRETACEOUS PLIOSAUR.

BY HEBER A. LONGMAN, F.L.S., C.M.Z.S. (DIRECTOR).

(Text-figures 1-5.)

IN 1924 a new gigantic marine reptile from the Queensland Cretaceous was described by the writer under the name *Kronosaurus queenslandicus*.¹ The type material consisted of a fragment of a very massive sauropterygian mandible, symphyseal region, with the remains, largely alveolar, of six very large thecodont teeth. These teeth had a maximum diameter of 40 mm., and it was suggested that they attained at least 250 mm. in total height, being comparable with those of *Pliosaurus grandis*. This fragment was forwarded from Hughenden, Central-western Queensland, by Mr. Andrew Crombie in 1899.

It is pleasing to be able to record that, through the kindly interest and enthusiasm of Mr. H. A. Craig, Mr. W. Charles, Head Teacher of the Hughenden State School, and Mr. N. E. Anderson, additional material of this marine reptile has been found. This was discovered in August, 1929, by these three gentlemen near a locality in which Mr. Charles had previously found fossils "two miles south of Hughenden." In all fifteen fragments were forwarded, but some of these were small specimens that were so much abraded that none of the original contours were preserved. The two largest fragments consisted of the proximal ends with portions of shafts of two long bones, which are of outstanding significance, as they apparently represent the largest marine reptile yet recorded. As will be seen, the dimensions of the preserved portions are in excess of the corresponding measurements for *Megalneusaurus rex* (Knight)² from Jurassic beds, Wyoming, America, previously regarded as the largest known Pliosaur, first described as *Cimoliosaurus rex*.³

When the type of *Kronosaurus* was described it was realised that it represented a gigantic form, and although these later fragments from Hughenden are disappointing in their state of preservation they add much to our knowledge of this Cretaceous Pliosaur, especially in regard to its dimensions, although mere size is not, of course, an index to importance.

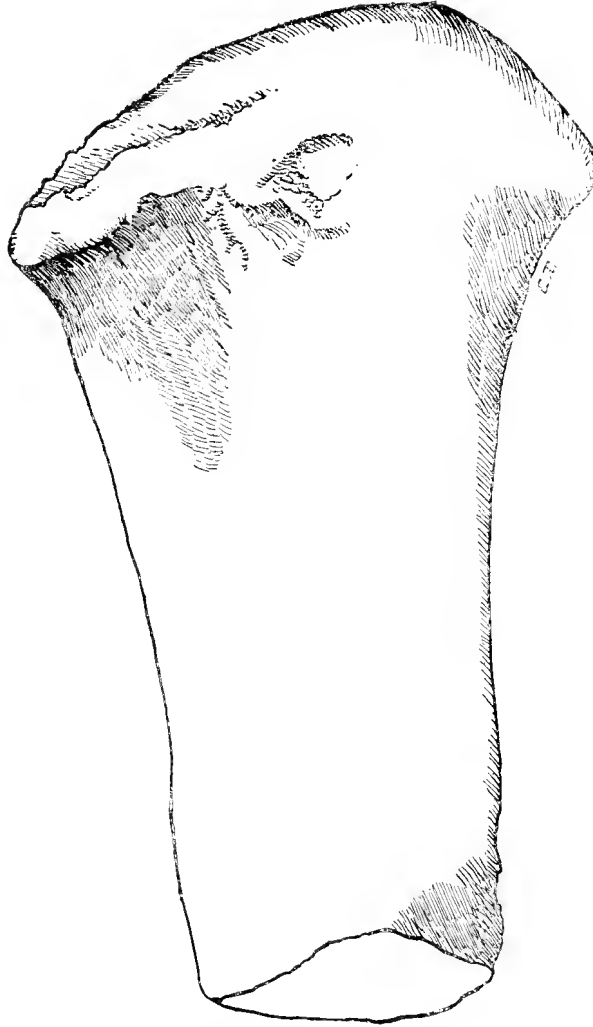
NOTE.—In Greek mythology Kronos, son of Uranos, swallowed his first five children, lest they should live to depose him. The sixth child, Zeus, was saved by his mother, Rhea, and ultimately deposed his father from the Olympian throne.—A. S. Murray's "Manual of Mythology."

¹ 1924: H. A. Longman, Mem. Qld. Mus., viii, pp. 26-28.

² 1895: W. C. Knight, Amer. Journ. Sci., 4th ser., vol. v, p. 378.

³ 1895: W. C. Knight, "Science," vol. ii (n.s.), p. 449.

In this connection, however, it is of interest to quote the words of Dr. F. W. Whitehouse in regard to our Ammonites in the Family Aconeceratidæ: "The outstanding feature of these Australian forms is their enormous size. Each species is represented by individuals far larger than any known member of the family in the other continents."⁴



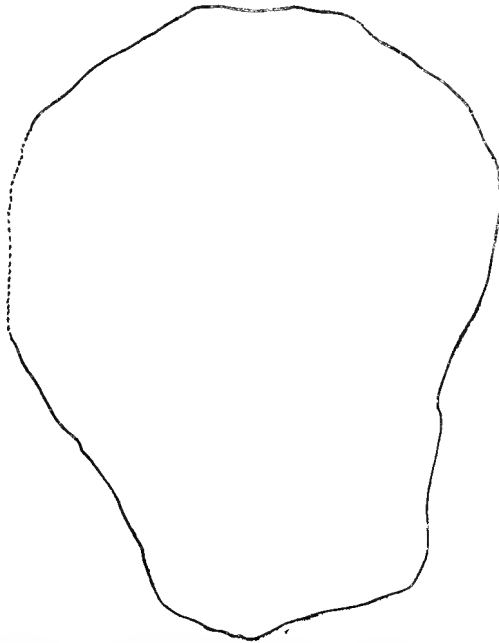
Text-figure 1.—*Kronosaurus queenslandicus*. Fragment of Left Humerus, Postero-external view, with massive trochanteric buttress. (Approximately $\frac{1}{4}$ natural size.)

Cratochelone berneyi, a giant turtle described by the writer in 1915, is also an exceptionally large form, and it is suggested that the probable

⁴ 1927: F. W. Whitehouse, Mem. Qld. Mus., ix, pt. 1, p. 113.

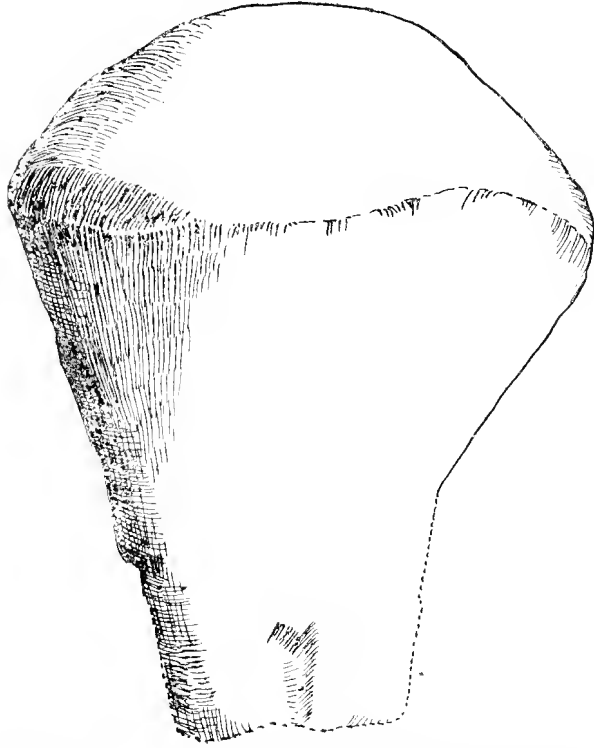
mediterranean nature of our ancient Cretaceous sea was suitable for the development of a few megalomorphic species, perhaps owing to lack of competition. There is an alternative suggestion that these forms were approaching extinction, a phase which is often associated with megalomorphism.

In addition to these long bones, there is a fragment of the proximal end of a mandible, an incomplete centrum and two distal fragments of a long bone, but these are too abraded to yield much evidence.

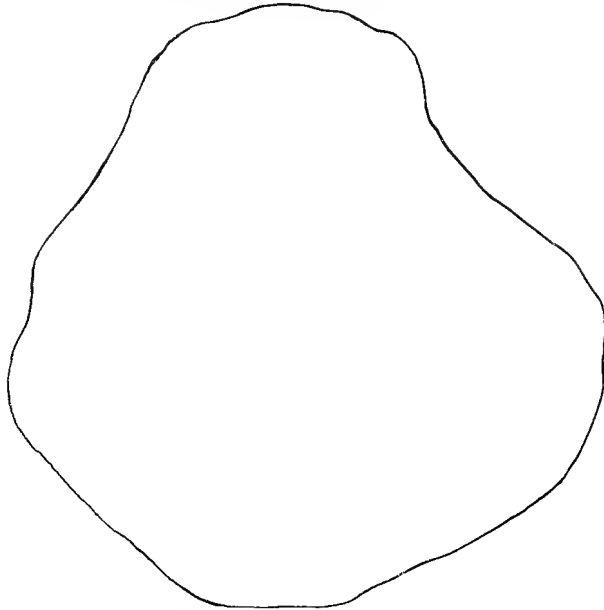


Text-figure 2.—*Kronosaurus queenslandicus*. Section through abraded head and trochanteric buttress of Left Humerus.

The incomplete limb-bones have evidently been subjected to colossal strains. In the first place, the fracture of the massive cylindrical shafts, which, when unabraded, attained at least eight inches in diameter, must have been the result of tremendous pressure. Apart from the fractures, the areas of abrasion are very considerable, and in the longer specimen much of the articular surface of the head has been lost. When the two bones are placed in juxtaposition, however, making due allowance for abrasion, there is so much similarity between the contours of the articular surface and the buttress for the attachment of muscles that they have been interpreted as right and left humeri. In view of their incompleteness, and also of the lack of outstanding distinctions between the femora and humeri of these paddle-limbed reptiles, the possibility of an error is here recorded, and additional material may show that one or both of these fragments may be femora.



Text-figure 3.—*Kronosaurus queenlandicus*. Fragment of Right Humerus; inner aspect.
(Approximately $\frac{1}{2}$ natural size.)



Text-figure 4.—*Kronosaurus queenlandicus*. Section through abraded head and trochanteric buttress of Right Humerus.

As long ago as 1871⁵ John Phillips pointed out that isolated femora and humeri were not always easy to distinguish. With a complete bone, distinctive diagnosis is usually gained from the contours of the distal region.

Dimensions of fragments:—

Left humerus, 480 mm. in length to fracture.

Maximum antero-posterior diameter of head (very incomplete), 234 mm.

Maximum diameter across head and trochanteric buttress (abraded), 292 mm.

Diameter of shaft, taken ten inches from proximal surface, 200 mm.; circumference, 585 mm.

The contour of the shaft near the region of fracture is somewhat oval, indicating the usual compression of the distal region.

Right humerus, 340 mm. in length to fracture.

Maximum antero-posterior diameter of head (abraded), 281 mm.

Maximum diameter across head and trochanteric buttress, 275 mm.

Owing to the differential abrasion the diameters of the head are markedly different in the two specimens, but this is obviously due to bad preservation. In the second or shorter fragment the antero-posterior contours of the head appear to be almost complete, and the maximum diameter is 281.

In so far as comparisons may be made, the measurements of the long bones of *Kronosaurus queenslandicus* slightly exceed those tabulated for *Megalneusaurus rex* by Knight (*loc. cit.*). The length of the complete humerus of the Wyoming specimen was 991 mm., and if the robustness of the Hughenden limb-bones was also reflected in their length the complete bone of *Kronosaurus* exceeded a metre.

In these Hughenden bones the convex articular surfaces slope outwards and downwards towards the massive buttress of the trochanter, which is centrally situated on the main axis of the bone and forms a projecting ridge. The contours are shown in Text-figures 1 to 4, but it should be emphasized that, owing to prolonged abrasion, the dorso-ventral diameter of the head in the longer specimen, or left humerus, is considerably greater than that of the convex articular surface in its antero-posterior extent. In the shorter specimen, or right humerus, where the abrasion has been more uniform, the two diameters are subequal.

When viewed from above the massive trochanteric process is almost quadrangular, owing to the pronounced projection of its upper part, below which it slopes sharply away on the external surface, subsiding into the sub-circular shaft.

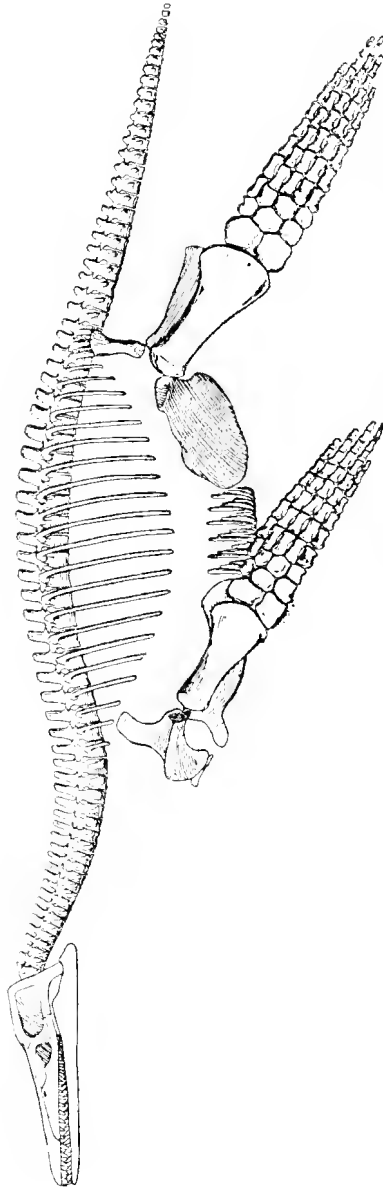
In his first description of *Plesiosaurus trochanterius*,⁶ subsequently transferred to the genus *Pliosaurus*,⁷ Richard Owen pointed out that the long

⁵ 1871: John Phillips, *Geology of Oxford*, p. 362.

⁶ 1839: R. Owen, *Rep. Brit. Assn.*, p. 85.

⁷ 1861: R. Owen, *Mon. Foss. Rept.*, Kimmeridge Clay, p. 7.

bones of this gigantic Plesiosauroid species "deviate from the usual structure of the humerus and femur in that genus (*Plesiosaurus*) in having a strongly developed trochanterian ridge projecting from the outer side of the head of the bone: this process is of considerable breadth, stands well out from the surface at its upper part, then gradually subsides, and is lost in the upper third of the humerus" (p. 85).



Text-figure 5.—Restoration of the skeleton of *Plesiosaurus phillipulus* (after C. W. Andrews).
($\frac{1}{2}$ natural size.)

The buttress-like process in these bones of *Kronosaurus*, whether interpreted as a trochanter or as a tuberosity, appears to have been more prominent than the corresponding structures in *Megalneusaurus*, *Pliosaurus*, or *Peloneustes*.

A pronounced depression on the postero-external surface of the longer specimen, below the buttress-like process, probably marks the insertion of powerful coraco-brachiales muscles, which pulled the humerus backwards and downwards.

The abraded surfaces are somewhat coarsely cancellous in appearance, and when viewed under a lens a curious irregular honeycombed effect is noticeable.

There are two fragments, over 200 mm. in length, in this series, which come from the distal end. These have been cleft in the median line of the main axis. Probably they represent the distal end of the same long bone, but since the initial cleavage so much abrasion has taken place that this cannot be positively stated. When placed in juxtaposition these two fragments present a distal end of about 400 mm. in antero-posterior width, with a maximum thickness of 134 mm. in the central region. In cross-section the bone is a flattened oval, and towards the anterior and posterior borders the thickness is much reduced. The articular area is fairly complete, but the fractures on the shaft are very irregular.

Embedded in a mass of matrix on the articular surface are the proximal remains of two bones, the radius and ulna, assuming the fragments to represent a humerus. Prolonged abrasion has so reduced these antebrachial elements that no useful information can be gained from them, but the ventral surface of the radius may have been very concave.

D. M. S. Watson in his interesting studies of the Elasmosaurid Shoulder-girdle and Forelimb,⁸ and his reconstruction of the musculature from relatively well-preserved bones, points out that the Plesiosaur limb "is essentially a rigid oar." In the large-headed types with elongated humeri, the structure of the fore-limb and girdle provided the mechanism for swift movement in ocean waters. Watson suggests that these large-headed forms, with their enormous gape, fed on large animals which were captured by superior speed.

C. W. Andrews's restoration of the skeleton of *Peloneustes philarchus*, from his valuable Catalogue of the Marine Reptiles of the Oxford Clay, published by the British Museum, has been reproduced (Text-figure 5) to illustrate the general structure of a Pliosaur.⁹

ACKNOWLEDGMENTS.

I am indebted to Dr. Anderson, of the Australian Museum, Sydney, for a transcript of W. C. Knight's paper on *Megalneusaurus* from the American Journal of Science, and to Mrs. Estelle Thomson for her excellent drawings.

⁸ 1924: D. M. S. Watson, P.Z.S., p. 914.

⁹ 1913: C. W. Andrews, Catal. Mar. Rept. Oxford Clay, pt. 2, Brit. Mus.

ICHTHYOLOGICAL MISCELLANEA.

BY GILBERT P. WHITLEY, ICHTHYOLOGIST, THE AUSTRALIAN MUSEUM, SYDNEY.*

(Plate I.)

THE Director of the Queensland Museum has kindly submitted for determination an interesting collection of fishes from that institution. With the exception of a fine specimen of *Chatodon (Citharædus) meyeri* (Bloch & Schneider) from Kaewieng, New Ireland, and a *Triorus reipublica* (Ogilby) labelled Papua, all the specimens came from Queensland, and a selection from them forms the basis of this paper. Some nomenclatorial notes which more or less directly concern Queensland fishes are also included and a few allied Western Australian forms have been compared with the eastern species. Fishes from Low Isles, North Queensland, will be dealt with in a forthcoming report on the fishes collected there in association with the British Great Barrier Reef Expedition, and it is hoped that the taxonomic notes in the present paper will help to lighten the burden of synonymy in the Low Isles report. Some of these notes may seem to be rather brief, but are nevertheless the result of close study of specimens and literature and may be amplified in future; it is necessary to introduce them in their present form to provide for various hitherto unrecognised items "a local habitation and a name."

The work on the ichthyology of Queensland performed during the last five years may be here reviewed, so that those who desire to keep the list of Queensland fishes up to date may have the means at their disposal. A list of the fishes recorded from Queensland waters was provided in the eighth volume of these Memoirs in 1925, and a bibliography containing 174 references was appended thereto. This list was mainly concerned with the period from about 1860, when Günther's Catalogue was being produced, to modern times, so that it is probable that an analysis of literature anterior to the Güntherian period would bring to light interesting early records of Queensland fishes. The fish-fauna of this State is so rich and varied that additional species, both endemic and extralimital, will doubtless be recorded from its waters for many years to come, and much careful research will have to be undertaken before any sort of coup-d'œil of its fauna can be obtained. The troublesome *nomina nuda* of Saville-Kent will have to be disposed of with care, preferably by being relegated to the synonymy of known Queensland species, and the types of the less known species of De Vis, Castelnau, and others must be re-described and figured before much original work can safely be performed.

* By permission of the Trustees of the Australian Museum.

The late A. R. McCulloch's Check-List of the fishes recorded from Australia, recently issued as a Memoir of the Australian Museum, embraces the Queensland fish-fauna and serves as an up-to-date basic catalogue. Several expeditions and groups of private individuals have made extensive collections in Queensland, notably on the Great Barrier Reef, in the last five years, and reports on them by various authors have appeared in the Memoirs of the Queensland Museum and the Records of the Australian Museum. An account of the fishes of the Capricorn Group was given in the fourth volume of the Australian Zoologist. In 1926, two parts of the Biological Results of the Fishing Experiments carried on by the F.L.S. "Endeavour" were published, a number of Queensland fishes being dealt with in them. Amongst the smaller contributions to Queensland ichthyology should be mentioned the description, by Nichols & Raven,¹ of a new *Rhadinocentrus* from the Babinda district and the renaming of an *Aseraggodes* by Chabanaud.² In Australia, Hamlyn-Harris³ has discussed the efficacy of mosquito-controlling fishes in Queensland, and Baneroff⁴ has continued his valuable observations on the Lungfish. In addition to these technical accounts, popular articles have appeared in the Australian Museum Magazine, wherein *Himantura granulata* (Macleay) was recorded from Queensland. Passing references to fishes from Queensland are made in the excellent work on the ichthyology of the Philippines and Oceania being done by Fowler⁵ and his associates, and also in the latest volume of Weber & Beaufort's Fishes of the Indo-Australian Archipelago. Several Queensland Chaetodontidae are included in Ahl's monograph⁶ of that family, and the Rhinobatidae have been revised by Norman.⁷

Family ATHERINIDÆ.

Pranesus ogilbyi gen. et sp. nov.

Eye very large. Head with scales above and on cheeks. Rami of mandibles not elevated posteriorly. Premaxillaries slender, not dilated posteriorly, and without a notch along their sides. Premaxillary processes short, their length less than half diameter of eye. Fine teeth on jaws and vomer. Gill-rakers slender and numerous. Body moderately robust, completely scaly. Anus situated between adpressed ventral fins. Dorsal fins widely separated. One anal spine. Caudal forked.

This new genus is practically identical with *Hepsetia* as defined by Jordan & Hubbs,⁸ but their conception of *Hepsetia* Bonaparte⁹ does not appear

¹ Nichols & Raven, American Museum Novitates 296, Feb. 1, 1928, pp. 1-2, fig. 1.

² Chabanaud, Ann. Mag. Nat. Hist. (10) v, Feb. 1, 1930, pp. 241-243.

³ Hamlyn-Harris, Proc. Roy. Soc. Qld. xli, 3, July 26, 1929, pp. 23-38, pls. i-viii.

⁴ Baneroff, Proc. Linn. Soc. N. S. Wales liii, 3, July 16, 1928, pp. 315-317.

⁵ Fowler, Mem. Bern. Bish. Mus. x, 1928; Fowler & Bean, Bull. U. S. Nat. Mus. 100, 1929.

⁶ Ahl, Archiv. Naturg. lxxxix, A. 5, May 1923, pp. 1-205, pls. i-ii.

⁷ Norman, Proc. Zool. Soc. London, 1926, pp. 941-982.

⁸ Jordan & Hubbs, Stud. Ichth., Monogr. Atherin. 1919, pp. 14, 31.

⁹ Bonaparte, Leon. Faun. Ital. iii, *Atherina hepsetus*, c. 1836, p. 2 (*file* Sherborn).

to be accurate. Sherborn, in his *Index Animalium*, considers *Hepsetia* Bonaparte as a possible error for *Hepsetus* Swainson.¹⁰ The latter genus has been overlooked by most ichthyologists and is apparently based on *Hydrocyon hepsetus* Cuvier, which is not an atherine, so that Swainson's name may be dismissed from further consideration here. Jordan & Hubbs regarded *Atherina boyeri* Risso¹¹ as the genotype of *Hepsetia* Bonaparte, but Sherborn's citation of the original reference, which is not accessible to me, strongly suggests that *Atherina hepsetus* Linné is the tautotype, in which case *Hepsetia* becomes an absolute synonym of *Atherina* Linné.

Under these circumstances, I consider it necessary to provide the new name *Pranesus ogilbyi* for the Australian atherine hitherto known as *Atherina pinguis* or *Hepsetia pinguis* Lacépède. Ogilby¹² suggested that the Queensland form might be distinct from the typical Mauritius species, so I propose the specific name in honour of that accomplished ichthyologist. The type of the species is the Moreton Bay specimen in the Queensland Museum figured in his paper.

Family APOGONIDÆ.

Genus LOVAMIA nov.

Orthotype, *Mullus fasciatus* White.¹³

Preopercle serrated on vertical limb and angle. Orbit entire. Jaws without distinct canine teeth. Small teeth in jaws and on vomer and palatines; none on tongue. A flat opercular spine. Maxillary not reaching vertical of hinder margin of eye.

Scales large, ciliated, in about 25 transverse series on body and in two rows between the complete lateral line and the back. Depth about one-third standard length and not much less than length of head. Body with dark longitudinal bands. No subcutaneous peritoneal tube above anal fin.

Seven smooth, pungent spines in anterior dorsal fin, which is separated from the posterior dorsal. Vent not far in advance of anal fin, which is short, with two spines and eight or nine rays. Caudal bilobed, without pungent spines.

The species accommodated by the genus *Lovamia* have been dealt with by Radcliffe¹⁴ and by McCulloch.¹⁵ A useful key to some genera of Apogonidæ has been compiled by Jordan & Jordan.¹⁶ *Apogon endekatenia* Bleeker¹⁷ is a species of *Lovamia*.

¹⁰ Swainson, *Nat. Hist. Classif. Fish. Amphib. Rept.* i, Oct. 1838, p. 259.

¹¹ Risso, *Ichth. Nice* 1810, p. 338, Mediterranean Sea.

¹² Ogilby, *Mem. Qld. Mus.* i, 1912, pp. 37-38, pl. xii, fig. 1, and text-fig. a.

¹³ White, *Voy. N. S. Wales*, 1790, p. 268 and plate. *Ex Shaw MS.*, Port Jackson, N.S.W.

¹⁴ Radcliffe, *Proc. U. S. Nat. Mus.* xli, 1911, pp. 245-261, pls. xx-xxv.

¹⁵ McCulloch, *Biol. Res. Endeavour* iii, 3, 1915, pp. 115-120.

¹⁶ Jordan & Jordan, *Mem. Carnegie Mus.* x, 1, 1922, pp. 43-44.

¹⁷ Bleeker, *Nat. Tijdschr. Ned. Ind.* iii, 1852, p. 449.

Lovamia is related to *Apogon* Lacépède,¹⁸ but may be distinguished by the larger scales, more denticulate preoperculum, dark longitudinal bands on body, shorter maxillary and bands of teeth in jaws. *Macrolepis* Rafinesque¹⁹ and *Aplogon* Agassiz²⁰ are regarded as synonyms of *Apogon* Lacépède.

Amia was the generic name given by Gronow²¹ to a fish from the East Indies. Gronow's work is non-binomial so his generic name is not available for use. Gray²² later revived Gronow's name in a binomial form and he named the East Indian species *Amia percaformis* from Gronow's manuscripts. But *Amia* Gray is preoccupied by *Amia* Linné, 1766, a different genus of fishes, and by *Amia* Gistel, 1848, a genus of Coleoptera. The type-species, *Amia percaformis* Gray, is a synonym of *Apogon moluccensis* Valenciennes²³ according to Bleeker,²⁴ but as that species has maxillary reaching vertical of hinder margin of eye, weaker dorsal spines, and no longitudinal bands on body, it also may be easily distinguished from *Lovamia*. Meuschen²⁵ gave the binomial name *Amia calva* to Gronow's non-binomial genus and species, but his identification was incorrect, as *Amia calva* Linné²⁶ is the American Bowfin, an entirely different fish. The best course to pursue under these circumstances is to use the generic name *Gronovichthys* for the unstriped Indo-Pacific species of "*Amia*."

Genus GRONOVICHTHYS Whitley, 1929.

Gronovichthys Whitley, Rec. Austr. Mus. xvii, 6, Nov. 28, 1929, p. 302, footnote.

Orthotype, *Amia percaformis* Gray.

Similar to *Lovamia*, but with the maxillary reaching vertical of hinder margin of eye; no longitudinal bands on body; dorsal spines weak.

Gronovichthys replaces *Amia* Gronow, 1763, non-binomial = *Amia* Meuschen, 1781 and Gray, 1854, preoccupied by *Amia* Linné, 1766 (*vide supra*).

Genus VINCENTIA Castelnau, 1872.

Another genus of fishes which claims attention here is *Vincentia* Castelnau.²⁷ The haplotype is the South Australian *V. waterhousii* Castelnau, which is a

¹⁸ Lacépède, Hist. Nat. Poiss. iii, 1802, p. 411. Haplotype, *A. ruber* Lacépède = *Mullus imberbis* Linné. Bibron (Dict. pittoresq. hist. nat. i, 1833, p. 237) remarked "C'est fort mal à propos que Lacépède a considéré le poisson qu'il a pris pour type de ce genre, le Mulle imberbe (*Mullus imberbis*) d'Artesi et de Linné."

¹⁹ Rafinesque, Analyse Nat. 1815, p. 86. *Nomen nudum*.

²⁰ Agassiz, Nomencl. Zool., 1846, Index. Univ.

²¹ Gronow, Zoophylac. Gronovianum, 1763, pp. 11 and 80, No. 273, pl. ix, fig. 2.

²² Gray, Cat. Fish coll. Gronow Brit. Mus., 1854, p. 173.

²³ Valenciennes, Nouv. Arch. Mus. Hist. Nat., Paris, 1832, p. 54.

²⁴ Bleeker, Atlas Ichth. vii, 1876, p. 93, pl. cccxxvii, fig. 1, as *A. monochrous*.

²⁵ Meuschen, Index Zoophylac. Gronov. 1781, No. 273; Whitley, Rec. Austr. Mus. xvii, 1929, p. 302.

²⁶ Linné, Syst. Nat., ed. 12, 1766, p. 500.

²⁷ Castelnau, Proc. Zool. Acclim. Soc. Viet. i, July 15, 1872, p. 245, St. Vincent's Gulf.

synonym of *Apogon conspersus* Klunzinger²⁸ which was described earlier (*vide* Zoological Record). *Vincentia* may be distinguished from *Lovamia* and *Gronovichthys* by its united dorsals and much greater depth of body, the depth being greater than length of head or about one-third total length.

Genus YARICA nov.

Orthotype, *Apogon hyalosoma* Bleeker, var. *torresiensis* Castelnau.

Preoperculum weakly serrated. Orbit entire. Jaws without canine teeth. Small teeth on jaws, vomer, and palatines; none on tongue. Profile concave over eyes. Maxillary reaching to below hinder half of eye. Scales large, ciliated, in less than thirty transverse series on body and in two rows between the complete lateral line and the back. Depth about one-third total length. Six smooth strong spines in first dorsal, which is separate from the second. Vent not far in advance of anal fin which has two spines and eight rays. Caudal bilobed with somewhat pungent upper and lower spines.

Yarica hyalosoma torresiensis (Castelnau).

Apogon hyalosoma Bleeker, Nat. Tijdschr. Ned. Ind. iii, 1852, p. 63; *et ibid.* v, 1853, p. 329. Amboina, Batavia, Sumbawa, and Sumatra.

Amia hyalosoma Bleeker, Atlas Ichth. vii, 1873, p. 96, pl. cccix, fig. 1. *Id.* Weber & Beaufort, Fish. Indo-Austr. Archip. v, 1929, pp. 283 and 341.

Apogon torresiensis Castelnau, Offic. Rec. Philad. Exlib., Melbourne, 1875, Intercolonial Exhibition Essays ii, p. 9. Cape York, Queensland.

One (*I. 4576*) from Townsville, North Queensland. Presented by F. H. Taylor. The range of Bleeker's species may be extended to include Queensland. *Apogon torresiensis* Castelnau is apparently conspecific but may be regarded as a variety for the present, as the Queensland form appears to have a narrower preorbital than that shown in Bleeker's figure and other differences may be found when comparison of series of specimens can be made.

Genus PRISTIPOGON Klunzinger, 1870.

Pristiapogon Klunzinger, Verh. Zool.-Bot. Ges., Wien, xx, 1870, p. 715. Haplotype, *Apogon frænatus* Valenciennes.

Preopercle distinctly serrated on both limbs. Jaws without distinct canine teeth. Seven dorsal spines.

Pristiapogon frænatus (Valenciennes).

Apogon frænatus Valenciennes, Nouv. Ann. Mus. Hist. Nat., Paris, i, May 1, 1832, p. 57, pl. iv, fig. 4. New Guinea and Guam.

Three specimens (Austr. Mus. Regd. Nos. *IA. 3987-3989*) from Rat Island, Port Curtis, Queensland, were collected by Messrs. Melbourne Ward and William Boardman.

This species has not hitherto been recorded from Australia.

²⁸ Klunzinger, Arch. Naturges, xxxvii, 1, early 1872, p. 18, Hobson's Bay ?

Family LUTJANIDÆ.

Lutjanus erythropterus annularis (Cuvier & Valenciennes).

- ? *Lutjanus erythropterus* Bloch, Nat. aush. Fische iv, 1790, p. 115, pl. ccclix. "Japan."
 ? *Mesoprion rubellus* Cuvier & Valenciennes, Hist. Nat. Poiss. ii, Oct. 1828, p. 475. Pondicherry.
Mesoprion annularis Cuvier & Valenciennes, Hist. Nat. Poiss. ii, Oct. 1828, p. 484. Java.
 ? *Mesoprion chirtah* Cuvier & Valenciennes, Hist. Nat. Poiss. ii, Oct. 1828, p. 488. Based on "Chirtah" Russell, Fish. Vizag., 1803, pl. xciii. Vizagapatam.
DiaCOPE metallicus Bleeker, Nat. Gen. Arch. Ned. Ind. ii, 1845, Topogr. Batav. p. 524. *Ex* Kuhl & Van Hasselt MS. Java (*file* Weber & Beaufort, 1911).
Lutjanus erythropterus Day, Fish. India, 1875, p. 32, pl. x, figs. 1-2. *Id.* Jordan & Thompson, Proc. U. S. Nat. Mus. xxxix, 1911, p. 453. *Id.* McCulloch, Biol. Res. Endeavour iii, 1915, p. 141 (Queensland). *Id.* Paradise & Whitley, Mem. Qld. Mus. ix, 1927, p. 85 (Pellew Group, Gulf of Carpentaria).

One specimen (*I. 4671*) with D. xi/15; A. iii/10; P. 16; Sc. 48, six rows of scales on notched preoperculum and more than ten oblique rows of scales above lateral line. It was labelled as *Lutjanus* sp., from "Bribie Island, Moreton Bay, Queensland. Pres. J. Freese. Colours in life:—Bright rosy red, with numerous oblique golden lines." It also has a dark blotch on upper half of caudal peduncle, preceded by a contrasted light blotch, but no dark band from eye to dorsal is distinguishable.

From Bloch's figure of a slender fish with red fins and less than ten rows of scales over a fairly straight lateral line, one would not identify this specimen as *Lutjanus erythropterus*, but as Day saw Bloch's type, and bearing in mind the remarks of Jordan & Thompson on this species, I feel obliged to use Bloch's name for the species. The name *Mesoprion annularis* applies best to the Queensland form: it was proposed by Cuvier and Valenciennes for a Javanese fish collected by Kuhl and Van Hasselt, whose manuscript name, introduced by Bleeker, is a synonym.

The Queensland specimen resembles *Lutjanus dodocanthoides* Bleeker²⁹ but has more oblique lines on body and the blotches on the tail, and agrees better with Bleeker's figure³⁰ of *L. chirtah*, which is said to be a synonym of *L. erythropterus*. The "Chirtah" of Russell has very dark edges to fins. This form is near *L. malabaricus* (Bloch & Schneider), from which the Queensland specimen is distinguished by having more fin-rays, more oblique rows of scales above lateral line, and a bald area around scales on temples.

Subfamily PARADICICHTHYINÆ nov.

Paradicichthys venenatus gen. et sp. nov.

(Plate I, fig. 1.)

"Chinaman Fish" Paradise, Medical Journ. Austr. ii, 25, 1924, p. 650, fig. 1. Great Barrier Reef, Queensland. *Id.* Paradise, Quart. Rev. Health Inspect. Assoc. Austr. iv, 3, July 1926, p. 44, pl. i, fig. 5.

²⁹ Bleeker, Atlas Ichth. vii, 1872, pl. cxcvi, fig. 2.

³⁰ Bleeker, Atlas Ichth. vii, 1872, pl. ccci, fig. 1.

The following is a preliminary diagnosis of a new Lutjanoid fish from North Queensland popularly known as the Chinaman Fish. It is hoped that an extended description will be published later with an account of the skull which has been prepared by Dr. H. L. Kesteven. The holotype is a large specimen (*IA. 1554*) from Townsville in the Australian Museum, and casts of it are also exhibited in the Queensland Museum and in the Townsville Institute of Tropical Medicine. Dr. Kesteven states (in MS.) that "The skulls of *Paradicichthys* and *Etelis* differ from the Lutjanoid skull in the peculiar shape of the basioccipital bone, and in the form of the prefrontal bone and the acartete condition of the maxilla. This last feature is, perhaps, the most important difference and alone would justify the segregation of these and other forms with similar skulls from the Lutjanidae." *Paradicichthys* is, however, nearer the Lutjanidae than the Sparidae, from which it differs mainly in having a small patch of teeth on each palatine. It also has a subocular shelf and the premaxillary separate from the maxillary.

D. x/16; A. iii/9; P. i/15; V. i/5; C. 15. L. lat. 56. L. tr. 9/1/21.

General bodily form of *Lutjanus* but with upper profile of head more convex. An oblique groove before eye to below nostrils. Checks and opercles scaly. Preoperculum entire, without notch. Greater part of nape, preopercular border, preorbital, and the broad, convex interorbital area naked. Premaxillary separate from maxillary which almost reaches vertical of anterior margin of eye; no supplemental bone. A single exterior series of strong, blunt, canine teeth in each jaw, behind which are bands of smaller blunt conical teeth. Outer canines enlarged anteriorly. A small patch of small tubercular teeth on each palatine; vomer toothless.

Body covered with cycloid scales which lie parallel with the dorsal profile above the lateral line and do not extend over the dorsal or anal fins. Spinous dorsal much lower than soft. Anal base short, the spines small. Pectorals and ventrals long and pointed. Caudal strongly emarginate. Vent somewhat in advance of anal fin.

General colour rosy or pinkish with darker and lighter zones arranged transversely and longitudinally. After death, the colour is more uniformly pinkish with some irregular violet spots on the body.

The flesh of this fish is sometimes poisonous as food. Dr. P. S. Clarke, of Cairns, North Queensland, has treated many cases of Chinaman Fish poisoning and has kindly supplied me with some interesting notes. He states that this fish is generally found at a depth of about 60 feet and grows to a weight of about 16 lb. Dr. Paradise noted that a weight of 9 kilograms or 20 lb. is attained. Length nearly 3 ft.

Specimens are in the Australian Museum from Townsville (Dr. Cilento; *IA. 1554*, holotype) and from between 17° S. and 19° S. Lat. on the Great Barrier Reef (Dr. Paradise; *IA. 2073-2074*); one of the latter, was illustrated in Paradise's reports.

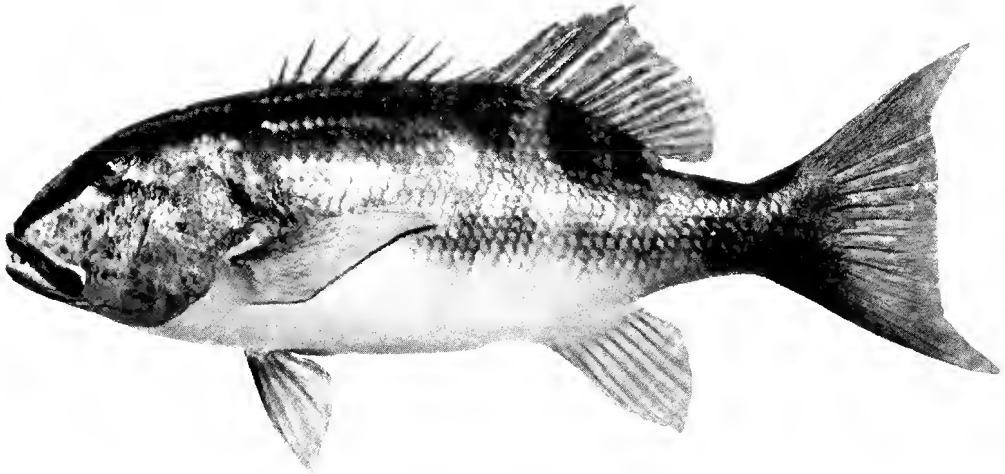


Figure 1.—*Paradicichthys venenatus* Whitley. Cast of holotype (plastotype) in Australian Museum. Original from Townsville, Queensland. Austr. Mus. Regd. No. *IA. 1551*. G. C. Clutton. *photo*.

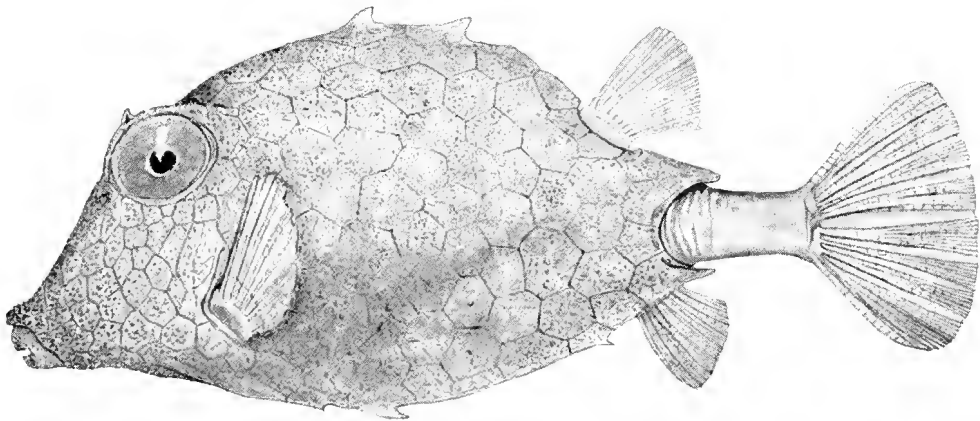


Figure 2.—*Trionus reipublicæ* (Ogilby). Lectotype of *Lactopterys reipublicæ* Ogilby. Moreton Bay, Queensland. Qld. Mus. Regd. No. *I. 1064*. G. P. Whitley, *del.*

Family GERRIDÆ.

Gerres splendens De Vis.

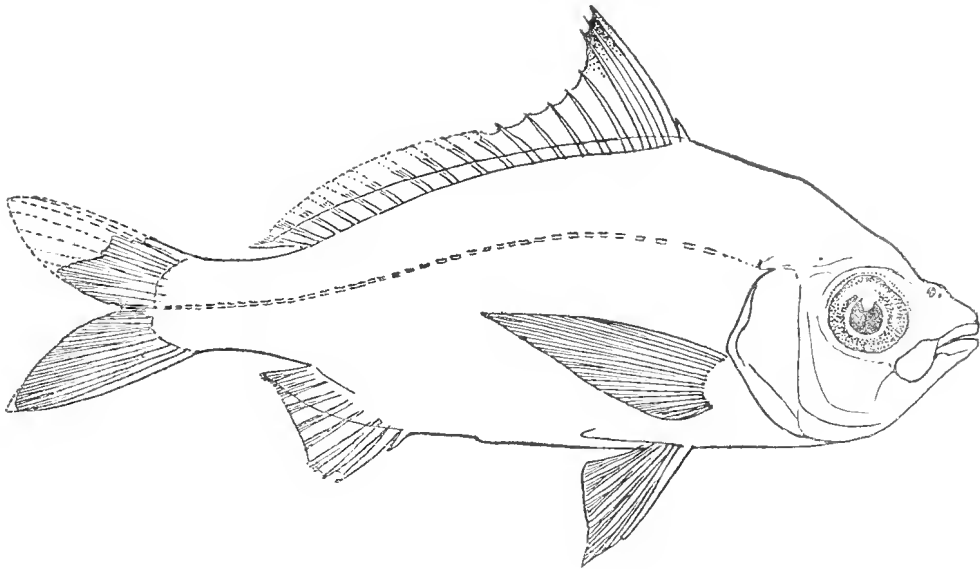
(Text-fig. I.)

Gerres splendens De Vis, Proc. Linn. Soc. N. S. Wales ix, 2, Aug. 19, 1884, p. 400. Cardwell, Queensland. Holotype in Queensland Museum. *Id.* Saville-Kent, Great Barrier Reef, 1893, p. 369 (listed only).

Gerres splendens McCulloch & Whitley, Mem. Qld. Mus. viii, 1925, p. 156 (listed only).

RE-DESCRIPTION OF THE HOLOTYPE OF **Gerres splendens** De Vis.

D. ix/10; A. iii/7; V. i/5; P. 16; C. 15 or 16. L. lat. circa 43. L. tr. 4/11/0.



TEXT-FIGURE I.

Gerres splendens De Vis. Holotype from Cardwell, Queensland. Qld. Mus. Reg. No. I. 94. G. P. Whitley, *del.*

Head (48 mm.) 3.1, depth (57) 2.6 in length to hypural (151). Eye (16) 3.0, snout (13) 3.7, interorbital (15) 3.2 in head. Pectoral 46 mm., second dorsal spine 30, ventral spine 22, second anal spine 15, and depth of caudal peduncle 17.

Profile rather gibbous over nape. Maxillary reaching to below anterior third of eye. Bands of fine teeth in jaws. All opercles entire. Three rows of scales on cheeks; area behind maxillary groove scaled. Seven gill-rakers on lower limb of first gill-arch.

Body covered with large cycloid scales in about 37 transverse series between head and hypural joint and in 4 longitudinal series above lateral line, some of the tubes of which are tilted upward posteriorly.

Dorsal and anal with dense scaly sheaths. Long axillary scales to ventrals. Pectorals pointed, reaching level of vent. Caudal forked, but damaged.

Colour evidently silvery with black area at tip of first dorsal. Eye dark bluish with bronze crescent on upper half of iris.

Described and figured from the holotype of *Gerres splendens* De Vis, kindly loaned to me for the purpose by Mr. H. A. Longman, to whom my thanks are hereby tendered. This specimen is 151 mm. long from snout to hypural joint or about $7\frac{1}{2}$ in. in total length. Queensland Museum Registered No. *I. 11/91*. Collected by Kendall Broadbent at Cardwell, North Queensland.

Variation and Affinities.—I have collected a series of young specimens of this species amongst mangroves at Low Isles, North Queensland. These show slight variation. Depth a little more than 3 in length to end of middle caudal rays in young, but 3 or less when larger. D. ix/10; rarely with 9 or 11 rays. Second dorsal spine a little over 2 in depth. L. lat. 41; rarely 40, sometimes 42 or even 43-44 tubes. Upper caudal lobe subequal to head. Colour bright silvery and without spots on body, but half-grown specimens sometimes with indistinct bars of darker scales. Tip of first dorsal black, some dark spots on dorsal rays.

Gerres splendens differs from *G. darnleyensis* (Ogilby)³¹ in having a larger eye, shorter pectoral, and larger scales. *Gerres raigiensis* Quoy & Gaimard³² is said to have 11 dorsal and 8 anal rays. Queensland records of *Gerres oyena* (Forsk.) and *G. philippinus* Günther³³ may refer to *Gerres splendens*. From the former, as figured by Klunzinger,³⁴ the Queensland species appears to differ in having smaller teeth, ten longitudinal rows of scales below lateral line, and less even profile, whilst from Günther's species it is distinguished by having different scale-counts.

Genus PAROCHUSUS nov.

Orthotype, *Gerres profundus* Macleay.³⁵

Back elevated at origin of dorsal. Depth about one-half standard length. No filamentous dorsal spines. Pectoral reaching to above anal fin.

This genus also includes *Gerres abbreviatus* Bleeker,³⁶ the dental characters of which are discussed in the eighth volume of the Atlas Ichthyologique, and *Gerres cherveti* Alleyne & Macleay,³⁷ but these species have fewer lateral line scales than the genotype.

³¹ Ogilby, Mem. Qld. Mus. ii, Dec. 10, 1913, p. 86, pl. xxiii, as *Xystema*. Type from Darnley Island in Queensland Museum (No. *I. 13/1071*).

³² Quoy & Gaimard, Voy. Uran. Physic., Zool., 1824, p. 292, Rawak & Waigiou.

³³ Günther, Cat. Fish. Brit. Mus. iv, 1862, p. 258. Philippine Is.

³⁴ Klunzinger, Fische Roth. Meeres i, 1884, p. 48, pl. v, fig. 1, as *G. oyena*.

³⁵ Macleay, Proc. Linn. Soc. N. S. Wales ii, June 1878, p. 350, pl. vii, fig. 3. Port Darwin.

³⁶ Bleeker, Verh. Bat. Gen. xxiii, 1850, Manoid., p. 11, and Nat. Tijdschr. Ned. Ind. i, 1850, p. 103. Batavia.

³⁷ Alleyne & Macleay, Proc. Linn. Soc. N. S. Wales i, Feb. 1877, p. 272, pl. vii, fig. 1. Cape Grenville, Queensland.

Family CHÆTODONTIDÆ.

Chætodon rainfordi McCulloch.

Chætodon rainfordi McCulloch, Rec. Austr. Mus. xiv, 1, Feb. 28, 1923, p. 4, pl. ii, fig. 1. Holbourne I., Queensland.

One specimen (*I. 4086*), Barnard Group, Great Barrier Reef, collected by W. E. J. Paradise.

Chætodon citrinellus nigripes De Vis.

Chætodon citrinellus Cuvier & Valenciennes, Hist. Nat. Poiss. vii, April 1831, p. 27. *Ex* Broussonet MS. Guam. *Id.* Cuvier, Règne Animal (Disciples' edition), 1836, pl. xxxix, fig. 1 (type).

Name in genitive case, without description, in Gmelin, Syst. Nat. (Linné), ed. 13, i, 3, 1789, p. 1269, footnote, *ex* Broussonet MS.

Chætodon nigripes De Vis, Proc. Linn. Soc. N. S. Wales ix, 3, Nov. 29, 1884, p. 453. Queensland.

Chætodon citrinellus nigripes Ahl, Archiv. Naturg. lxxxix, A, 5, 1923, p. 105.

One (*I. 3372*), coast of South Queensland.

Family PLATACIDÆ.

Genus ZABIDIUS nov.

Orthotype, *Platax novemaculeatus* McCulloch.³⁸

This new genus is easily distinguished from *Platax* Cuvier³⁹ by its nine dorsal spines. No notch between the spinous and soft dorsal fins. Soft dorsal and anal fins with rounded margins, not produced into falciform lobes.

Barnard⁴⁰ considered *Platax novemaculeatus* McCulloch as possibly belonging to the genus *Chatodipterus* Lacépède,⁴¹ but that genus has five dorsal spines, falciform fins, and a notch between the two dorsals. An attempt has been made by Fowler & Bean⁴² to unite McCulloch's species with *Platax pinnatus* (Linné) which has been called *P. teira* (Forskaal) by Australian authors, but I have examined Australian specimens identified as both species and regard *Zabidius novemaculeatus* (McCulloch) as quite distinct.

Family ENOPLOSIDÆ.

Enoplosus armatus (White).

Chætodon armatus White, Voy. N. S. Wales 1790, p. 254, fig. 1. [*Ex* Shaw MS. Botany Bay district, New South Wales.]

Chætodon constrictus Shaw, Zool. N. Holl., 1794, p. 17, pl. vi. [Botany Bay district, New South Wales.] Plate published 1793.

Enoplosus white Lacépède, Hist. Nat. Poiss. iv, 1802, p. 541. Based on White, 1790.

The "Zoology of *New Holland*," by George Shaw, illustrated by James Sowerby, and published in 1794, is a rare book on natural history. Only one

³⁸ McCulloch, Biol. Res. Endeavour iv, 4, Oct. 31, 1916, p. 188, pl. iv, fig. 1. Off Gloucester Head, Queensland. Holotype on deposit in Austr. Mus.

³⁹ Cuvier, Règne Animal, ed. 1, ii, '1817' = Dec. 1816, p. 334. Logotype, *Chætodon teira* Bloch (= *C. pinnatus* Linné).

⁴⁰ Barnard, Ann. S. Afr. Mus. xxi, 1927, p. 605.

⁴¹ Lacépède, Hist. Nat. Poiss. iv, 1802, p. 503. Haplotype, *Chætodon plumieri* Bloch.

⁴² Fowler & Bean, Bull. U. S. Nat. Mus. 100, viii, 1929, p. 21.

fish, *Chaetodon constrictus*, is described therein, but, as it has been overlooked by most systematists, attention is called to it here. The type-locality of this fish may be designated Botany Bay, New South Wales. The illustration of *Chaetodon constrictus* is dated "London Published Oct. 1, 1793, by I. Sowerby & Co, No. 2. Mead place Lambeth." The name is synonymous with *Chaetodon armatus* White and *Enoplosus white* Lacépède, from the same district; thus *Chaetodon constrictus* Shaw = *Enoplosus armatus* (White).

Family TEUTHIDÆ.

Genus NASO Lacépède, 1801.

Naso Lacépède, Hist. Nat. Poiss. iii, 1801, p. 104. Ex "*Nascus*" Commerson MS. Logotype, *N. fronticornis* Lacépède, selected by Jordan & Fowler, 1902.

Nason Anonymous, Allg. Lit. Zeit. 1802 (3), Jan. 1802, p. 22. Emendation for *Naso* Lacépède (*vide* Sherborn, Index Anim. ii, 17, 1928, p. 4255). Genotype, by present designation, *Naso fronticornis* Lacépède.

Nascus Cuvier, Règne Animal ed. 1, ii, "1817" = Dec. 1816, p. 331. Ex Commerson in Lacépède.

Sherborn quotes the anonymous introduction of the name *Nason* in January 1802 in a work which I have not seen but which is apparently a review of Lacépède's book. *Naso* Lacépède "1802," published in the tenth year of the French Republic, therefore evidently appeared in 1801.

Subgenus CYPHOMYCTER Fowler & Bean, 1929.

Cyphomycter Fowler & Bean, Bull. U. S. Nat. Mus. 100, vii, 1929, pp. 2, 264, and 273. Orthotype, *Naso tuberosus* Lacépède.

This may even be a valid genus, characterised by the convex hump on the snout.

***Naso (Cyphomycter) tuberosus* Lacépède.**

Naso tuberosus Lacépède, Hist. Nat. Poiss. iii, 1801, pp. 105 and 111, pl. vii, fig. 3. No locality [= Mauritius].

Acanthurus nasus Shaw, Gen. Zool., Pisc. iv, 2, 1803, p. 376, pl. li. Based on *Naso tuberosus* Lacépède from "Indian Seas" [*i.e.* Mauritius].

Nascus tuber Cuvier & Valenciennes, Hist. Nat. Poiss. x, 1835, p. 290. Based on *Naso tuberosus* Lacépède. Mauritius (Commerson & others).

Acanthurus tuberosus Ogilby, Mem. Qld Mus. iii, 1915, p. 135 (Plate I, Q). *Id.* McCulloch, Austr. Mus. Mem. v, 1929, p. 275.

Naso (Cyphomycter) tuberosus Fowler & Bean, Bull. U. S. Nat. Mus. 100, viii, 1929, p. 273, fig. 19.

A 20-inch specimen (*I. 4637*) in the Queensland Museum from Yeppoon, Queensland, and presented by Mr. J. Stevenson, has been identified by Mr. T. C. Marshall as *Naso tuberosus*. A sketch of this fish, made by Mr. Marshall, shows that it is an old specimen with a hump developed below the anterior portion of the dorsal fin. The type-locality of this species is Mauritius and the Queensland form may be distinct, but I hesitate to give it the new name it probably deserves without fuller data at my disposal. An up-to-date work on the fishes of Mauritius is greatly to be desired so that comparison may be made between Mauritius, Indo-Pacific, and Australian forms. Although early writers regarded them as conspecific, the fishes of Eastern Australia and those of Mauritius are almost certainly distinct.

Family OPISTHOGNATHIDÆ.

Genus TANDYA nov.

Orthotype, *Opisthognathus maculatus* Alleyne & Macleay.⁴³

Maxillary extending well beyond hind margin of eye, its distal extremity truncate. Teeth of outer row in jaws larger than the others, except for an inner row of strong teeth in the lower jaw. Scales cycloid, of moderate size, in more than sixty and less than eighty transverse rows on the body. They extend over shoulders but leave naked patches on each side of spinous dorsal and above pectorals. Twelve dorsal spines, all simple. Caudal rounded.

Gill⁴⁴ made a new genus, *Gnathypops*, for [*Opisthognathus*] *maxillosus* Poey and *O. microps* Poey, "with moderately small scales and maxillars passing little beyond the eyes," and his name has been employed for the Australian species to be noted hereunder. The logotype of *Gnathypops* is the Cuban *Opisthognathus maxillosus* Poey,⁴⁵ as selected by Jordan & Gilbert⁴⁶ who redescribed the species. It differs from Australian forms in having eight dorsal spines and a shorter maxillary.

Besides the genotype, my new genus includes two other Australian species: *Opisthognathus darwiniensis* Macleay⁴⁷ from Port Darwin, and *O. inornatus* Ramsay & Ogilby⁴⁸ from Derby, Western Australia. These must now be known as *Tandya darwiniensis* and *Tandya inornata* respectively. The type of the latter species is in the Australian Museum (*I. 841*) and was figured by McCulloch.⁴⁹

The type of *Batrachus punctatulus* Ramsay⁵⁰ is also in the Australian Museum (*I. 1254*). This species, described from Torres Strait, is synonymous with *Tandya maculata*.

Family BLENNIIDÆ.

Several well-differentiated species have been described as belonging to *Blennius* Linné, but obviously have no close relationship with that European genus and would better be regarded as the orthotypes of new genera as follows:—

Blennius intermedius Ogilby⁵¹ may be called *Pictiblennius*; this new genus also includes *Blennius tasmanianus* Richardson.⁵²

⁴³ Alleyne & Macleay, Proc. Linn. Soc. N.S. Wales i, 3, Feb. 1877, p. 280, pl. ix, fig. 3. Palm Is., N. Queensland ("Chevert" Exped.). Type in Macleay Mus., University of Sydney.

⁴⁴ Gill, Proc. Acad. Nat. Sci. Philad. 1862, p. 241.

⁴⁵ Poey, *Memorias* ii, 1860, p. 286.

⁴⁶ Jordan & Gilbert, Bull. U. S. Nat. Mus. iii, 16, 1882, p. 942.

⁴⁷ Macleay, Proc. Linn. Soc. N. S. Wales ii, 4, June 1878, p. 355, pl. ix, fig. 3. Port Darwin, North Australia. Type in Macleay Museum, University of Sydney.

⁴⁸ Ramsay & Ogilby, Proc. Linn. Soc. N. S. Wales (2) ii, 3, Nov. 30, 1887, p. 561.

⁴⁹ McCulloch, Rec. West Austr. Mus. i, 1914, p. 215, pl. xxx.

⁵⁰ Ramsay, Proc. Linn. Soc. N. S. Wales viii, 1, June 19, 1883, p. 177. Name emended to *B. punctatulus* by authors.

⁵¹ Ogilby, Mem. Qld. Mus. iii, Jan. 28, 1915, p. 127. Darnley I., Queensland. Type in Qld. Mus.

⁵² Richardson, Trans. Zool. Soc. Lond. iii, 1849, p. 129. Port Arthur, Tasmania.

Blennius rhabdotrachelus Fowler & Ball⁵³ is typical of *Rhabdoblennius*.

Blennius snowi Fowler⁵⁴ is the orthotype of *Nixiblennius*.

Blennius tonganus Jordan & Seale⁵⁵ may be named *Dubiblennius*.

Blennius laticlavus Griffin⁵⁶ is the type of *Zeablennius*.

A well-marked group of New Zealand Blennies which includes *Triptyrgion segmentatum* McCulloch & Phillipps⁵⁷ and *T. bucknilli* Griffin⁵⁸ may be named *Notoclinops*, with the former species as orthotype.

The Sabre-toothed Oyster Blenny of New South Wales which has been identified by authors⁵⁹ as *Petroscirtes variabilis* Cantor⁶⁰ is not that species, but requires a new subgeneric and specific name and may be called *Petroscirtes (Ostreoblennius) steadi*. Mr. D. G. Stead, after whom the species is named, recently collected a fine specimen in Port Jackson, New South Wales, the type-locality, with D. 31; A. 22; P. 14; V. 2; C. 11; depth 6.1 and head 3.9 in length to hypural; ventrals, pectorals, and caudal hyaline. It is proposed to figure and describe this species more fully at a later date.

Schmeltz⁶¹ noted *Petroscirtes cyprinoides* Cuv. & Val. from Bowen, but his record has been generally overlooked.

The Australian species of the subfamily Salariae have been admirably treated by McCulloch & McNeill⁶² but I find it necessary to propose two new generic names as the result of a study of numerous Queensland specimens.

Genus NEGOSCARTES nov.

Orthotype, *Salarias irroratus* Alleyne & Macleay.⁶³

Dorsal fins distinct. Large mandibular canines. Pectorals not nearly extending to anal fin. Ground-colour light in tone, overlain with dark reticulations. Seventeen dorsal and nineteen anal rays.

⁵³ Fowler & Ball, Proc. Acad. Nat. Sci. Philad. 1924 (1925), p. 272. Wake Island.

⁵⁴ Fowler, Mem. Bish. Mus. x, 1928, p. 431, fig. 71. Strong Island, Carolines.

⁵⁵ Jordan & Seale, Bull. U. S. Bur. Fish. xxv, 1906, p. 420. Tonga.

⁵⁶ Griffin, Trans. N. Z. Inst. lvi, 1926, p. 542, pl. xevi, fig. 1. Bay of Plenty, New Zealand. Type in Auckland Museum.

⁵⁷ McCulloch & Phillipps, Rec. Austr. Mus. xiv, Feb. 28, 1923, p. 20, pl. iv, fig. 3. Otago, New Zealand.

⁵⁸ Griffin, Trans. N. Z. Inst. lvi, 1926, p. 544, pl. xevii. Bay of Plenty, New Zealand. Type in Auckland Museum.

⁵⁹ Günther, Cat. Fish. Brit. Mus. iii, 1861, p. 234. Port Jackson specimen only. McCulloch, Austr. Zool. Handbook, i, 1922, p. 86.

⁶⁰ Cantor, Journ. Asiat. Soc. Bengal 1849, p. 1182; Cat. Malay. Fish. 1850, p. 200. Penang.

⁶¹ Schmeltz, Cat. Mus. Godef. vii, 1879, p. 48.

⁶² McCulloch & McNeill, Rec. Austr. Mus. xii, 1918, pp. 9-23, pls. iii-iv.

⁶³ Alleyne & Macleay, Proc. Linn. Soc. N. S. Wales i, 4, March 1877, p. 337, pl. xiii, fig. 4. Low Isles, Queensland. *Id.* McCulloch & McNeill, Rec. Austr. Mus. xii, 1918, p. 13, pl. iii, fig. 2 (Murray I., Q.).

Genus CRENALTICUS nov.

Orthotype, *Salarias crenulatus pallidus* Whitley.⁶⁴

Dorsal notched. Upper lip crenulated. Mandibular canines small or absent. Nineteen or more dorsal and anal rays.

In *Crenalticus pallidus* and *C. crenulatus* (Weber) the anal rays are produced and thickened in males. *Crenalticus meleagris* (Cuv. & Val.)⁶⁵ is apparently congeneric.

Both these new genera differ from *Salarias* Cuvier in having the dorsal fin excised between the spines and rays and in having canines usually present. *Rupiscartes* Swainson ("Alticus" Commerson in Lacépède) has more fin-rays than *Negoscartes* and differs from *Crenalticus* in having the upper lip entire.

Family GOBIIDÆ.

Gobiodon quinquestrigatus ceramensis (Bleeker).

Gobius quinquestrigatus Cuvier & Valenciennes, Hist. Nat. Poiss. xii, March 1837, p. 134. Tongatabou.

Gobius ceramensis Bleeker, Nat. Tijdschr. Ned. Ind. iii, 1852, p. 704. Waihai, Ceram.

Gobiodon ceramensis Günther, Journ. Mus. Godef. vi, 13 (Fische der Südsee vi), 1877, p. 182, pl. cix, fig. D.

One (*I. 4545*) from Bowen, Queensland, with very dark body and fins and light-brown head; another (*I. 4546*) from the same place is entirely chocolate brown. Collected and presented by E. H. Rainford.

Family TÆNIOIDIDÆ.

Leme purpurascens De Vis.

Leme purpurascens De Vis, Proc. Linn. Soc. N. S. Wales ix, 3, Nov. 29, 1884, p. 698. Brisbane, Queensland. *Id.* McCulloch & Ogilby, Rec. Austr. Mus. xii, 1919, p. 206, pl. xxxi, fig. 3.

Tænioides purpurascens Chabanaud, Bull. Soc. Zool. France li, 1927, p. 415.

One specimen (*I. 4638*) measuring 113 mm. in total length, from Five-mile Rocks, Yeronga, Brisbane River. Presented by R. H. Walker.

Family ELEOTRIDÆ.

Philypnodon grandiceps (Kreffft).

Eleotris grandiceps Krefft, Proc. Zool. Soc. Lond., July 7, 1864, p. 183. Upper Hawkesbury River, N. S. Wales.

Philypnodon grandiceps Waite, Rec. Austr. Mus. v, 1904, p. 285, pl. xxxvi, fig. 2 (references and synonymy).

Four (*I. 4548*) from Bellevue Station, about eighty miles up the Brisbane River. Presented by Mrs. Lumley Hill.

⁶⁴ Whitley, Austr. Zool. iv, 4, April 1926, p. 235. North-west Islet, Queensland.

⁶⁵ Cuvier & Valenciennes, Hist. Nat. Poiss. xi, July 1836, p. 332, as *Salarias*: "rapporté par Péron de la terre de Van-Diemen." Probably from North-Western Australia, as no *Salarias* occurs in Tasmania and Péron did not visit the Great Barrier Reef.

Genus CALLELEOTRIS Gill, 1863.

Subgenus GERGOBIUS nov.

Orthotype, *Eleotris tæniura* Macleay.

Distinguished from *Calleleotris* by the fewer dorsal rays (13 instead of 19) and the ornate colouration.

Calleleotris (Gergobius) tæniura (Macleay).

Eleotris tæniura Macleay, Proc. Linn. Soc. N. S. Wales, v, 4, May 20, 1881, p. 624. Low Island, Queensland.

This is the Queensland species which has been called *Valenciænnea longipinnis* by authors. *Valenciænnea* Bleeker is preoccupied and the figure of *Eleotris longipinnis* Lay & Bennett, described from the Loo Choo Islands, does not agree with Australian specimens so well as Macleay's account of *E. tæniura*, a specimen of which I have collected at the type-locality. For references to literature concerned see McCulloch's Check-List.⁶⁶

Family SYNANCEJIDÆ.

Genus SYNANCEJA Bloch & Schneider, 1801.

- Synanceja* Bloch & Schneider, Syst. Ichth. 1801, p. 194; spelt *Synanceia* on p. xxxvii. Logotype, *Scorpena horrida* Linné, designated by Jordan Gen. Fish. i, 1919, p. 58.
- Synanchia* Swainson, Nat. Hist. Classif. Fish. Amphib. Rept. ii, July 1839, pp. 180 and 267 (not p. 268 = *Erosa* Swainson): misprinted *Synachia* on p. 57. *Errore pro Synanceja*.
- Buffichthys* Swainson, Nat. Hist. Classif. Fish. Amphib. Rept. ii, July 1839, pp. 181 and 268. Logotype, *B. horrida* Swainson (= *Scorpena horrida* Linné), selected by Swain, Proc. Acad. Nat. Sci. Philad. 1882 (1883), p. 277. Spelt *Buffichthys* by Day, Fish. India 1875, p. 162.
- Synancidium* Müller, Archiv. Naturges (Wiegmann) ix, 1, 1843, p. 302 and Abhandl. K. Akad. Wiss. Berlin 1844 (1846), p. 163. *Genus calebs* ("Synanceia mit Vomerzähnen"). Logotype, *Scorpena horrida* Linné, designated by Jordan, Gen. Fish. ii, 1919, pp. 169 and 201. Spelt *Synancydium* by Agassiz and by Seudder.
- Synancia* Agassiz, Nomencl. Zool. 1846, Index Univ., p. 358. *Emend. pro Synanceja*. Logotype, *Scorpena horrida* Linné, by present designation. *Id.* Swain, Proc. Acad. Nat. Sci. Philad. 1882 (1883), pp. 277 and 304. *Id.* Regan, Ann. Mag. Nat. Hist. (8) xi, 1913, pp. 171 and 176.

A difficulty which continually confronts modern systematists is the fixation of genotypes for those genera which were originally proposed for more than one species and in which there is neither orthotype nor tautotype. The practice of using the first species or one chosen as the main species or "example" by the "first reviser," without a formal type-designation having been made, is discarded as impracticable. The choice of logotypes for fish genera has been made in scattered places in ichthyological literature by various authors, and, whilst an endeavour is made here to quote the earliest type-designations for every genus as far as possible, it is realised that much more

⁶⁶ McCulloch, Austr. Mus. Mem. v, 1929, p. 367.

bibliographical work will have to be done by ichthyologists and their associates generally before finality will be reached concerning the logotypes of some of the earlier genera of fishes.

The case of *Synanceja* illustrates the difficulty which may be met with when trying to trace the earliest genotype selection. This name was originally proposed by Bloch & Schneider for the following species with "Corpus nudum, caput magnum, cavernosum":—

1. *horrida*, p. 194. *Ex Scorpaena horrida* Linné. Bengal & Japan.
2. *uranoscopa*, p. 195. New species. Tranquebar.
3. *verrucosa*, p. 195. New species, figured on pl. 45. India.
4. *didactyla*, p. 195. *Ex Scorpaena didactyla* Pallas. Indian Sea.
5. *rubicunda*, p. 196. *Ex Triglā rubicunda* Hornstedt. Amboina.
6. *papillosus*, p. 196. *Ex Scorpaena cottoides* Forster MS. New Zealand.

and "species non definiende" p. 197. *Ex Gron. Mus.* 1, 46, n. 103; *Zoophyl.* p. 87, n. 290 [apparently *Scorpaena scrofa* Linné, 1758.]

One of these species must, of course, be the genotype, and as there is no tautotype it becomes necessary to search masses of ichthyological literature to discover who first formally named a logotype. The most fruitful sources of type-designations failed in this case: the French Dictionaries of Natural History and all the available works of Cuvier, Bleeker, and Kaup. Bleeker⁶⁷ regarded *Synanceia*, founded on *S. horrida*, and *Synancidium*, founded on *S. verrucosa*, as synonymous but designated no types for them. Gill⁶⁸ gave a masterly exposition of the taxonomic tangles surrounding *Synanceja* but he also named no genotype for it. A little earlier, Jordan and Starks⁶⁹ had approached the same problem from another angle, but their passing reference to the genus in question, "*Synanceia (horrida) = Synancidium = Bufichthys*," cannot, in my opinion, be construed as a type-designation.

The first selection of the logotype of *Synanceja* was apparently made by Jordan,⁷⁰ who chose *Scorpaena horrida* Linné, "by common consent." He later⁷¹ regarded *S. verrucosa* Bloch & Schneider as the type of *Synanceja* "as first restricted by Müller, 1843," but Müller made no type-designation. On the same page, Jordan stated "*S. horrida* is type of *Synancidium* Müller," and, as this is the first logotype-designation for Müller's genus which I have been able to discover, *Synancidium* becomes an absolute synonym of *Synanceja*; Jordan also came to that conclusion on p. 216 of the work cited.

I regard *Synanchia* Swainson as a mis-spelling of *Synanceja*, and follow Bibron⁷² in considering it a synonym of *Synanceja*. Another mis-spelling, or

⁶⁷ Bleeker, *Natuurk. Verhand. Holl. Maatsch. Wetensch.* (3) ii, 3, 1874.

⁶⁸ Gill, *Proc. U. S. Nat. Mus.* xxviii, 1905, pp. 221-224.

⁶⁹ Jordan & Starks, *Proc. U. S. Nat. Mus.* xxvii, 1904, p. 156.

⁷⁰ Jordan, *Gen. Fish.* i, 1917, p. 58.

⁷¹ Jordan, *Gen. Fish.* ii, 1919, p. 169.

⁷² Bibron, *Dict. d'Hist. Nat.* xii, 1861, p. 125.

emendation, is *Synancia* of Agassiz 1846, Swain 1883, and Regan 1913; to avoid confusion, I name *Scorpana horrida* Linné the logotype of each of these. Another absolute synonym of *Synanceja* is *Bufilethys* Swainson, for which Swain selected the same logotype.

Subgenus NOFUA nov.

Bleeker, in his "Revision des Espèces Insulindiennes de la famille des Synacéoides," regarded *Synanceja horrida* and *S. verrucosa* as congeneric because a new species from the Moluccas which he called *Synancia platyrhynchus*⁷³ was intermediate in structural characters between the two species. However, I regard *S. verrucosa* as typical of *Synanceichthys* Bleeker,⁷⁴ and propose the new name *Nofua* as a subgenus of *Synanceja* with *S. platyrhynchus* Bleeker as orthotype. The key characters given by Bleeker will serve to define it.

Synanceja horrida (Linné).

- "*Ikan Swangi Pouwa*" Renard, Poiss. Mol. i, 1718, pl. xxxix, fig. 155 (*vide* Gronow).
 "*Ikan Sowangi Bezâr*" &c. Valentyn, Amboina iii, 1726, p. 399, fig. 170. Amboina.
 "*Perca alepidota: dorso monopterygio.*" &c., Gronow, Zoophylac. Gronov., 1763, p. 88, No. 292, pls. xi, xii, and xiii, fig. 1. Bengal.
Scorpana horrida Linné, Syst. Nat. ed. 12, 1766, p. 453, No. 3. Based on Gronow and Valentyn. Eastern India [=Bengal].
Scorpana alepidota Bloch, Nat. ausl. Fische iii, 1787, p. 15 (*vide* Bleeker, 1874), pl. clxxxiii (*horrida* on plate). East Indies.
Scorpana horrida minor Meuschen, Ind. Zoophyl. Gronov., 1781, No. 292. [Bengal.]
Scorpana horrida Bonnaterre, Tabl. Encycl. Meth. Ichth., 1788, p. 69, pl. lxxxviii, fig. 369, copied from Bloch. (East Indies.) *Id.* Gmelin, Syst. Nat. (Linné), ed. 13, i, 3, 1789, p. 1217 (India).
Synanceja horrida Bloch & Schneider, Syst. Ichth. 1801, p. 194 (Bengal).
Scorpana horrida Lacépède, Hist. Nat. Poiss. ii, 1802, pl. xvii, fig. 2; *ibid.* iii, 1802, pp. 258 and 261.
 "*La Scorpène horrible*" Bose, Nouv. Dict. d'Hist. Nat. xxx, 1819, p. 411, pl. P. 19, fig. 5 (Mer des Indes).
Synancia horrida Cloquet, Dict. Sci. Nat. ii, 1827, p. 441. *Id.* Cuvier & Valenciennes, Hist. Nat. Poiss. iv, Nov. 1829, p. 440 (Java).
Synancia grossa Gray, Illustr. Indian Zool. i, March 1830, pl. xvii. Singapore. Also spelt *Synanacca grossa*; *vide* Sherborn, Index Anim.
Bufilethys horrida and *grossa* Swainson, Nat. Hist. Classif. Fish. Amph. Rept. ii, July 1839, p. 268. Based on Lacépède, 1802, and Gray, 1830.
Synancidium horridum Günther, Cat. Fish. Brit. Mus. ii, 1860, p. 144 (not Australian specimens). *Id.* Day, Fish. India i, Aug. 1875, p. 162, pl. xxxix, fig. 3.
Scorpana monstrosa Gray, Cat. Fish. coll. Gronow Brit. Mus., 1854, p. 117. *Ex* Gronow MS. Equivalent to Gronow, 1763.

Valentyn gave early pictures of stonefishes, as the species of this genus are called, and his "*Ikan Sowangi Bezâr*" obviously represents a specimen of

⁷³ Bleeker, Natuurk. Verhand. Holl. Maatsch. Wetensch. (3) ii, 3, 1874, pp. 11 and 14, pl. i, fig. 2.

⁷⁴ Bleeker, Ned. Tijdschr. Dierk. i, 1863, p. 234. Type, *Synanceja verrucosa* Bloch & Schneider. Not seen; quoted from Weber & Beaufort and from Jordan.

Synanceja horrida in which the contiguous bony bosses over the eyes are depicted as star-like objects. Cuvier & Valenciennes regard this figure as representing their *Scorpena diabolus*. Valentyn's fig. 342 is a conventional representation of a stonefish, regarded as *Synanceichthys verrucosus*, which may be mentioned in passing on account of its historical interest.

Synanceja horrida is an Indian species which has been wrongly recorded from Australia. The Australian Stonefish differs from descriptions and figures of the true *S. horrida* in having the nuchal or supratemporal crests larger, the preorbital stay of different architecture, and the anal spines very small and not pungent. There are more wart-like outgrowths on the body and the lower pectoral rays are simple in the Australian species, which has been named *Synanceia trachynis* by Richardson.

***Synanceja trachynis* Richardson.**

- Synanceia trachynis* Richardson, Ann. Mag. Nat. Hist. ix, July 1, 1842, p. 385. Port Essington (Gilbert). Type in British Museum. *Id.* Bleeker, Verhand. Akad. Amsterd. ii, 1855, p. 8.
- Synanceidium horridum* Günther, Cat. Fish. Brit. Mus. ii, 1860, p. 144 (Australian specimens only). *Id.* Klunzinger, Sitzb. Akad. Wiss. Wien lxxx, 1, 1879, p. 367 (Port Darwin). *Id.* Saville-Kent, Great Barrier Reef 1893, pp. 286 and 369, pl. xlvii, fig. 1 (Cooktown, Q.).
- Synanceja horrida* McCulloch, Austr. Mus. Mag. ii, 5, 1925, p. 159, figs. (Thursday I., &c., Queensland). *Id.* Kesteven, Rec. Austr. Mus. xv, 3, 1926, p. 225, figs. 10-15 (skull). *Id.* Tandy, Nat. Hist. Mag. ii, 2, 1929, p. 89, fig. 11 (Low Is., Q.). *Id.* Whitley and Boardman, Austr. Mus. Mag. iii, 1929, p. 369 and figs.
- "*Cynancehorrida*" Stevens, Amat. Fish. Assoc. Qld., Ann. Rept. 1925-26 (1926), p. 5. Error.
- Cynanceja* (sic) *horrida* Paradise, Quart. Rev. Health Inspect. Assoc. Australia iv, 3, July, 1926, p. 45, fig. (Torres Strait).

Apart from specimens met with by the British Great Barrier Reef Expedition, with which I hope to deal elsewhere at a later date, I have examined specimens of *Synanceja trachynis* in the Australian Museum from the following localities:—Moreton Bay, Boyne Island, Port Curtis, Endeavour River, Thursday Island, and Torres Strait, Queensland; Port Darwin, North Australia; Port Hedland, Western Australia, and some extralimital forms.

The species has been wrongly recorded from Sydney by Castelnau⁷⁵ as *Synanceidium horridum*, and Waite⁷⁶ has noted it from Houtmans Abrolhos, Western Australia.

Poisonous Properties of the Australian Stonefish.—General remarks on the poisonous properties of the Australian Stonefishes, *Synanceja trachynis* and *Synanceichthys verrucosus*, have been made by Saville-Kent and other writers, but the most recent account is by Duhig & Jones⁷⁷ who discuss in detail the venom, dorsal spines, variability in poison-sacs, and the effects of the poison. The specimens used by these authors were caught in Moreton Bay, South

⁷⁵ Castelnau, Proc. Linn. Soc. N. S. Wales iii, 1879, p. 351.

⁷⁶ Waite, Rec. Austr. Mus. vi, 1905, p. 74.

⁷⁷ Duhig & Jones, Mem. Qld. Mus. ix, 2, 1928, pp. 136-148, figs 1-8; Austr. Journ. Exp. Biol. Med. Sci. v, 2, 1928, pp. 173-179; Nature, Sept. 22, 1928, p. 454.

Queensland. In "Stone fishes and the Art of Camouflage," McCulloch⁷⁸ wrote about *Synanceja trachynis*, but his figure on p. 159 shows the dissected venom apparatus of *Synanceichthys verrucosus*. Other notes on stonefishes, besides those already quoted, have been given by Banfield⁷⁹ and Cleland.⁸⁰

Synanceja trachynis is said to reach a length of nearly 2 feet, but the average size of my specimens is about 11 inches.

Family PLATYCEPHALIDÆ.

Subfamily INEGOCHINÆ.

Genus SUGGRUNDUS nov.

Insidiator Jordan & Snyder, Proc. U. S. Nat. Mus. xxiii, Dec. 10, 1900, p. 368. Orthotype, [*Platycephalus*] *rudis* Günther. *Id.* Jordan & Thompson, Proc. U. S. Nat. Mus. xlvii, 1913, p. 70. *Id.* McCulloch, Biol. Res. Endeavour ii, 1914, p. 137. *Id.* Jordan & Hubbs, Mem. Carneg. Mus. x, 1925, p. 286. *Id.* McCulloch, Austr. Mus. Mem. v, 1929, p. 402.

Thysanophrys Jordan & Richardson, Proc. U. S. Nat. Mus. xxxiii, Feb. 28, 1908, p. 630; Check-list Fish. Philip Archip. 1910, p. 53. Not *Thysanophrys* Ogilby, *s. str.*

The generic name *Insidiator* Jordan & Snyder is perhaps preoccupied by *Insidiator* Amyot,⁸¹ a non-binomial genus of insects, but is certainly preoccupied by *Insidiator* Oken,⁸² a genus of fishes equivalent to *Epibulus* Cuvier,⁸³ and may be renamed *Suggrundus*, with *Platycephalus rudis* Günther⁸⁴ as orthotype. This species is said to be equivalent to *P. mcerderroortii* Bleeker⁸⁵ and should thus be known as *Suggrundus mcerderroortii*.

Grammoplites Fowler⁸⁶ may be regarded as distinct from *Suggrundus* as the lateral line is armed throughout with spines, whereas in the latter genus there are spines only on the anterior portion.

In the past, a large array of species has been included under "*Insidiator*" or confused with the distinct *Thysanophrys* Ogilby,⁸⁷ but work on these fishes has been rendered much easier by Jordan & Hubbs's excellent key to the

⁷⁸ McCulloch, Austr. Mus. Mag. ii, 5, 1925, pp. 159-162, 3 figs.

⁷⁹ Banfield, The Confessions of a Beachcomber, 1908, p. 143 and plate.

⁸⁰ Cleland, Austr. Med. Gazette, Sept. 1912, pp. 3-30.

⁸¹ Amyot, Ann. Soc. Ent. France iii, 4, 1846, p. 481, non-binomial (*vide* Sherborn, Index Animalium).

⁸² Oken, Allgemeiner Naturg., Univ. Register, 1842, p. 199. Based on *Epibulus* Oken [= Cuvier]. Tautotype, *Sparus insidiator* Pallas. See also Cloquet's articles on "Filou" and "Insidiator" in Dict. Sci. Nat.

⁸³ Cuvier, Règne Anim. ed. 1, ii, "1817" - Dec. 1816, p. 264.

⁸⁴ Günther, Rept. Voy. Challenger, Zool. i, 6, 1880, p. 66, pl. xxix, fig. B. Japan.

⁸⁵ Bleeker, Acta Soc. Sci. Indo-Nederl. viii, 1860, p. 80, pl. i, fig. 3. Nagasaki, Japan (*vide* Jordan & Richardson, Proc. U. S. Nat. Mus. xxxiii, 1908, p. 635).

⁸⁶ Fowler, Journ. Acad. Nat. Sci. Philad. (2) xii, 4, June 10, 1904, p. 550. Orthotype, *Cottus scaber* Linné. "Lateral line armed with spines."

⁸⁷ Ogilby, Proc. Linn. Soc. N. S. Wales xxiii, 1, 1898, p. 40. Orthotype, *Platycephalus cirronasus* Richardson.

Japanese genera of *Platycephalidae*. Comparison of this with the key to Japanese "*Thysanophrys*" given by Jordan & Richardson years before shows that characters regarded as specific in 1908 prove on closer analysis and elaboration to be generic in 1925.

Subgenus *REPOTRUDIS* nov.

Orthotype, *Platycephalus macracanthus* Bleeker.⁸⁸

Interorbital space less than vertical diameter of eye. Upper preopercular spine enlarged, about equal in length to longitudinal diameter of eye. Anterior third of lateral line with distinct upstanding spines.

Family *OSTRACIIDÆ*.

Genus *TRIORUS* Jordan & Hubbs, 1925.

Triorus Jordan & Hubbs, Mem. Carneg. Mus. x, 2, June 27, 1925, pp. 96 and 256. Orthotype, *Lactophrys tritropis* Snyder.

The nearest allies of this genus are the *Ostraciidæ* with three-angled carapaces. *Tetrosomus* Swainson⁸⁹ has only one spine on the back. *Lactophrys* and *Rhinesomus* Swainson⁹⁰ have no spines on back and more than nine dorsal and anal rays.

Triorus reipublicæ (Ogilby).

(Plate I, fig. 2.)

Ostracion concatenatus Bleeker, Versl. Med. Kon. Akad. v. Wet. Afd. Natuurk xv, 1863, p. 443, and Nederl. Tijdschr. Dierkunde ii, 1865, p. 68 (Port Jackson). *Id.* Günther, Cat. Fish. Brit. Mus. viii, 1870, p. 259 (N. S. Wales specimen only). Not *Ostracion concatenatus* Bloch, Nat. aush. Fische i, 1785, p. 101, pl. cxxxii, a West Indian species without spines on carapace.

Lactophrys concatenatus Waite, Mem. N. S. Wales Nat. Club. ii, 1904, p. 57 (N. S. Wales—listed only).

Lactophrys reipublicæ Ogilby, Mem. Qld. Mus. ii, Dec. 10, 1913, p. 92. New name for *Ostracion concatenatus* of Australian authors (not Bloch).

Lactophrys stellifer Jordan & Thompson, Mem. Carneg. Mus. vi, 1914, p. 268. Note that Sydney specimen differs from *L. tritropis* Snyder from Japan. *Id.* Jordan, Tanaka, & Snyder, Journ. Coll. Sci. Imp. Univ. Tokyo xxxiii, 1913, p. 431 (Sydney and Lord Howe Is.). *Id.* McCulloch, Austr. Zool. ii, 1922, p. 127 (not fig.). Not *Ostracion stellifer* Bloch & Schneider, Syst. Ichth. 1801, p. 499, pl. xviii, which has four strong spines on lateral ridge; described from "America" but probably from East Indies or Japan.

Triorus stellifer McCulloch, Austr. Mus. Mem. v, 1929, p. 423.

D. 9; A. 9; P. i/10; 8 branched rays in caudal.

Eye (12 mm.) 1.6 in snout (19) or 1.2 in interorbital (15). Opening of carapace around mouth (9) 2.7, gill-slit (6.5) 3.8, pectoral (15) 1.7 in head (25) which is 2.8 in length of carapace (71), measured from tip of snout to anterior

⁸⁸ Bleeker, Versl. Akad. Amsterdam (2) iii, 1869, p. 253. Amboina.

⁸⁹ Swainson, Nat. Hist. Classif. Fish. Amphib. Rept. ii, July, 1839, pp. 194 and 323. Name amended to *Tetrosomus* by Agassiz (Nomencl. Zool., Index Univ., 1846) who notes that there is a genus of microbes named *Tetrosomus* Corda, Alman. Carlsh., 1839.

⁹⁰ Swainson, Nat. Hist. Classif. Fish. Amphib. Rept. ii, July 1839, pp. 194 and 324.

edge of lateral concavity before the tail. Depth, excluding spines (37.5), 2.7 in total length (103) and little less than width (40). Anal or dorsal base (6) 4.1, caudal base (7) 3.5, height of dorsal or anal (12) 2.08 in head.

Profile steep, emarginate; snout pointed. Interorbital markedly concave. A small spine over anterior third of eye. Gill-opening more than half eye-diameter and situated below posterior half of eye. Carapace with more rugosities on head than elsewhere. Opening of carapace surrounding mouth a little less than eye diameter. Lips fleshy. Ten long, separate, blunt teeth in upper jaw, some of them movable; eight similar teeth in lower jaw. Nostrils in a groove before eye.

Carapace three-angled. A convex dorsal ridge extending from interorbital to dorsal fin and bearing two strong spines. Lateral ridges almost horizontal, not projecting strongly downwards, extending from sides of head to rear of carapace and each bearing a prominent spine below and before the first dorsal spine and preceded by a small spine; another small spine below and before the origin of the dorsal fin but no spine on lateral ridge below eye. Ventral surface convex anteriorly, flattened or slightly concave posteriorly. Carapace closed above and below tail; dorsally it ends as a rounded process but ventrally it is broadly truncate. Ten scutes between gill-opening and tail, about five between eye and snout, seven along dorsal ridge, nine down sides of body, and seventeen along median line of belly, those before anal space rudimentary. Caudal peduncle as long as snout.

Dorsal high, its margin rounded, with the first ray simple and the rest branched; anal similar to dorsal. Pectoral with upper rays longest and with a tubercle-like spine. Caudal rounded, a simple ray above and below.

Colour, after long preservation, uniform brown, lighter on soft parts, spines and junction lines of scutes. Eye bluish. Teeth dark brown.

Described and figured from a specimen which I designate lectotype of *Lactophrys republica* Ogilby. It is 85 mm. in length from snout to base of caudal and comes from Moreton Bay, Queensland. Registered No. *I. 1064* in the Queensland Museum.

I have examined thirty-six specimens from the collections of the Queensland and Australian Museums from various localities, and regard them as referable to the same species though further work on larger series might show racial or varietal differences.

Compared with the lectotype, young specimens from Moreton Bay (Qld. Mus. *I. 325*; Austr. Mus. *LA. 4592*) have two strong spines over eye, back more elevated, and spines on lateral ridges more pronounced. An anterior spine, on the lateral ridge, below the eye, is evidently lost with age. Fourteen to fifteen median ventral scutes in young specimens. The body scutes may also show growth-lines radiating from their centres to their corners and giving them a starry appearance. The largest Australian specimen of this species.

I have seen is No. *I. 326* in the Queensland Museum. It has a carapace of 108 mm. and the whole fish must have been over 6 inches long; unfortunately the tail is broken. It has sixteen median ventral scutes and smooth, starry sides, and came from Moreton Bay.

A specimen labelled Papua (Qld. Mus. *I. 327*) is about the same size as the type, having a carapace of 71 mm., but has rougher scutes and no supra-orbital spines: otherwise it is identical.

Large series of young specimens from New South Wales in the Australian Museum have characters similar to those of the Moreton Bay form but are slightly more elevated dorsally, more rugose on the sides, and some have milky-blue spots on caudal peduncle and posterior half of body. Spine on each lateral ridge below eye present in all but the largest specimens. There is also a median gibbosity before the dorsal fin and behind the spines which is much more pronounced than in any Queensland specimen examined. A large specimen from Port Jackson (Austr. Mus. *IA. 4591*: carapace 105 mm., standard length 123) differs from Ogilby's type in being much more rugose all over and has slightly smaller eye, lower fins, and more convex post-anal margin of carapace. In very small specimens, notably in a series from Bondi, New South Wales (Austr. Mus. *A. 5537-5542*), the belly is rounded and the lateral ridges point downwards and outwards.

From Lord Howe Island, the Australian Museum has two specimens. One (*I. 7862*) with a carapace of 56 mm. is similar to New South Wales specimens, but the other (*I. 4360*) is of interest because of its large size. This specimen has a carapace of 152 mm. and a total length of nearly 9 inches. All the spines on the ridges are obsolete and the depth is about half the length of the carapace. Width 70 mm., orbit 20, interorbital 24.

Triorus reipublicæ (Ogilby) resembles *T. tritropis* Snyder⁹¹ but differs in having much fewer rugosities, which are chiefly restricted to the head. The snout of *T. reipublicæ* is more acutely pointed with the profile straight rather than convex and there is generally no spine on lateral ridge below eye. The opening of the carapace surrounding the mouth and the size of the gill-slits also appear to differ from those shown in Snyder's figure.

Triorus reipublicæ is probably pelagic, at least when young. One specimen was found in the stomach of a snapper trawled off Port Stephens, New South Wales. The species ranges from New Guinea and Queensland to New South Wales and Lord Howe Island.

***Triorus pyxis* sp. nov.**

In addition to the series of *T. reipublicæ* (Ogilby), in the Australian Museum, there are two specimens of a new species from Western Australia.

⁹¹ Snyder, Proc. U. S. Nat. Mus. xi, May 26, 1911, p. 535, as *Lactophrys*. Misaki, Japan. Type later figured in vol. xlii, 1912, p. 424, pl. fiv, fig. 1.

This novelty is closely allied to the eastern Australian form but differs as follows:—

No spines over orbit. Groove for nostrils more excavated. Junction of scutes not so straight and even as in *T. reipublicæ* but each scute margined with close-set grooves at right angles to its edge, which is correspondingly notched. Rugosities not so pronounced, more in the form of rounded, reticulating irregularities of surface. Lateral scutes immediately before the caudal peduncle forming a sculptured shelf which is more evident in *T. pyxis* than in *T. reipublicæ*, to which it is similar, though scarcely identical, in other details. Five scutes on dorsal ridge. Nine dorsal and anal rays.

Holotype (*LA. 394*) and paratype (*LA. 395*) in Australian Museum, from Cottesloe, near Perth, Western Australia.

Genus ACANTHOSTRACION Bleeker, 1866.

Acanthostracion pentacanthus (Bleeker).

Ostracion pentacanthus Bleeker, Act. Soc. Sci. Ind. Neerl. ii, 1857, p. 98. Amboina.

Ostracion (Acanthostracion) fornasini Bleeker, Atlas Ichth. v, 1865, p. 34, pl. cciii, fig. 4. Amboina.
Not *O. fornasini* Bianconi from Mozambique.

One specimen (*Qld. Mus. I. 1575*) from Southport, South Queensland; presented by V. J. Hargraves. Length of carapace 84 mm. New record for Australia. This tropical species has been recorded from New Zealand as *Ostracion fornasini*, but it is doubtful whether it occurs so far south.

The species called *Ostracion (Acanthostracion) fornasini* in Bleeker's Atlas Ichthyologique is probably not *O. fornasini* Bianconi⁹² from Mozambique, but is *O. pentacanthus* Bleeker from Amboina. Bianconi's original description is not available in Australia, but Barnard⁹³ states that *Lactoria fuscomaculata* von Bonde is a synonym. Von Bonde's illustration⁹⁴ shows a species with thicker mouth region, more depressed dorsal spine, less branched caudal rays, and smaller anal spines than Bleeker's figure represents. The Queensland Museum specimen, compared with von Bonde's figure, differs in having the head a little over 3 in length of carapace, scutes of chin, breast, and posterior part of sides particularly rugose, no dark band from eye to pectoral, and markings on body tending to form wavy lines.

Günther⁹⁵ figured an allied form with much stronger preorbital and anal spines than the Indo-Australian species possesses. His figure apparently represents a distinct Hawaiian species, named *Lactoria galeodon* by Jenkins.⁹⁶

⁹² Bianconi, Nouv. Ann. Sci. Nat. [Bologna] (2) v, March 1846, p. 115; *vide* Sherborn, Index Animalium ii, 10, 1926, p. 2490.

⁹³ Barnard, Ann. S. Afr. Mus. xxi, 2, 1927, p. 963.

⁹⁴ Von Bonde, Rept. Marine Survey S. Afr. iii, 1924, p. 38, pl. ix, fig. 1, as *L. fuscolineata*.

⁹⁵ Günther, Journ. Mus. Godeff. vi, 17 (Fische der Südsee ix), 1910, p. 457, pl. clxx, figs. B-B'.

⁹⁶ Jenkins, Bull. U. S. Fish. Comm. xxii, 1902 (Sept. 23, 1903), p. 487, fig. 34. Honolulu.

Family TETRAODONTIDÆ.

Spheroides (Lagocephalus) inermis Temminck & Schlegel).

Tetraodon inermis Temminck & Schlegel, Faun. Japon., Poiss., 1850, p. 278, pl. cxxii, fig. 2. Simabara Bay, Japan.

An 18-inch specimen (*I.* 4657) from Woody Point, Moreton Bay. Presented by G. Thompson.

Genus TORQUIGENER nov.

Orthotype, *Spheroides tuberculiferus* Ogilby.

A row of papillæ before the gill-openings. Chin prominent, deep, plicated. Nostrils in the form of a rounded papilla with two perforations. Nine or ten dorsal rays. Dorsal and anal fins elevated, acute. Caudal fin rounded but with the outer rays slightly produced. Lateral line system well developed. A fold on each side of body. Skin of back, sides, and belly with spaced spines.

Torquigener tuberculiferus (Ogilby).

Spheroides tuberculiferus Ogilby, Mem. Qld. Mus. i, Nov. 27, 1912, p. 61, pl. xiv, fig. 1. Moreton Bay and Wide Bay. Q. *Id.* McCulloch, Biol. Res. Endeavour iii, 1915, p. 168 (not figure).

Three specimens (*I.* 318) from Moreton Bay.

Torquigener tuberculiferus vicinus subsp. nov.

Spheroides tuberculiferus McCulloch, Biol. Res. Endeavour iii, 3, April 21, 1915, p. 168, pl. xxxiv, fig. 1. Western Australian specimens only.

After comparing Western Australian specimens with typical Queensland forms, I regard the Australian Museum specimen figured by McCulloch as the type of a new subspecies. It is closely allied to *T. tuberculiferus* but has the spines of the ventral surface not extending so far forward on to the chin, nostrils in higher papillæ, and smaller spots on cheeks.

The following new names have been proposed in this paper:—

Subfamily: *Paradicichthyinæ*. Genera or subgenera: *Crenalticus*, *Dubi-blennius*, *Gergobius*, *Lovamia*, *Negoscartes*, *Nixiblennius*, *Nofua*, *Notoclinops*, *Ostreoblennius*, *Paradicichthys*, *Parochusus*, *Pictiblennius*, *Pranesus*, *Repotrudis*, *Rhabdoblennius*, *Suggrundus*, *Tandya*, *Torquigener*, *Yarica*, *Zabidius*, and *Zeablennius*. Species: *Paradicichthys venenatus*, *Petroscirtes (Ostreoblennius) steadyi*, *Pranesus ogilbyi*, and *Triorus pyxis*. Subspecies: *Torquigener tuberculiferus vicinus*.

WASPS OF THE GENUS *CERCERIS* IN THE QUEENSLAND MUSEUM.

BY T. D. A. COCKERELL.

Cerceris hackeriana n. sp.

Female (type). Length about 13 to 15 mm.; black, marked with red and yellow; head and thorax above with short ochreous pubescence; head massive, face very broad, orbits diverging below; sides of face above mandibles with appressed ochreous hair; clypeus black, finely punctured, the lower margin with four obtuse dentiform lobes, the upper part with a large outstanding lamina, its basal part broad and yellow, its apical part narrower, dark reddish, and bifid, ending in a pair of shining nodules; mandibles robust, strongly curved, dark red, with a yellow spot at base, the apical portion black, with a red spot at tip; antennæ entirely ferruginous; front and vertex dull and densely punctured, but a shining space at each side of ocelli; yellow lateral face-marks broad but short, ending obliquely at about level of antennæ; an elongate yellow spot behind the top of each eye; thorax very coarsely punctured, but area of metathorax convex, polished and smooth, weakly obliquely striate at sides; light marks of thorax consisting of a pair of cuneiform yellow marks on prothorax above; tubercles dull red, scutellum with a broad red band, obtusely excavated in middle behind, and postscutellum with an interrupted yellow band on red ground; tegulæ clear, ferruginous; wings strongly brownish, darker along upper margin; coxæ black, marked with cream-colour apically; legs otherwise ferruginous, the femora marked with black behind, the mark on the anterior ones confined to the base; abdomen strongly punctured, petiole broader than long, red at base, apex and sides, and with a small yellow spot on each side; second tergite black, with an entire apical yellow band; third with apical margin dull red, fourth with an apical yellow band margined with reddish, fifth with the basal two-fifths black, and the rest dull red; apex red, the pygidial plate broad, but narrowing apically.

Male. Length about 11.5 mm.; more slender; disc of clypeus occupied by a large subquadrate lemon-yellow area, and the bidentate lamina wholly absent; face narrowed, lateral marks much narrower, spots behind eyes small and pyriform; scutellum entirely black; black on femora more extensive, on anterior ones not confined to base; abdomen with yellow bands on second and fifth tergites, third all black, fourth with red hind margin, fifth and apex red. The petiole is longer than broad.

Two females, one male: Tooloom, N.S.W., Jan. 1926 (*H. Hacker*). Nearest to *C. opposita* Smith, but easily known by the clypeal lamina of the female, and other characters. *C. opposita* is a considerably smaller insect.

***Cerceris goddardi* n. sp.**

Female (type). Length slightly over 10 mm.: black, with yellow markings and a little red: hair scanty and pale, but forming rather conspicuous oebreous tomentum on fifth tergite: head, thorax and abdomen densely and strongly punctured, head broad, face very broad, orbits diverging below; clypeus short and transverse, its middle portion convex, its lateral portions band-like, the whole pale yellow except the lower margin of the middle portion which is black, and furnished with a pair of small tubercles on each side, the inner ones much the smallest; below the middle, the clypeus is expanded into a broad deeply emarginate or excavated lamina, the margin reddish, and ending on each side in a dark rounded angular projection (perhaps analogous to the structure in *C. armigera* Turner, but that is said to be apical, and not a lamina from the disc); mandibles externally yellow suffused with reddish, the apex black; lateral face-marks broad, light yellow, ending obtusely a little above level of antennæ, the inner margin convex; a narrow yellow line from near middle ocellus to upper end of supra-clypeal area; four equally spaced yellow spots on top of head, the outermost behind top of eyes; antennæ black above, dull ferruginous beneath, including scape; mesothorax very coarsely sculptured, entirely black; prothorax above with a pair of large broad-cuneiform light-yellow marks; tubercles black; scutellum somewhat shining, with sparse large punctures, and a yellow spot at each side; postscutellum with a yellow band; metathorax with a pair of very large, long-oval, whitish marks, approaching below; the area large, triangular, dull, minutely roughened, with a delicate median sulcus, mesopleura not tuberculate; tegulae bright ferruginous; wings dusky hyaline, darker in costal region, stigma orange; second cubital cell very broad, receiving recurrent nervure at middle (beyond middle in *C. hackeriana*); legs black, with knees, tibiae, and tarsi ferruginous; abdomen with petiole considerably longer than broad, black at base, pale yellow in middle, red at apex; second tergite with a large crescentic yellow mark on each side, third black, fourth with apical half yellow, fifth with a narrow apical yellow band and the extreme margin red; pygidial plate broad, ferruginous, the apical corners angulate; venter not modified.

Male. Length about 9 mm.; clypeus yellow, convex, with no lamina; frontal yellow stripe reaching clypeus; black bands between upper part of clypeus and lateral marks narrow; scape short, swollen, orange in front; no yellow spots at top of head; tegulae orange, black at base and narrowly in front; scutellum entirely black; second [cubital cell not broadened, its outer side incomplete above (the same on both sides), recurrent nervure received distinctly before the middle; third cubital cell not so produced apically; nervures darker; stigma less brightly coloured; anterior and middle trochanters and femora red in front; second tergite with a broad bright-yellow band, narrower in middle, and with a linear (suffused) red interruption; fourth and fifth tergites with yellow bands; pygidial plate mainly black, but dark red at apex and sides, and on each side of it a yellow spot; venter simple. The sixth tergite has a rather obscure yellow band, failing in middle.

Two other males are smaller, with a pair of yellow spots on scutellum, the tibiæ and tarsi yellow, the band on second tergite broad and entire, the pygidial plate yellow, with a small dark mark at base.

One female, three males: Dunk Island, Queensland. The female collected May 1914 (*Hamlyn-Harris*); the males August 1927 (*H. Hacker*). Mr. Hacker marked the female "near *opposita* Sm."; it is easily known from that species by the structure of the clypeus. The males caused me a good deal of perplexity: at first I had them set apart as a distinct species, and even thought the larger and smaller males might be different. I conclude, however, that the whole series represents a single variable species, but commend the matter to investigators on the ground, who may be able to reverse this decision. The male is very much like that of *C. venusta* Sm. in many respects, but the lateral-face marks do not extend so far toward the middle of the face, the femora are largely black, the metathorax is spotted, the band on postscutellum is entire. In *C. venusta* the second cubital cell receives the recurrent nervure very near the base. The new species is named after Professor E. J. Goddard, in recognition of his organisation of the survey of the Dunk Island fauna.

***Cerceris calida* Turner, 1915.**

Female: Babinda, Queensland, July 18, 1923 (*W. C. Dormer*). The emarginate apex of clypeus is I feel sure not the morphological margin, but the emarginate lamina of *C. goddardi*, in this species becoming subapical. The second cubital cell is small and triangular, receiving the recurrent nervure about or a little before the middle. The second tergite is clear red, with a broad yellow base. The species was described from Kuranda.

***Cerceris darrensis* n. sp.**

Female. Length about 8 mm., rather slender, coarsely punctured, black with few light markings, the thorax being entirely black, except for a couple of obscure red spots on prothorax above; head very broad, with silvery hair at sides of face; clypeus, broad lateral marks (very broad below, narrower above, truncate a little above level of antennæ), and under side of seape creamy-white; seape above clear red; flagellum strongly blackened above, clear red below; mandibles little curved, black at apex, red in middle, yellowish white at base; lower margin of middle lobe of clypeus broadly black, shining, with a small median tooth; disc of clypeus with an extended conical pointed spine or lamina, the apical part of which is black; a small round shining somewhat elevated yellow spot behind the top of each eye; area of metathorax rather small, triangular, moderately shining, but rugosopunctate, with a tendency to oblique striæ; other parts of metathorax extremely coarsely and densely punctured; tegulæ ferruginous, the margin anteriorly orange; wings hyaline, marginal cell and apex dusky; stigma dark reddish; second cubital cell small, receiving recurrent nervure well before middle; legs basally black, knees red, anterior and middle tibiæ light yellow in front, infuscated behind; hind tibiæ black, yellowish at apex and with a rather obscure yellowish stripe

behind; anterior and middle tarsi pale, hind tarsi dark fuscous; petiole broader than long, its apical margin red; second tergite black, obscurely reddish at base; third dull red, somewhat blackened in middle, with an apical interrupted pale yellow band; fourth black; fifth black, with a broad but obscure pale reddish band; pygidial plate broad, dark red, blackened apically. Pleura and venter simple.

Darra, Brisbane, Dec. 14, 1915 (*H. Hacker*). In Turner's table it falls near *C. opposita*, but it is very distinct by the structure of the clypeus and other characters. *C. unispinosa* Turner, from Darra, has a name which would have been appropriate for this species, but it is quite a different insect. Mr. Haeker had labelled this as a new species.

Cerceris brisbanensis n. sp.

Female. Length hardly 6.5 mm.: rather slender but with broad head, strongly punctured, black with pale ornaments; hair scanty and white, appressed and silvery on clypeus; mandibles pale yellow with long black apex; face pale yellow, with a rather narrow black band from each antenna down to clypeus, leaving an elevated yellow frontal carina, broadened below; lateral face-marks ending in an obtusely subangular manner halfway up front; a broad pale-yellow stripe behind eyes, the upper part divided, separating the usual postocular spot; a gently curved yellow band across top of head, interrupted in middle; margin of middle lobe of clypeus black, but it is overhung by a very broad short lamina, broadly and rather shallowly emarginate, with a dark rounded tubercle at each side, and anterolateral to these, on the true margin, is a shiny dark tubercle; scape yellow in front and behind, a little dark at apex; flagellum long, dark brown above, testaceous below; prothorax and mesothorax entirely black, or prothorax may have two large yellow spots; scutellum and postscutellum each with a yellow band, but that on scutellum may be interrupted; metathorax with a pair of fusiform yellow marks (a little stained with red), converging below; area of metathorax triangular, black, finely irregularly plicatulate all over; mesopleura simple; tegulae clear yellow; wings hyaline, dusky in marginal cell and at apex; stigma light rufous; second cubital cell very broad, receiving recurrent nervure before the middle; legs light reddish-testaceous, anterior ones blackened at base, and their femora darkened above; petiole much longer than broad, pale dull reddish, black at base; second tergite light yellow, suffused with red; third black, narrowly obscure red apically, and broadly so at sides; fourth dull pale yellow, black at base; fifth brown or pale yellowish; apical plate broad, very dark reddish or partly yellowish.

Two females, Darra, Brisbane, Dec. 14, 1915 (*H. Hacker*). An insignificant looking but distinct species, resembling *C. venusta*, but the structure of the clypeus is different.

Cerceris goodwini n. sp.

Female. Length about 8.3 mm.: black, with thin white hair, conspicuous at sides of metathorax, and on cheeks, long on sides of petiole and basal part

of second tergite; head large and broad; face light yellow except the supra-clypeal area and a narrow band part-way down each side of clypeus; a short elevated yellow keel between the antennæ; lateral marks ending very broadly at about level of antennæ; small yellow spots behind upper part of eyes; lower margin of clypeus black, with lateral tubercles, and overhung by a black-edged very broadly and shallowly emarginate lamina, having at each side a rounded shining black tubercle (the whole structure similar in principle to that in *C. brisbanensis*); scape curved, black, with a subapical reddish spot in front; flagellum dark above, but apex above, and whole under side, bright ferruginous; thorax black, closely punctured (less so on scutellum); prothorax with a small crescentic yellow mark on each side above, but no other yellow markings on thorax; area of metathorax somewhat shining, with a median sulcus, which is finely cross-ribbed, and the surface of the area finely plicatulate and showing some punctures; mesopleura simple; tegulæ chrome yellow, with a basal reddish spot; wings greyish hyaline, dusky in marginal cell and beyond; stigma reddish black; second cubital cell very broad, receiving recurrent nervure a little before middle; legs basally black, but knees and tibiæ bright ferruginous; anterior and middle tarsi pale reddish, hind tarsi red, the small joints partly infuscated; petiole black, rugose, longer than broad, its hind margin narrowly red; second tergite black in middle, red at sides, with two large triangular yellow spots basally; third black; fourth black with a broad apical yellow band; fifth dusky red, with base black, and a narrow imperfect apical yellow band; apex dark, the broad pygidial plate reddish.

Stanthorpe, Queensland, July 31, 1924 (*F. A. Perkins*). Named after Sir John Goodwin, Governor of Queensland, an excellent naturalist, in recognition of his interest in the work of the entomologists. It is allied to the last species, but quite distinct. Also at Stanthorpe, Feb. 1, 1926, was taken a female *C. minuscula* Turner. The tegulae in both sexes are very bright ferruginous.

NEW AUSTRALIAN BEES.

BY T. D. A. COCKERELL.

***Parasphecodes zamelanus* sp. n.**

Male. Length about 11 mm., anterior wing 8.3; entirely black, including antennæ and legs, except for the usual yellow clypeus, with the sides above black, the black areas uniting above, the upward extension of yellow ending in a sharp point; body throughout with thin but quite long and conspicuous dull white hair, stained with blackish on head and thorax above; clypeus prominent, with a median groove; sides of face with conspicuous white hair; front dull, but a shining crescent in front of middle ocellus; mesothorax dull, somewhat shining in middle, very finely punctured; scutellum bigibbous, the elevations distinctly shining; area of metathorax moderately shining with well-defined straight plicæ; tegulæ black with an obscure reddish spot; wings greyish hyaline, the outer margin darker; nervures dark fuscous; stigma light brown with dark border; second cubital cell very broad, receiving first recurrent nervure near end; legs with white hair; spurs pale; abdomen shining, finely punctured, no depression between first and second tergites; second sternite with a median elevation, not amounting to a spine.

Two from Dunalley, Tasmania, Dec. 26, 1917 (*G. H. Hardy*); Queensland Museum. Near to *P. cervicalis* Ckll., but larger and with different venation.

***Parasphecodes rufocollaris* sp. n.**

Female. Length about 7.5 mm., anterior wing 6.3; head and thorax black, with very little hair; prothorax, tubercles, and tegulæ bright ferruginous; surface of body dullish, with a sericeous lustre; mandibles dull red with black base; antennæ black; area of metathorax very large and long, without evident sculpture, the median triangular area completely dull, the broad marginal area somewhat shining; under the microscope the area shows an excessively minute reticulation; sides of metathorax with fine white tomentum, as if mildewed; wings long, reddish, stigma (very large) and nervures dark rufo-fuscous; second cubital cell higher than broad; first recurrent nervure meeting intercubitus; legs clear bright ferruginous, the tarsi with pale golden hair; abdomen rather narrow, cuneate basally, dark brownish red, stained with blackish, the third tergite very dark, and beyond that practically black; no hair bands or patches; first two tergites with a little elevation on each side; third sternite with pale hair, but on the next two it is black.

National Park, Queensland, Dec. 1921 (*H. Hacker*); Queensland Museum. Allied to *P. bribiensis* Ckll., but easily known by the peculiar colouration. Mr. Hacker had recognised it as a new species.

Parasphecodes anhybodinus sp. n.

Male. Length about 10 mm., anterior wing 8; head and thorax black, including mandibles and the very long antennæ: clypeus dull honey yellow, polished, the sides above black, middle depressed; hair of head and thorax thin, dull white, a little fuscous on vertex and scutellum; sides of face with rather dense white hair: mesothorax dull, finely and closely punctured, but the punctures clearly visible under a lens; scutellum bigibbous, the elevations shining, the distinct punctures well separated; area of metathorax large, dullish, with strong straight well-spaced plicæ at sides, but in middle with finely rugulose confused sculpture, hind margin obtuse, interrupted in middle; tegulæ dark rufous; wings hyaline, with a dusty apical spot; stigma and nervures dilute sepia; second cubital cell very broad, receiving recurrent nervure very near its end; abdomen with first three segments dark chestnut red, the first suffused with blackish basally, and with white hair, the third suffusedly blackish; fourth tergite and beyond black; no hair bands or patches; a deep cleft between first and second sternites, the second somewhat elevated basally; claspers with greatly swollen shining base.

Cheltenham, Victoria, April 13, 1918 (*F. E. Wilson*): Queensland Museum. Allied to *P. hybodinus* Ckll., but elevation of second sternite much less pronounced, and red of abdomen much darker. They agree in the shining snow-white hair on inner side of hind tarsi. The stigma of *P. hybodinus* is redder, and the wings are not so long. *P. hybodinus* has the malar space shorter, and the clypeal pale area clear light yellow.

Parasphecodes notescens sp. n.

Male (type). Length about 9 mm.; head and thorax black, with the clypeus (except a large black mark on each side above) pale yellow, labrum and mandibles reddish, tubercles clear red, tegulæ pale rufo-fulvous; antennæ very long, reaching base of abdomen, flagellum bright ferruginous beneath; face strongly narrowed below; hair of face, front, and thorax above pale fulvous, on cheeks and under side of thorax it is dull white; mesothorax and scutellum dull, minutely and densely punctured, hairy, but not sufficiently to hide the surface; area of metathorax large, dull, without a shining rim, with rather indistinct radiating plicæ; mesopleura dull, hairy; wings hyaline with an apical dusky spot; stigma and nervures dusky reddish; second cubital cell higher than broad, first recurrent nervure meeting intercubitus; legs bright ferruginous, with the coxæ, trochanters, femora at base and more extensively beneath, black; abdomen shining chestnut red, a moderate depression between first and second tergites, no basal black spot, tergites beyond the third more or less stained with blackish; second ventral segment not modified.

Female. Length about 9 mm.; head and thorax black, tubercles reddened apically, tegulæ rufo-fulvous; head and thorax above with fulvous hair, dense on postscutellum; area of metathorax semilunar, with fine dense plicæ, and a narrow shining rim; first recurrent nervure reaching second cubital cell a little

before end; femora black with apex broadly rufous; anterior and middle tibiae dusky red, hind tibiae black; anterior and middle tarsi reddish, hind pair black, with an orange brush at end of basitarsi; abdomen broad, minutely punctured, tergites dark red, with no black basal mark, extreme apex blackish; small cuneiform patches of white hair at lateral bases of second and third tergites; venter with white hair.

Beaconsfield, Victoria, Jan. 1, 1918 (*F. E. Wilson*, 510, 631); Queensland Museum. Closely related to *P. fultoni* Ckll., the male easily distinguished by the flagellum red beneath (all black in *P. fultoni*, and also in *P. rufulus* Friese), and the female by the red front and middle tibiae.

***Parasphecodes subfultoni* sp. n.**

Female. So like *P. fultoni* Ckll. that I hesitated to separate it, but it is definitely distinct from the type of that species as follows:—Tegulae rufous (not the clear rufo-fulvous of *P. fultoni*); wings blackish, unusually dark, with darker stigma and very dark nervures; area of metathorax large, with no crescentic margin, the surface covered with strongly wrinkled rugae; middle tibiae red at base (as also are the anterior ones); abdomen very dark red, the same colour throughout, the margins of the third and fourth tergites coloured like the rest. The venter has much white hair.

Victoria, 1923 (*E. Wilson*); Queensland Museum.

***Parasphecodes submoratus* sp. n.**

Female. Length about 7.6 mm.; head and thorax black, with thin white hair, becoming pale brown dorsally and even black on vertex; clypeus and tubercles entirely black; antennae black; clypeus moderately shining, with scattered punctures, no median groove; front dull, somewhat shining at sides; mesothorax slightly shining, excessively finely punctured, median groove distinct; cheeks and pleura with conspicuous long white hair; scutellum bigibbous, the elevations shining; area of metathorax large, the basal part finely plicate, no distinct shining rim; under the microscope the area shows a very delicate cross-lineolation; posterior truncation very small; tegulae rufescent, very dark; wings dilute brown, stigma reddish brown, nervures dark fuscous; second cubital cell broad, first recurrent nervure meeting the intercubitus; legs black; abdomen chestnut red, the apical tergite blackened; hind margins of segments testaceous; no hair-patches; venter with white hair.

Russell Falls, National Park, Tasmania, Jan. 10, 1925 (*A. J. Turner*); Queensland Museum. In my manuscript table it runs to *P. lichatus* Sm., but it is evidently distinct. *P. lichatus* is a much larger insect.

***Parasphecodes submeracus* sp. n.**

Female. Length a little over 9 mm.; head and thorax dull black, robust, with rather abundant erect white hair (entirely white dorsally); mandibles very faintly reddish subapically; clypeus and tubercles entirely black; head

broad; clypeus shining, with widely scattered punctures, no median sulcus; flagellum with a very faint reddish tinge beneath; mesothorax entirely dull, the punctures so fine as to be hardly visible under a lens, but the microscope shows excessively dense small punctures; middle of postscutellum with dense pale tomentum; area of metathorax large, poorly defined, almost without distinct sculpture, but the microscope shows fine plicæ at the base; there is no shining rim; tegulæ very dark brown, almost black; wings greyish hyaline, with no evident apical cloud; stigma and nervures dull rufous; basal nervure very strongly bent, and ending a long distance from nervulus; second cubital cell higher than broad; first recurrent nervure meeting intercubitus, or going to apical corner of second cubital cell; legs black, with thick pale hair, spurs ferruginous; abdomen very broad, dull dark red, finely punctured, black beyond the third tergite; no hair-patches; venter with white hair; second sternite simple. Orange pollen (round grains, without spicules) has been collected on the hind femora and tibiæ, and the base of the abdomen beneath.

Stanthorpe, Queensland, Nov. 3, 1922 (*F. A. Perkins*); Queensland Museum. Also runs to *P. lichatus* in my table, and suggestive of *P. hirtiventris* Ckll., but quite distinct. The peculiar basal nervure is a good recognition mark.

Parasphecodes bribiensiformis sp. n.

Female. Like *P. bribiensis* Ckll., but area of metathorax much larger, subtriangular, with coarse though irregular plicæ; first abdominal tergite considerably broader, being much broader than long; base of second tergite pellucid whitish except at extreme sides; tegulæ piceous with a red spot (fulvotestaceous in *P. bribiensis*); hair of scutellum very pale fulvous.

Bribie Island, Queensland, Aug. 29, 1920 (*Hacker*); Queensland Museum. I hesitated whether to call this a variety of *P. bribiensis*, or a distinct species; but the area of metathorax is so different that it must apparently be separated.

The species of this group, with brown abdomen, and bosses on the first two tergites, are neither true *Parasphecodes* nor true *Halictus*. They may form a subgenus *Aphalictus* subg. n., probably to be treated as a genus when structural studies of both sexes can be made. The type of the subgenus is *P. bribiensis* Ckll.

Halictus moreensis sp. n.

Female. Length about 8 mm.; robust, black, with very broad abdomen (its width over 3 mm.); tibiæ and tarsi entirely clear bright ferruginous; legs otherwise reddish brown, with the femora clear red apically; head broad; mandibles rufous in middle; scape black, flagellum ferruginous beneath; clypeus shining, punctate, convex, with no median sulcus; hair of head grey, rather abundant; front minutely striate; mesothorax and scutellum with short, rather dense, pale-fulvous hair; postscutellum with paler tomentum, very dense in middle; mesothorax dullish, scutellum shining, not bigibbous; area of metathorax semilunar, not at all pointed behind, and with no shining rim, the

surface densely sculptured all over, finely reticulate; posterior truncation sharply margined at sides; upper margin of prothorax at sides, and margin of tubercles, densely pale-tomentose; tegulae ferruginous; wings hyaline, slightly dusky, stigma and nervures light ferruginous; second cubital cell very broad; first recurrent nervure meeting intercubitus; outer recurrent and intercubitus weakened; hind spur simple; abdomen shining, with erect pale hair at base and sides; basal pale ochreous-tinted hair-bands on segments 2 to 4, broad at sides, contracted or interrupted in middle; extreme apex with red hair.

Moree, N.S.W., March 1923 (*A. P. Dodd*); Queensland Museum. Related to *H. conspicuus* Smith (of which *H. alboguttatus* Friese appears from the description to be a synonym), but with bands instead of spots on the abdomen.

***Halictus picticornis* sp. n.**

Male (type). Length about 4.5 mm., anterior wing 3.5; black, the clypeus with a broad yellow band (its upper margin rounded); mandibles ferruginous; flagellum bright ferruginous beneath, with the last three joints black; tubercles clear ferruginous, this colour extending some distance along the margin of the prothorax; tegulae bright ferruginous; knees red, and basitarsi pale dull reddish; abdomen somewhat brownish, first tergite with a broad bright ferruginous margin, second less conspicuously reddened apically; pubescence scanty and pale, the abdomen with thin hair, but no bands or patches. Face narrow, eyes converging below; clypeus strongly produced; antennae of moderate length; front and mesothorax very densely punctured, the mesothorax slightly shining; postscutellum with a dense tuft of hair; area of metathorax minutely rugulose all over, with no shining margin; wings greyish hyaline, stigma rather small, dark reddish; nervures very dark, the outer ones strong; second cubital cell narrowed above, angulate where it receives the recurrent nervure some distance from end; abdomen shining, second tergite with a basal depression.

Female. Length about 5.5 mm.; black, with mandibles reddened apically; flagellum clear bright ferruginous beneath, except at base; thorax entirely black; mesothorax evidently shining, with well-separated punctures on a minutely sculptured (not polished) surface; area of metathorax semilunar, densely covered with irregular vermiform rugae, with no shining rim; legs obscure brownish; anterior knees red, hind spur with four or five very short oblique teeth, and one large obtuse one; nervures rather paler, and outer ones weaker, than in male; abdomen shining black, hind margins of tergites obscurely brownish; no bands or patches, but a thin covering of pale hair giving a pruinose effect.

Caloundra, 1916 (*H. Hacker*); Queensland Museum. The male Jan. 20, the female Jan. 2. The male will be easily recognised by the peculiar antennae. The female is very near *H. plebeius* Ckll., but smaller, with yellowish and fuscous hair on hind legs. It is also allied to *H. globosus* Smith.

Halictus excusus sp. n.

Male. Length about 7.5 mm.: slender, black, with a large triangular cream-coloured mark on clypeus (but labrum and mandibles black); antennæ very long, flagellum moniliform, entirely black: tubercles black: tegulae dark, with a red spot; legs black, the tarsi with dense white hair on inner side; abdomen black, densely and rather coarsely punctured, extreme bases of third and fourth tergites red, only visible when much extended. Head rather broad: face covered with white hair; hair of thorax above dilute brownish; mesothorax entirely dull, it and the scutellum excessively densely punctured; area of metathorax semilunar, dull, rugulose, with dense vermiform rugæ, and no shining rim: wings hyaline, faintly dusky along outer margin; stigma dull reddish, with darker margin; nervures fuscous; second cubital cell broad, receiving recurrent nervure just before end; abdomen moderately shining, without hair bands or spots; conspicuous erect pale hair on first tergite: venter with bands of white hair.

Pyengana, Tasmania, Dec. 31, 1915 (*F. M. Littler*). Runs in my table to *H. lanaricellus* Ckll., but is separated at once by the entirely dull mesothorax.

Halictus viridarii sp. n.

Male. Length about 7 mm.: black, rather stout, with a broad transverse pale-yellow band on clypeus; labrum black; mandibles faintly reddened apically; antennæ long, reaching postscutellum, entirely dark: tubercles black: tegulae rufous: legs black, with thin white hair; abdomen black, closely punctured, hind margins of tergites faintly brownish. Head broad: face covered with white hair: hair of scutellum and postscutellum white: mesothorax dull, very densely punctured; scutellum moderately shining; area of metathorax large, shining apically, covered with fine plicæ, delicate and confused in middle, distinct and straight at sides; wings hyaline, stigma dilute brown: nervures pale brown, becoming colourless apically; second cubital cell large, but higher than wide, first recurrent nervure meeting intercubitus: abdomen rather broad, thinly hairy, with distinct patches of greyish hair at lateral bases of second and third tergites: apex with a dark shining rounded plate; fringes of ventral segments extremely short and scanty.

National Park, Queensland, Dec. 1919 (*H. Hacker*); Queensland Museum. Resembles *H. excusus*, but area of metathorax and abdomen quite different. It may also be compared with *H. granulithorax* Ckll., *H. pulvitectus* Ckll., and *H. baudini* Ckll., but is quite distinct.

Halictus subplebeius sp. n.

Male. Length about 6.8 mm., anterior wing 5.8; black, rather robust, the abdomen broad for a male; clypeus with a broad creamy white band, having a slight median extension above; labrum black; mandibles dark red subapically; antennæ long, entirely black; face broad; clypeus short, shining,

with scattered punctures: supraclypeal area large, convex, shining but not polished; hair of head and thorax scanty, dull white, face with little hair; mesothorax shining, with scattered punctures; scutellum shining, with only the faintest median depression; area of metathorax large, semilunar, concave, the margin somewhat shining, the surface very delicately sculptured with fine plicæ, irregular and more or less joined by minute cross-lines, and failing some distance before the apex, the region beyond the plicæ granular: posterior truncation dullish; tegule practically black, with an obscured red spot; wings dusky, stigma dark reddish brown, nervures fuscous; second cubital cell broad, receiving recurrent nervure at apical corner; third cubital broader above than second; legs black, with the tarsi obscure reddish brown; abdomen polished, shining, pure black, without hair bands or spots.

Two males: National Park, Queensland, Dec. 1919 (*H. Hacker*); Queensland Museum. Resembles *H. plebeius* Ckll., but much larger, with dark tegule and different metathorax.

***Halictus exceptus* sp. n.**

Female. Length about 7 mm.; robust, black, including antennæ; mandibles obscurely reddened apically; pubescence very scanty and short; head broad, inner orbits arched; clypeus shining, with scattered punctures, not at all sulcate in middle; supraclypeal area dullish; mesothorax shining, with well separated strong punctures (dense at sides), the intervals minutely striate; scutellum moderately shining, the median depression very weak; mesopleura transversely striate; area of metathorax large, semilunar, dullish, with very delicate plicæ, the margin not distinctly shining; the plicæ fail a considerable distance before the margin; tegule rather dark rufous; wings rather strongly reddened; stigma large, dusky rufous, nervures fuscous; second cubital cell very broad, receiving recurrent nervure near end; outer recurrent and intercubitus much weakened; legs obscure brownish, the tarsi rather pale reddish brown; abdomen shining black, with very little hair, but small white hair-patches at lateral bases of second and third tergites, and, when the fourth tergite is extended, an entire white band (dense at sides, thin and weak in middle) is seen at base; hair of venter straight and comparatively short.

Three females: Tooloom, N.S.W., Jan. 1926 (*H. Hacker*). Allied to *H. seminitens* Ckll., but readily distinguished by the tarsi.

***Halictus micridoneus* sp. n.**

Male. Length about 4.5 mm.; shining black, with rather short abdomen, head large and rather broad; pubescence pale and very scanty, the face and clypeus with thin erect white hair; antennæ short, like those of a female; tegument of clypeus black, the extreme edge hardly noticeably pallid; labrum rufous; mandibles black, with a broad light-yellow band; supraclypeal area shining; front very densely punctured; at each side of the ocelli is a shining area with sparser punctures; mesothorax shining, but strongly punctured;

scutellum polished: area of metathorax dull, subreticulate, with coarse rugæ, no shining margin: tegulæ rufous: wings hyaline, the pale stigma dark-margined; second cubital cell very broad: first recurrent nervure joining third cubital cell, some distance from base: legs with white hair, knees red, and tarsi pale red: abdomen shining, a strong sulcus between first and second tergites; hind margins of tergites somewhat pallid: no hair bands or spots.

Brisbane, Nov. 19, 1913 (*H. Hacker*). Runs near *H. idoneus* Ckll., but that is much larger. It is much like *H. cyclognathus* Ckll., but the face is much narrower, &c. The general aspect suggests *H. forticornis* Ckll., but the antennæ are quite different. The venation is peculiar.

***Halictus euryurus* sp. n.**

Male. Length nearly 6 mm., anterior wing about 5; black, the abdomen broad-oval, the hind margins of the tergites beyond the first stramineous: face broad, tegument of clypeus entirely black, mandibles obscurely reddish apically: hair of head and thorax rather abundant, long, white, long but thin on front of head: antennæ of moderate length, black, the flagellum very obscurely brownish beneath: clypeus flattened, shining, depressed in the middle at lower end: supraclypeal area very sparsely punctured: front densely punctured: mesothorax and scutellum strongly punctured, only moderately shining: area of metathorax with sharp straight plicæ, only two or three in middle wrinkled, margin shining: posterior truncation dull: tegulæ dark rufous: wings clear hyaline, iridescent, stigma pale reddish, nervures pale, second cubital cell broadened below, receiving first recurrent nervure some distance from its end: outer recurrent and interenbitus much weakened: legs black, small joints of tarsi rufescent, hind tibiæ robust: abdomen moderately shining, finely punctured.

Adaminaby, N.S.W., Oct. 19, 1918 (*A. J. Turner*): Queensland Museum. Somewhat allied to *H. macrops* Ckll. and *H. bursarie* Ckll. The metathorax and antennæ separate it at once from *H. macrops*. The mesothorax is much more coarsely punctured than in *H. clariventris* Friese.

***Halictus sculpturatus* sp. n.**

Male. Length about 6.5 mm.: black, moderately robust, the abdomen without hair bands or patches: face rather broad, with thin white hair: clypeus with a transverse cream-coloured band: labrum reddish: mandibles reddened subapically: antennæ rather long, flagellum moniliform, obscurely brownish beneath: front very densely punctured: hair of thorax scanty, white: long, erect, and pure white on postscutellum: mesothorax shining, strongly punctured, median groove strong, and on each side of it anteriorly oblique striae: area of metathorax semilunar, not pointed behind, appearing to have no shining rim, but seen from behind a small shining edge is visible: surface of area strongly sculptured all over, the plicæ wrinkled and irregular in middle, straight and distinct at sides: tegulæ dark rufous: wings brownish hyaline, iridescent, stigma dark reddish brown: nervures fuscous, second cubital cell

rather narrow, first recurrent meeting intercubitus; legs black, the last joint bright red at apex, the claws tipped with black; abdomen shining, finely punctured; ventral segments with bands of white hair.

Stradbroke Island, Sept. 17, 1915 (*H. Hacker*). Allied to *H. spenceri* Ckll., but mesothorax and area of metathorax quite different.

***Halictus evasus* sp. n.**

Female. Length 7 mm.; black, head and thorax with rather long white hair, quite dense on cheeks and postscutellum; mandibles black; face broad, clypeus shining, punctured, not sulcate in middle; supraclypeal area shining, sparsely punctured, the punctures smaller than on clypeus; upper margin of clypeus microscopically transversely lineolate; front dull, densely punctured; antennae entirely dark; mesothorax dull, very coarsely punctured; scutellum polished, with very fine punctures; area of metathorax concave, shining, with fine regular plicæ all over, the hind margin swollen and obtuse, slightly interrupted in middle, hardly shining; mesopleura transversely striate; tegulae very dark, almost black; wings hyaline, faintly brownish; stigma and nervures dull brown; second cubital cell broad, receiving recurrent nervure at its apical corner; outer recurrent and intercubitus very weak; legs black, very hairy; hind spur with a large rounded lamella near base; abdomen broad, shining, thinly hairy, with distinct but well-separated punctures, hind margins of tergites not discoloured; second and third tergites basally at sides with cuneiform patches of white hair; hair of venter long and abundant.

Coolangatta, Queensland, Sept. 6, 1913 (*A. J. Turner*); Queensland Museum. Very close to *H. confusellus* Ckll., but easily separated by the more robust, dull, coarsely sculptured mesothorax, and the shining area of metathorax.

***Halictus limatiformis* var. *scrupulosus* var. n.**

Female. First abdominal segment, and sometimes much of base of second, clear red.

Nanango district, Queensland, Nov. 1927 (*H. Hacker*). I thought at first that this was a new species allied to *H. tatei* Ckll., but it is certainly only a variety of *H. limatiformis*, the normal form of which occurs in the same district.

***Halictus suburbanus* sp. n.**

Female. Length hardly 5 mm., not very robust; head broad, dull dark green; mandibles dark reddish apically; flagellum dull reddish beneath; clypeus black, with the upper margin broadly green, and a purple suffusion below the green; supraclypeal area finely tessellated and sparsely punctured, the lower part purplish; front minutely punctato-striate; hair of head and thorax scanty and white; mesothorax and scutellum dull emerald green, the scutellum a little more shining, but not at all polished; surface of mesothorax very finely and densely sculptured all over; area of metathorax with strong straight plicæ, but sculptured between, posterior rim shining when seen from behind;

tegulae rather small, shining rufous; wings greyish hyaline, stigma dark brown; second cubital cell broad below, narrower above, receiving first recurrent nervure near its end; third cubital very short, outer recurrent and intercubitus much weakened; femora black with knees red; tibiae and tarsi red, the colour rather dull; abdomen not specially broad, shining black, pruinose-pubescent with the hind margins of the tergites somewhat discoloured or brownish.

National Park, Queensland, 3,000 ft., March 1, 1921 (*A. J. Turner*); Queensland Museum. Very close to *H. urbanus* Smith, but the mesothorax is larger and duller. Also close to *H. williamsi* Ckll., but mesothorax more shining, and bluer green, and scutellum shining. These bees could be regarded as local races of *H. urbanus*, unless the males show structural differences. The original *H. urbanus* came from Champion Bay, W. Australia.

***Haliectus dorsicyaneus* sp. n.**

Female. Length about 5 mm., not very robust, abdomen not broadened; head black; mesothorax small, dark blue, shining but not polished; scutellum blue, with two polished shining spaces; metathorax black; area large, finely sculptured, semicircular, without a shining rim; flagellum obscurely rufescent beneath; hair of head and thorax scanty, white; tegulae small, dark rufous; wings clear hyaline; stigma large, pale brownish, nervures pale, outer ones very weak; second cubital cell rather broad, receiving recurrent nervure before its end; legs black, knees and small joints of tarsi red; abdomen shining black, with little hair, the apical part thinly pubescent. The mesothorax is microscopically tessellate, with scattered punctures; the area of metathorax, seen under the microscope, is coarsely reticulate.

Launceston, Tasmania, Jan. 23, 1916 (*F. M. Littler*). In my table it runs to *H. kestereni* Ckll., which differs at once by blue metathorax. Compared with *H. inclinans* Smith, it is less robust, with darker tegulae and different abdomen.

***Haliectus luctificus* sp. n.**

Female. Length about 5.4 mm., rather robust; head black, mesothorax dull very dark green, scutellum dark blue, with two polished areas; area of metathorax large, crescentic, dull and coarsely sculptured (minutely reticulate, appearing coarsely so under microscope), with a very conspicuous regularly curved shining margin; metathorax black; hair of head and thorax very scanty; tegulae dark rufous; wings clear hyaline, with pale testaceous stigma and pale nervures, the outer recurrent and intercubitus very weak; first recurrent nervure joining basal corner of third cubital cell, the outer and lower boundaries of which are reduced to thin hyaline lines, hardly visible even under the microscope; legs with knees and small joints of tarsi red; abdomen broad, shining black, thinly pubescent in the apical region. The supraclypeal area is polished, with scattered punctures, and the punctures on clypeus are very large.

Launceston, Tasmania, Jan. 23, 1916 (*F. M. Littler*). Allied closely to the last, and also to *H. mundulus* Ckll., from which it is distinguished by the shining margin of metathoracic area. At the same time and place, Mr. Littler took a couple of *H. subinclinans* Ckll.

***Paracolletes cyaneorufus* sp. n.**

Female. Length about 7.5 mm.; robust, head and thorax black, abdomen dusky chestnut red, with a delicate purple suffusion; pubescence very scanty, pure white on cheeks and under part of thorax, white also on upper part of head, but on thorax above brown, though hardly noticeable; mandibles long, bidentate, wholly dark; face very broad, clypeus and supraclypeal area highly polished, the clypeus with widely scattered large punctures; front dull in middle, striate, shining and punctate at sides; antennæ black, the flagellum very obscurely reddish beneath apically; mesothorax dull; scutellum polished; area of metathorax triangular, with a transverse ridge; sides of thorax dull, with a brilliant shining space below wings; tegulæ rufous; wings brownish hyaline; stigma ferruginous, with dark margin; marginal cell obliquely truncate at end; basal nervure almost reaching the very oblique nervulus; second cubital cell rather small, triangular, with a very small face on marginal cell; the first recurrent nervure joining second cubital very near its end; upper apical corner of third discoidal a right angle; legs brownish black, anterior knees rufescent; scopa of hind tibiæ pallid; abdomen shining, without hair bands or spots, apex with a fringe of brown hair.

Bribie Island, Aug. 29, 1920 (*H. Hacker*); Queensland Museum. Close to *P. rufovenus* Friese, but considerably smaller. The genus *Euryglossidia* is related to *Paracolletes* of this group, and not to *Euryglossa*.

***Paracolletes melanurus* sp. n.**

Female. Length about 6.8 mm.; black, the abdomen a faintly reddish black, and the hind tibiæ and tarsi obscurely brownish; hair of head and thorax extremely scanty, fuscous on scutellum; antennæ short, black, the apical part of flagellum very obscurely reddish beneath; mandibles long, with inner tooth remote from the reddish apex; face very broad, the clypeus, supraclypeal area, and a space at each side of antennæ shining; clypeus with scattered strong punctures; front dull; mesothorax dull, scutellum moderately shining; area of metathorax polished, without sculpture; tegulæ brown; wings reddish hyaline; stigma large, solid dark reddish; nervures fuscous; basal nervure meeting nervulus; marginal cell very long, with narrow end; second cubital cell small, narrowed above, receiving recurrent nervure a little beyond middle; first cubital longer than the other two together; scopa of hind tibiæ brown; abdomen shining, practically hairless above, but with very dark brown hair at apex; venter with erect pale (slightly ochreous) hair.

Toooloom, N.S.W., Jan. 1926 (*H. Hacker*); Queensland Museum. Rather like *P. nitidulus* Ckll. in appearance, but venation quite different. The venation, except for the more produced marginal cell, is much in the style of *P. incanescens* Ckll.

Paracolletes semiviridis sp. n.

Male. Length about 8.3 mm.; head and thorax black, with much outstanding white hair, pale ochreous on thorax above; hair of face very dense, long, silky, and pure white; mandibles rufescent apically; antennæ only moderately long, the flagellum chestnut red beneath except basally; front and vertex dull; mesothorax and scutellum dull; base of metathorax shining; tegulae brown; wings strongly brownish, with dark stigma (which is well developed) and nervures; basal nervure falling conspicuously short of nervulus; second cubital cell receiving recurrent nervure slightly beyond middle, practically at middle; third cubital very long, receiving second recurrent a considerable distance before end; femora black, with knees red; tibiae and tarsi bright chestnut red; abdomen dull olive green, closely and finely punctured, hind margins of tergites very pale testaceous, and thinly beset with short white hair, only noticeable in certain lights; apex with white hair; venter with bands of pure white hair.

Charleville, Queensland, Sept. 12, 1920 (*A. J. Turner*); Queensland Museum. This may be compared with *P. castaneipes* Ckll., which is much larger, with black hair on thorax above.

Paracolletes nomiaeformis sp. n.

Male. Length about 8 mm.; black, with the hind margins of the closely punctured abdomen broadly testaceous, with a little red just above; head and thorax densely hairy, the hair long and shaggy, white on cheeks and lower part of mesopleura, dull white on face and front, very pale greyish, with a yellowish tinge, on thorax above and on vertex; mandibles with a bright red subapical band; tegument of clypeus all black; flagellum very short, bright ferruginous beneath except at base; a polished shining area at each side of vertex; mesothorax shining, finely punctured; scutellum polished; base of metathorax rugulose, with a fine transverse keel, the marginal sutures heavily ridged laterally; tegulae dark reddish, closely punctured; wings greyish hyaline, the apex suffusedly darker; stigma well developed but narrow, dark rufous; basal nervure falling conspicuously short of nervulus; marginal cell rather short, obliquely truncate; second cubital cell very small, receiving recurrent nervure near middle; third cubital very long, receiving second recurrent far from end; legs dark brown, with white hair; abdomen loosely hairy all over, but without hair-bands.

Three males: Charleville, Queensland, Sept. 11, 1920 (*A. J. Turner*); Queensland Museum. Very near *P. sigillatus* Ckll., but smaller, face much narrower, and mesothorax much more punctured. It looks like a *Nomia*.

Paracolletes plumosus (Smith).

Female: Stanthorpe, Q., 6-1-26 (*F. A. Perkins*). The base of the metathorax may or may not be transversely striate in this species, as I have understood it. Possibly more extensive collecting may show that two species are included in *P. plumosus* as now understood. The genitalia of the males should be examined.

Paracolletes providus (Smith).

Females: Stanthorpe, Q., 7-10-24 and 3-10-24 (*F. A. Perkins*). I have received additional specimens of *P. hackeri* Ckll. from Mr. Hacker, and find the distinction from *P. providus* difficult to appreciate. Typically, the abdomen of *P. providus* is more polished and oily-appearing, not so strongly punctured, while *P. hackeri* has a tuft of dull fulvous-tinted hair in front of each tegula. But I am no longer confident that these differences do not fall within the range of variation of *P. providus*. The matter can only be settled by those on the spot, or by the collection of good series in typical localities.

Nomia geophila sp. n.

Male. Length 8-9 mm., anterior wing 6.5; black, with the hind margins of the second and following abdominal tergites hyaline: pubescence white, dense on face, covering the surface; on the thorax above the hair is greyish; tegment of clypeus wholly black; mandibles more or less rufous beyond the base; flagellum very short for a male, entirely dark; mesothorax shining, with distinct not very close punctures; scutellum quite closely punctured, depressed in middle; metathorax shining, the striated basal area forming a very narrow band, obtusely angulate behind in middle; a depressed polished space above hind legs; tegulae very dark brown, with hyaline margins; wings hyaline, the apical margin faintly clouded; stigma small, dusky rufous; nervures dark fuscous; second cubital cell very small, receiving recurrent nervure beyond the middle; legs dark brown, with dull white hair; hind legs not modified, but all the femora very short and small; abdomen finely punctured, very conspicuously on first tergite, no hair-bands; hind trochanters with a small apical process above; venter not modified; claspers long and thin, with an expanded apex, from the inner corner of which, directed obliquely mesad, is a finger-like process; spatha broad basally, narrowing to the apical part, which is rod-like, obtuse at end; tongue slender, dagger-like, only moderately long.

Two males: "Bred earth cells, 10-11-18, Moree"; Queensland Museum. Closely related to *N. gilberti* Ckll., but antennae a little shorter, mesothorax shining, and postscutellum without the dense covering of pure white hair, nor are there conspicuous white hair-patches at sides of scutellum. In *N. frenchi* Ckll. the antennae are very much longer.

Nomia grisella Ckll., described from Cape York, has been found by W. C. Dormer at Gordonvale, Feb. 24, 1923.

Exoneura tasmanica sp. n.

Male. Length 7 mm.; head and thorax shining black; hair of head black, thin but long and outstanding on face, on thorax pure white beneath, and dorsally brown, a sort of very dilute chocolate colour; eyes black, very large, converging below; clypeus long and narrow, cream-coloured, with dull surface; in the narrow space between clypeus and eye there is on each side a cream-coloured line; labrum white, with a black spot at each side, mandibles

rufescent apically; antennæ black; tubercles black; tegulae very dark brown, nearly black; wings reddish hyaline; stigma long lanceolate, ferruginous, with a dark margin; recurrent nervure joining second cubital cell at extreme basal corner; legs basally black, with the knees, tibiae, and tarsi bright ferruginous; anterior and middle tibiae with no dark markings, but hind tibiae with a broad black band posteriorly; abdomen rather dark red, the first two tergites black with red margin, the third with a black discal suffusion, the fourth to sixth with lateral black marks, large on sixth; venter mainly clear red, but partly dark basally.

Windermere, Tasmania, Feb. 13, 1916 (*F. M. Litter*). This cannot be the male of *E. turneri* Ckll., as that has much darker wings, and the recurrent nervure ending far from base of second cubital cell. The face-marking, colour of pubescence, and venation readily distinguish it from all known males.

Palæorhiza flavomellea Cockerell.

Two females: Dunk Island, Aug. 25, 1927 (*F. A. Perkins*).

Palæorhiza parallela recessiva Cockerell.

Female: Palm Island, May 30, 1926 (*F. A. Perkins*).

Hylæus chlorosoma Cockerell.

Female: Stanthorpe, Q., 10-11-23 (*F. A. Perkins*).

Euryglossa mutica Cockerell.

Male: Stanthorpe, Q., 10-11-23 (*F. A. Perkins*).

Pachyprosopis aurantipes Cockerell.

Male: Stanthorpe, Q., 10-11-23 (*F. A. Perkins*).

NOTES ON A FATAL EPIDEMIC INTESTINAL DISEASE OF GOLDFISH.

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(Plate II.)

THE epidemic herein described occurred amongst "Comet," "Fantail," and "Calico" Goldfish in the smaller aquaria of Mr. J. C. Brunnich, Agricultural Chemist. All developmental stages fell a prey to the disease. The tanks were well aerated, and had been in use for a long time, but it was only in those tanks where hard tap-water had been used to replenish the supply that the fish contracted the disease; whilst in the larger outdoor ponds and tanks no infection seems to have taken place. Food consisting of white worms (*Enchytræ*) reared in special containers; scraped meat and artificial foods were given alternately. To understand the problem thoroughly, a further and more detailed examination of the actual waters involved is imperative.

The aquarist is well aware that sudden fatal epidemics among fish are liable to occur at any time and without apparent cause. Sometimes deaths can be definitely traced to fungoid diseases, but more often than not the evil is deep-seated and is due to some other cause as yet only surmised. From time to time such epidemics have been noted, but in most cases death intervenes before any preventive measures can be adopted, and sometimes all the inhabitants of an apparently healthy aquarium die before the seriousness of the outbreak can be realised.

In aquaria directly under my care, containing local fish and a few "tropicals," similar experiences have been frequent, and for some years now an opportunity has been sought of becoming better acquainted with fish diseases so as to enable a diagnosis to be made sufficiently early, to save considerable mortality, always so characteristic of such epidemics.

In this particular case the symptoms are quite definite, so that it should be possible to detect the disease in the early stages of development. It is interesting in the first place to notice that there appears to be a seasonal appearance of such epidemics. I make this statement guardedly because as yet we have very little idea as to the cause of the seasonal occurrence, and consequently because the disease seems to break out quite independently, in different adjoining aquaria at the same time almost to a day, it is seen to be very definite in its action and very deadly, the source of the infection remaining as much as ever a mystery.

Superficially the water in the aquaria gives little indication of impending tragedy, and it is not until the fish begin to suffer disintegration of the abdominal contents that the abnormality becomes distinctly noticeable, the fish resting motionless on the bottom of the tank. Now and again, as if to cast off the discomfort occasioned thereby, a fish will make a sudden dart through the water only to come to rest again with extreme suddenness. This action seems to denote a final stage in the development of the disease.

It is I think recognised that it is desirable from time to time to replace the chemicals in the water which are used up during the healthy life of the fish, and small quantities of magnesium sulphate and sodium chloride materially assist towards this end, whilst the addition of plaster of paris provides for a possibility of calcium deficiency. In this instance the use of plaster of paris arrested the disease.

The readiness with which the CaSO_4 is dissolved in "spent" aquaria containing an undue accumulation of carbon dioxide as the result of the presence of putrefying substances in the water, followed by a period of rapid oxygen consumption, suggests the necessity of such chemicals. Soon after the calcium sulphate is added to the water, precipitation takes place and the water, becoming wonderfully clear, provides an improved environment for the fish themselves, which soon react to the changed conditions. As soon as an equilibrium has been reached, the CaSO_4 may be removed, but by this time a higher alkalinity has been reached. Now although our larvivorous fish will live in slight acidity, say pH 6.0, nevertheless it is a matter of frequent comment that they do so only under protest, and that they seem more prone to disease than they do in alkaline waters. The acidity of the water seems to synchronise also with the slow but sure destruction of the snails: *Bullinus pectorosus* Conrad and *Limnaea lessona* Desh. do not seem to thrive in such a medium.—R.H.H.

PATHOLOGY OF THE DISEASE.

Three fish were examined post-mortem. The pathological findings resembled very closely those found in cholera in the human; they were as follow:—

There was constantly a deep bile-tinged staining under the skin of the abdomen just ventral and caudal to the left pectoral fin. One specimen showed necrosis of the body wall at the site of the staining, the skin being thinned, of the texture of tissue paper, and was about to slough. There were no other external features of interest. On opening the body, the respiratory system I found to be, as far as I could judge, normal.

On examination of the abdominal contents, I found practically the whole of the intestines involved in a gangrenous process, only about a centimetre of the terminal portion escaping. The bile channels were also involved, leading to rupture and consequent staining of the abdominal wall, as noted above. I could not judge macroscopically whether the liver was involved. In two specimens, the necrotic process had spread to the swim bladder, which no

doubt led to the condition observed by my co-author, namely, falling to the bottom of the tank and inability to rise to the surface of the water.

HISTOLOGY OF THE DISEASE.

This may best be described in stages illustrated by the figures (Plate II.).

Intestine.—First stage: Acute inflammatory exudate in the villi and submucosa (Figure 2, left, and Figure 3).

Second stage: Sloughing of the mucosa but epithelial cells staining well (Figure 4).

Third stage: Sloughing with marked cellular degeneration of epithelium. General structure of the gut is fairly well maintained (Figure 5).

Fourth stage: Necrosis and sloughing of the whole villi, musculature still intact (Figure 6).

Fifth stage: Complete necrosis of the whole intestinal wall. Amorphous sloughs in the lumen (Figure 7).

Liver.—This organ showed complete necrosis, the nuclei of the cells having completely degenerated while their cytoplasm stained very feebly with cytoplasmic dyes. There was no evidence of primary fatty degeneration so I judge the intoxication to have been of an overwhelming kind, similar to acute necrosis in the human. The general texture of the viscus was unrecognisable.

ETIOLOGY.

The three fish that form the subject of the above comment were submitted to me in formalin. Successful cultures of the intestinal flora could not then be anticipated. Direct smears showed as the only significant feature the presence of a subterminal spored elostridium.

I had the opportunity of culturing the gut contents of another fish which had died of the same disease. Direct smears showed an unusual organism in my experience of intestinal flora, namely, a small non-motile Gram-negative diplobacillus in almost all cases encapsuled. Very rarely what appeared to be the same organism was single and not encapsuled. Variation in size was considerable, from 1.25 to 4 microns averaging about 2 microns in length by 0.5 micron in width. An emulsion of gut content was plated out on McConkey's medium. The organism evidently fermented lactose as no pale colonies showed up. Examination showed the diplobacillus still present, and to obtain a pure culture a subculture was made on a plain agar plate. No growth of the germ desired was obtained, or at least it was overgrown to such an extent that it could not be recovered. A similar fate befell those on the first plate, and the organism, evidently very delicate, was lost. I do not suggest this bacillus is the cause of the disease, but an organism of the kind noted seemed to me so unusual that I judged it wise to follow it up, and I mention it here for the information of workers in this field.

An interesting point in the epidemiology of the disease was put to me by Mr. Marshall, of the Queensland Museum scientific staff. He desired to know why fish, which were transported all the way from Japan in the same water unchanged and therefore likely to be foul and heavily infected and survived this apparently unfavourable medium, died, as did many recently imported fish, when taken ashore and put in clean water of a composition assumed by experienced aquarists to be a suitable environment. The only explanation that I can offer is that the original tanks in which the fish were transported contained bacteriophage in the water, as might very easily happen. In the event of another epidemic of this kind I propose to test this hypothesis experimentally.

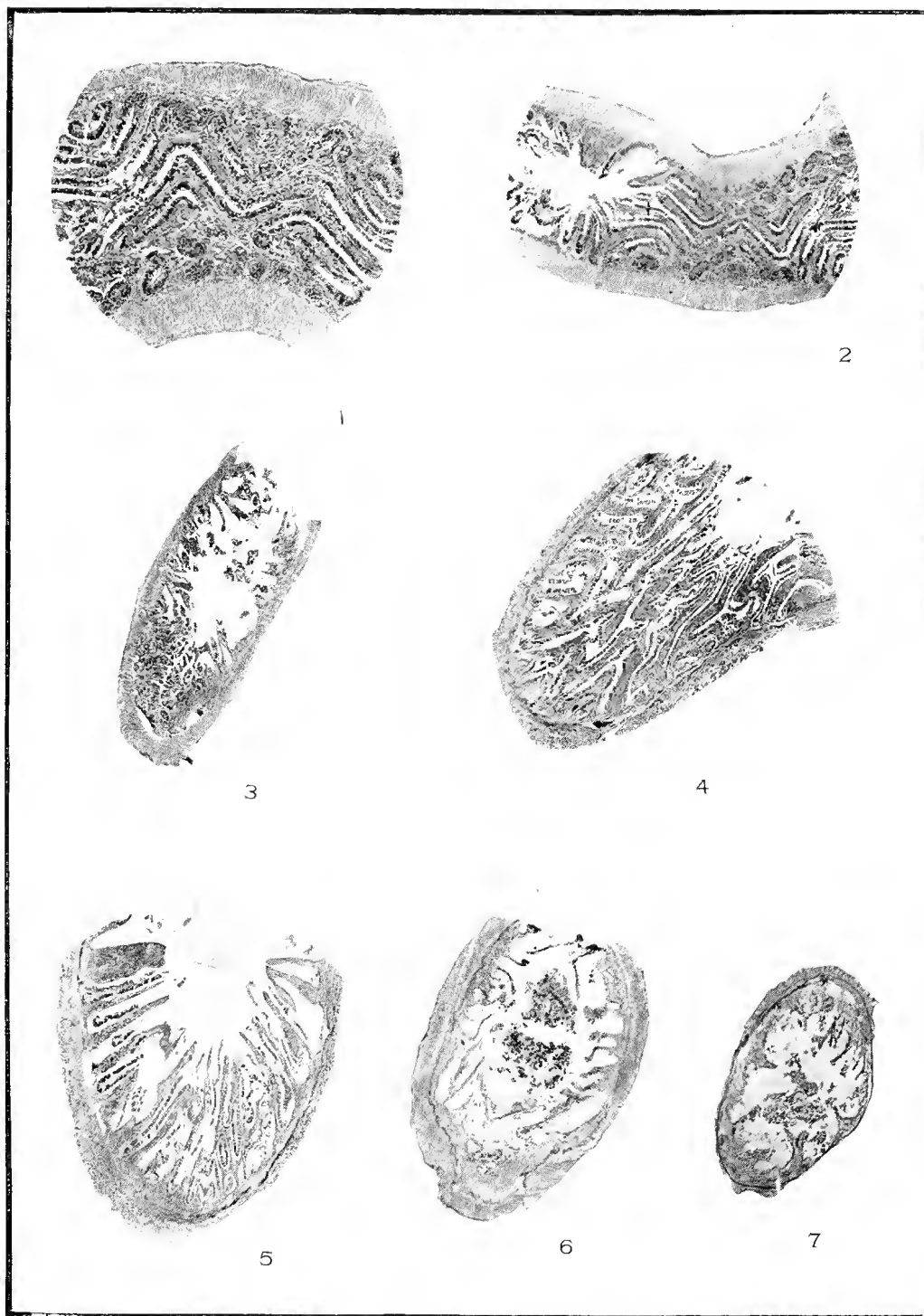
The above work is necessarily only preliminary, since the amount of material available was very scanty, and was done without access to much literature on the subject.

The Medical Research Council¹ make a small passing reference to the fact that a cholera-like disease occurs in fish.

T. P. Hughes² reports an exhaustive investigation of fowl cholera, and describes as constantly occurring a "small pleomorphic, bipolar staining, Gram-negative, non-motile bacillus," which rather resembles that which I have described in this instance. I read Hughes's paper after I suspected this bacillus as having some causal relationship with the disease, and now feel that more material treated by more refined methods may enable me to solve the problem of etiology.—J.V.D.

¹ Med. Res. Council: "A System of Bacteriology," 1929, vol. iv, p. 436.

² Hughes, T. P.: *Jl. of Exptl. Medicine*, 1930, 51, 225.



SECTIONS OF INTESTINE OF DISEASED GOLDFISH.
(For description, see text, p. 21.)

THE MARSUPIALS OF QUEENSLAND.

BY HEBER A. LONGMAN, F.L.S., C.M.Z.S. (DIRECTOR).*

OWING to the fact that settlement in the southern parts of Australia preceded the occupation of our northern areas, it is not surprising that the majority of more recent additions to our fauna have come from Queensland, the Northern Territory and islands, and the northern parts of West Australia. In 1912 the late Charles Hedley stated in an address to the Linnean Society of London: "In Australia marsupials and monotremes are least developed in the North; proceeding southwards more groups successively appear till ultimately Tasmania has, as Professor Spencer expressed it, a condensation of most that is noteworthy in the Australian region."¹ This was a surprising statement, even in 1912, especially in view of the rich fossil marsupial fauna of the mainland.

In commenting on the statements made by exponents of the Antarctic theory, I pointed out in a previous paper² that, with the exception of the rare *Gymnobelideus*, there is not a genus of living marsupials that is unrepresented in either the Torresian or Eyresian (Ereman) sub-regions. Although no striking discoveries have been made since 1924, the additions recorded to our list of marsupials strengthen my criticism. It is not necessary to traverse the diverse views expressed as to the origin of our marsupials dealt with in another paper.³ Neither do I wish to lay stress on the present distribution of our marsupials as affording definite evidence as to their northern or southern entrance into this continent in the remote past. But if the facts of present-day and recent distribution have any value it is obvious that the evidence yielded is opposed to the Antarctic theory.

The marsupials of Australia comprise so many distinctive genera that it seems quite logical to suggest that their evolution has largely taken place within our own region. Although the palaeontological evidence is incomplete, it is now obvious that our fossil marsupials were even more distinctively Australian than those of to-day. Such genera as *Diprotodon*, *Nototherium*, *Euryzygoma*, *Phascolonus*, *Sthenurus*, *Palorchestes*, *Procoptodon*, and *Thylacoleo* are specialised marsupials with no known near relatives outside of the Australian region. No serious attempt has yet been made to derive these extinct species from any known forms in South America, even though the assumptions of the

* The substance of this paper was read before Section D (Zoology) at the Brisbane meeting of the Australasian Association for the Advancement of Science, 1930.

¹ 1912: C. Hedley, Pr. Linn. Soc., London, 124th session, p. 84.

² 1924: H. A. Longman, Rep. A.A.A.S., vol. 17, p. 362.

³ 1924: H. A. Longman, Mem. Qld. Mus. vol. viii, pp. 1-15.

Wegener hypothesis have been invoked in order to demonstrate the possibility of transit for the two or three living marsupials in the two continents which are considered by some authorities to be lineally related.

These remarks are prefatory to a list of species and certain subspecies of present-day marsupials, comprising over ninety names. Much new knowledge has been gained through the material collected for the British Museum, mainly through Captain (now Sir Hubert) Wilkins, which was worked up by that rare enthusiast the late Oldfield Thomas. Valuable material was also obtained by Mr. H. C. Raven for the American Museum of Natural History, New York, following the visit to Australia of Professor W. K. Gregory. Although excellent work has also been done by such Australians as E. Le G. Troughton and A. S. Le Souef, and by Professor F. Wood-Jones, we have to admit, with regret, that our efforts have been somewhat limited in comparison. Fortunately, however, representatives of most of this new material have been lodged in the Queensland Museum.

The multiplicity of genera in recent years is another interesting development. The late Allan McCulloch once expressed the opinion that there was a danger, if some enthusiasts had their way, of a distinct genus being created for every species. Fortunately the entomologists, whose species are legion, will prevent this from being carried out. Some ornithologists, however, have certainly done their best, or worst, in this direction.

In earlier years we included all the "native cats" in one genus, but R. I. Pocock has recently established four genera for the four best-known Australian species of *Dasyurus* (1926).⁴ Time alone will prove whether systematists generally will adopt this principle, and there is certainly much to be said for the generic separation of *D. maculatus* from *D. hallucatus*, but this leads naturally to the establishment of the other genera and so the splitting goes on. Paul Matschie, of Berlin, has also proposed new genera, and several subgenera, including two subgenera for *Dasyurus* in 1916.⁵ antedating Pocock, but he deals mainly with Papuan species.

The genus *Macropus* is now restricted by some authors to the kangaroos, large wallabies being placed in *Wallabia* and small wallabies in *Thylogale*, but when recent fossil forms are also considered there are grave difficulties in adopting this nomenclature.

It is of interest to note that during the last ten years no less than ten new species of *Petrogale* (Rock Wallabies) have been described, two by A. S. Le Souef and eight by Oldfield Thomas. These form an interesting parallel to the ten subspecies of Wallaroos that have been described, although some of the Rock Wallabies seem very distinct, doubtless through lengthy isolation. The creation of subspecies in several genera has been an outstanding feature of the more recent work.

⁴ 1926: R. I. Pocock, P.Z.S., p. 1082.

⁵ 1916: P. Matschie, M. tt. Zool. Mus., Berlin, Bd. 8, Heft 2.

Wood-Jones considers that the primitive Australian Marsupials were polyprotodont and didactylous, and that the diprotodont group arose as a specialisation in the syndactylous section. He therefore uses the Sub-Orders Didactyla and Syndactyla in preference to Polyprotodontia and Diprotodontia.⁶ Wood-Jones's classification appears to reflect more correctly than the terms in general use the phylogenetic development of our marsupials.

In view of the distinction between our phalangers and the true opossums of America, the name possum, by which our species are most commonly known, has been deliberately adopted in this list.

As descriptions of the older species are readily obtained in Oldfield Thomas's Catalogue of the Marsupialia (British Museum, 1888), only references to recent literature are given.

LIST OF QUEENSLAND PRESENT-DAY MARSUPIALS.

Family MACROPODIDÆ.

Macropus giganteus (Zimmerman). Great Grey Kangaroo. Queensland, including Stradbroke Island.

Macropus melanops Gould. Black-faced Kangaroo.

A. S. Le Souef (Austr. Zool. iii, 1923, p. 145) considers this as specifically distinct from *M. giganteus*.

Macropus robustus Gould. Wallaroo.

Pending a revision of the Wallaroos none of the ten subspecies recorded are listed here.

Macropus rufus (Desmarest). Red Kangaroo. Western Queensland.

Macropus rufus dissimulatus Rothschild (1905). Western Queensland.

Mr. J. Edgar Young obtained two skins of this subspecies from the St. George district. It was described by Rothschild in Nov. Zool., xii, p. 508.

Macropus agilis (Gould). Coast or Agile Wallaby. Eastern Queensland; extends as far south as Stradbroke Island.

Macropus ruficollis (Desmarest). Red-necked Wallaby. Southern Queensland; extends as far north as the Burnett and Upper Dawson. H. H. Finlayson, of Adelaide, who has placed on record many observations on this wallaby (Trans. Roy. Soc. South Aus., liv, 1930, pp. 47-56, plates i-iii), collected specimens from the Upper Dawson.

Macropus ualabatus (Lesson & Garnier). Swamp or Black-tailed Wallaby. South-eastern Queensland.

⁶ 1923: Wood-Jones, The Mammals of South Australia, part i., p. 83.

Macropus ualabatus apicalis (Gunther). Type locality: Cape Grafton, North Queensland.

Macropus ualabatus ingrami Thomas & Dollman. Type locality: Inkerman, North Queensland. (P.Z.S. 1908. p. 788. plate xlii).

Macropus welsbyi Longman. Red Stradbroke Island Wallaby. South-east Queensland.

This handsome wallaby was described in 1922 (Mem. Qld. Mus., vii, p. 298). An additional specimen was obtained by H. G. Barnard in 1927.

Macropus parryi Bennett. Pretty-face or Whip-tail Wallaby.

Macropus dorsalis (Gray). Scrub or Black-striped Wallaby.

This appears to be the most common wallaby in Queensland, and in some districts it is regarded as a pest.

Macropus coxeni (Gray). Coxen's Wallaby. Cape York.

Macropus stigmaticus (Gould). Branded Wallaby. North-eastern Queensland.

Macropus wilcoxi (McCoy). Red-legged Wallaby. Southern Queensland.

Macropus thetidis (Lesson). Pademelon Wallaby. South-eastern Queensland.

Macropus bedfordi Thomas.

Oldfield Thomas described this wallaby (P.Z.S., 1900, p. 112) from a single skin, presented by the Duke of Bedford. The animal had been brought alive "from Queensland or North Australia." It is allied to *M. eugenii*.

Petrogale xanthopus Gray. Yellow-footed Rock Wallaby. Western Queensland.

Petrogale penicillata Gray. Brush-tailed Rock Wallaby. South-eastern Queensland.

Petrogale assimilis Ramsay. Allied Rock Wallaby. Type locality: Palm Island, North-eastern Queensland.

Petrogale godmani Thomas (1923). Godman's Rock Wallaby. Type locality: Black Mountain, near Cooktown, North Queensland.

Petrogale purpureicollis Le Soeuf (1924). Purple-necked Rock Wallaby. Type locality: Dajarra, North-western Queensland. (Austr. Zool., iii, p. 274.)

Petrogale celeris Le Soeuf (1924). "Active Rock Wallaby." Type locality: Terachy Station, Adavale, South-western Queensland.

Petrogale inornata Gould. Plain Rock Wallaby. Northern Queensland.

According to Stokes (Discoveries in Australia, vol. i, p. 336, 1846), the type locality is Cape Upstart, near Bowen.

Petrogale herberti Thomas (1926). Herbert's Rock Wallaby. Type locality: Eidsvold, Eastern Queensland.

Petrogale puella Thomas (1926). Little Rock Wallaby. Type locality: Glendower Station, Flinders River, North-western Queensland.

Dendrolagus lumholtzi Collett. Lumholtz's Tree Kangaroo. North-eastern Queensland.

Dendrolagus lumholtzi fulvus De Vis. Tawny Tree Kangaroo. Herberton, North Queensland.

Described in 1887 by De Vis as a distinct species (Pr. Roy. Soc. Qld., iv, p. 132).

Dendrolagus bennettianus De Vis. Bennett's Tree Kangaroo. Bloomfield River, North Queensland.

A coloured plate of this species is given in P.Z.S., 1894, Plate XLVI.

Onychogale frænata (Gould). Bridled Nail-tailed Wallaby. South-western Queensland.

A. S. Le Socuf (Austr. Zool., vol. 3, 1923, p. 110) considers this species to be on the verge of extinction, but it is not uncommon in some parts of Southern Queensland, and its pelts were frequently seen in the sales two or three years ago under the name of "pademelon." It is now a protected species.

Lagorchestes conspicillatus pallidior Thomas. Queensland Hare Wallaby. Northern Queensland.

Sometimes called the "Grass Rat" by trappers. The light-coloured Queensland forms were given subspecific rank by Oldfield Thomas in 1908.

Subfamily POTORINÆ.

Æpyprymnus rufescens (Gray). Rufous Rat-kangaroo. Eastern Queensland.

Bettongia gaimardi (Desmarest). Gaimard's Rat-kangaroo. Southern Queensland.

Potorous tridactylus (Kerr). Dark Rat-kangaroo. Southern Queensland.

Subfamily HYPSPRYMNODONTINÆ.

Hypsiprymnodon moschatus Ramsay. Musk Rat Kangaroo. North-eastern Queensland.

In the Cairns district this is sometimes called the "Black Bandicoot."

Family PHALANGERIDÆ.

Acrobates pygmæus (Shaw). Feather-tail or Pygmy Flying Possum.

This dainty little marsupial lives in holes in gum-trees which it lines with leaves. It is widely distributed in Queensland.

Dromicia (Eudromicia) macrura Mjöberg. Queensland Dormouse-possum. Atherton Tableland, Queensland.

Mjöberg (Kungl. Sven. Vetenskapsakad. Hlgr., Bd. 52, 1915, p. 19) separated *lepida*, *caudata*, and *macrura* from *Dromicia* and established the genus *Eudromicia*. "*Dromicia frontalis*" De Vis (Pr. Linn. Soc. N.S.W. (2), vol. 1, p. 1134) was founded on immature specimens which are apparently referable to *Acrobates pygmaeus*.

Dactylopsila picata Thomas. Queensland Striped Possum. North Queensland.

In 1908 Thomas separated the Queensland forms from the Papuan *D. trivirgata* under the above name. According to Lönnberg and Mjöberg (1915) the Striped Possum is found as far south as Millaa Millaa.

Petaurus australis reginæ Thomas. Yellow-bellied Flying Phalanger.

The Queensland forms were designated as *Petaurus australis reginæ* by Thomas in 1923.

Petaurus sciureus (Shaw). "Sugar Squirrel." Eastern Queensland.

Includes *Bolideus gracilis* De Vis (1882) from "north of Cardwell," North Queensland.

Petaurus breviceps Thomas. Lesser Flying Phalanger. Eastern Queensland.

Matschie (*loc. cit.*) places this in a subgenus *Petaurella*.

Petaurus breviceps longicaudatus Longman.

In 1924 the writer described this subspecies from the Mapoon Mission Station, Gulf of Carpentaria (Pr. Roy. Soc. Qld., xxxvi, p. ix). These phalangers are most nearly related to *Petaurus ariel* Gould from Port Essington, included by Thomas (Brit. Mus. Catal.) in the synonymy of *P. breviceps typicus*.

Petauroides volans incanus Thomas. Large Flying Phalanger. South-eastern Queensland.

Petauroides volans armillatus Thomas. Type locality: Coomooboolaroo, East-Central Queensland.

These two subspecies were described by Thomas in 1923 (Ann. Mag. Nat. Hist. (9), xi, p. 247-8).

Petauroides volans minor Collett. Type locality: Herbert Vale, North Queensland.

Pseudochirus laniginosus (Gould). Common Ring-tailed Possum. Southern Queensland.

Four subgenera have been described for the Australian and Papuan Pseudochiri by Matschie and Thomas, but the names are not introduced here.

Pseudochirus laniginosus oralis Thomas (1926). Type locality: Bloomfield, East-central Queensland.

Pseudochirus laniginosus incanens Thomas (1923). Type locality: Vine Creek, Ravenshoe, North Queensland.

Pseudochirus rubidus Troughton & Le Socuf. Bunya Mountains. Ring-tailed Possum.

In 1929 Troughton & Le Socuf described a specimen from the Bunya Mountains, South Queensland, under the above name (Rec. Aus. Mus., vol xvii, pp. 291-296, plate xlv).

Pseudochirus herbertensis Collett. Herbert River Ring-tail Possum. North Queensland.

Pseudochirus herbertensis colletti Waite. Collett's Ring-tail Possum. Cairns district, North Queensland.

This well-marked subspecies can be readily separated by the smooth prehensile surface of the tail.

(**Pseudochirus dahli** Collett, from the Mary River, Arnhem Land, has been recorded in error by A. S. Le Socuf (The Wild Animals of Australasia, p. 268), owing to confusion with the Mary River, Queensland.)

Pseudochirus archeri Collett. Archer's Ring-tail Possum or Toolah. Cardwell, Cairns district, North Queensland.

Pseudochirus lemuroides Collett. Sombre Ring-tail Possum. North-east Queensland.

Pseudochirus cervinus Longman (1915). Fawn Ring-tail Possum. Atherton Tableland, North Queensland (Mem. Qld. Mus., iii, p. 22).

Trichosurus vulpecula (Kerr). Common or Silver-grey Possum.

Trichosurus vulpecula johnstonii (Ramsay). Type locality: Bellenden-Ker Range, North Queensland.

This coppery form, which was designated by Ramsay as specifically distinct, is at least a well-marked subspecies.

Trichosurus vulpecula mesurus Thomas (1926). Type locality: Inkerman, North Queensland.

Trichosurus vulpecula eburacensis Lönnberg (1915). Type locality: Between Coleman and Mitchell Rivers, Cape York Peninsula.

This subspecies was described by Lönnberg in 1915 (Kungl. Sv. vet. Akad. Hlgr., Bd. 52, p. 9).

Trichosurus caninus (Ogilby). "Scrub" or Short-eared Possum. Eastern Queensland.

Trichosurus caninus nigrans Le Socuf. Black Short-eared Possum. Coastal "scrubs" of South Queensland and New South Wales.

Described in Australian Zoologist, 1916, i. p. 64.

Phalanger (Ceonyx) maculatus Geoffroy. Spotted Cuscus. Cape York, Queensland.

Possibly the Cape York forms should be distinguished from the non-Australian specimens by the use of Gould's term *nudicaudata* (1849). In 1918 Alexander established the genus *Wyulda* for the Cuscus from North-west Australia, with the specific name *squamicaudata*.

Family PHASCOLARCTIDÆ.

Phascolarctos cinereus adustus Thomas. Koala or Native Bear.

In 1923 Oldfield Thomas separated the Queensland forms from the New South Wales and Victorian koalas under the name *Phascolarctos cinereus adustus* (Ann. Mag. Nat. Hist. (9), xi, p. 246). There are no records of the occurrence of koalas farther north than Townsville.

Family PHASCOLOMYIDÆ.

Phascolomys mitchelli Owen. Naked-nosed Wombat. South-eastern Queensland.

According to Mathews and Iredale (Vict. Nat., xxix, 1912, p. 14), Perry's "Opossum hirsutum" was applied to the New South Wales wombat, which would give *hirsutum* (1811) priority over Owen's name.

Phascolomys gillespiei De Vis (1900). Queensland Hairy-nosed Wombat. Type locality: Moonie River, South-western Queensland (Ann. Qld. Mus., No. 5, pp. 14-16. Plates ix-x).

Family DASYURIDÆ.

Dasyurus maculatus (Kerr). "Tiger Cat" or "Spotted-tailed Native Cat." Eastern Queensland.

Large specimens of this marsupial may attain 3 feet 6 inches in total length. Probably most of the stories of a fierce new carnivorous animal are based on unusually large "Tiger Cats." A. S. Le Socuf (Wild Animals of Australasia, pp. 329-332) reprints several references to a large "Striped Marsupial Cat" of the Cape York Peninsula, which is presumably new, but which has never been collected.

Dasyurus hallucatus Gould. Northern Native Cat. North Queensland.

Dasyurus hallucatus predator Thomas. Cape York, Queensland.

This subspecies was described by Thomas in 1926 (Ann. Mag. Nat. Hist. (9), xviii, p. 543).

Dasyurus gracilis Ramsay.

This species, which was described by Ramsay in 1888 from a single specimen obtained in the Bellenden-Ker Range, is unrepresented in our collections.

Dasyurus geoffroyi Gould. Geoffroy's Native Cat.

Two specimens are listed in our series without precise localities.

Dasyurus viverrinus (Shaw). Common Native Cat.

Although this species is represented in our old collections, no precise localities are indicated.

- Phascogale penicillata** (Shaw). Brush-tailed Pouched Rat. Queensland.
- Phascogale minutissima** (Gould). Pygmy Pouched Mouse. Central and Southern Queensland.
- Phascogale apicalis** Gray. Freckled Pouched Mouse. Queensland.
- Phascogale flavipes** Waterhouse. Yellow-footed Pouched Mouse. Southern Queensland.
- Phascogale flavipes adusta** Thomas (1923). Type locality: Ravenshoe, North Queensland.
- Phascogale godmani** Thomas (1923). Type locality: Ravenshoe, North Queensland.
- Planigale ingrami** (Thomas) 1906.
A. S. Le Soeuf records this tiny marsupial from near Burketown, North Queensland (Austr. Zool., 1930, vi, p. 110).
- Planigale ingrami brunneus** Troughton. Type locality: Wyangerie, Flinders River, North-western Queensland (F. L. Berney).
The genus *Planigale* was established by Troughton in 1928 (Records Austr. Mus., xvi, p. 282), the "marked flattening of the upper surface of the skull" being the distinctive feature.
- Sminthopsis virginiae** (De Tarragon). Striped-faced Pouched Mouse. East-central Queensland.
A specimen of this rare marsupial, which came from Mackay, was described by the writer in the Qld. Agric. Journal, March 1918, p. 117.
- Sminthopsis leucopus** (Gray). White-footed Pouched Mouse. Eastern Queensland.
- Sminthopsis murina** (Waterhouse). Grey Pouched Mouse. Southern Queensland.
- Sminthopsis crassicaudata** (Gould). Fat-tailed Pouched Mouse. Western Queensland.
- Antechinomys laniger** (Gould). Jerboa Pouched Mouse. South-western Queensland.
- Family PERAMELIDÆ.
- Thalacomys lagotis** (Reid). Rabbit-Bandicoot. Western Queensland.
Three subspecies have been described. Additional material is required before the specimens from Western Queensland can be definitely placed, but they appear to be most closely related to Spencer's *T. minor*. A brief account of a living specimen by the writer appears in the Queensland Naturalist, vol. iii, 1922, p. 52.
- Perameles nasuta** Geoffroy. Long-nosed Bandicoot. Southern Queensland.
- Perameles nasuta pallescens** Thomas. Type locality: Vine Creek, Ravenshoe, North Queensland. Described in 1923 (Ann. Mag. Nat. Hist. (9), xi, p. 173).
- Isoodon obesulus** (Shaw). Short-nosed Bandicoot. Southern Queensland.

Isoodon macrurus (Gould). Northern Bandicoot.

This species extends to South-eastern Queensland.

Isoodon torosus (Ramsay). Ramsay's Bandicoot. Type locality: Near Cooktown, North Queensland.

This is evidently distinct from *I. macrurus*.

Isoodon peninsulæ Thomas. Cape York Bandicoot. Northern Cape York.

Chœropus castanotis (Gray). Pig-footed Bandicoot. Western Queensland.

We have no Queensland specimens in our collection, but Wood-Jones (Mammals of South Australia, 1924, pt. ii, p. 171) records its occurrence in the far west of this State.

THE GLENORMISTON METEORITE.

BY H. C. RICHARDS, D.SC, PROFESSOR OF GEOLOGY AND MINERALOGY, UNIVERSITY OF QUEENSLAND; HONORARY PETROLOGIST AND MINERALOGIST, QUEENSLAND MUSEUM.

(Plates III-VIII.)

INTRODUCTION.

IN 1925 a metallic substance was forwarded by Mr. George Wood, Clerk of Boulia Shire Council, to myself as Professor of Geology in the University of Queensland, as a result of which its meteoric character was recognised. Following upon this, about a year later, the Queensland Museum purchased the meteorite from Mr. F. H. Story, late manager of Glenormiston Station where it was found.

The mass received by the Queensland Museum shows evidence of one or two small pieces having been forced away, but it is in a reasonably complete condition, and as the list of Queensland meteorites is small some interest is attached to its description.

The main specimen on being received weighed $85\frac{1}{2}$ lb., and in shape was an irregular sub-triangular shell-like mass with distinct concave and convex surfaces.

The small specimen originally forwarded to myself for examination weighed approximately 750 grammes, while another one forwarded to Mr. B. Dunstan, Chief Government Geologist, weighed approximately the same amount.

The chemical analysis made in the Government Chemical Laboratory by Mr. F. Conmah through the courtesy of Mr. J. B. Henderson, Government Analyst, was made on borings from the specimen forwarded to myself.

A fragment weighing 1.550 grammes has been sawn from the main mass to afford a surface for etching purposes and for examination; the line of parting is shown on Plate III.

OBSERVATIONS ON QUEENSLAND METEORITES.

In the Records of the Australian Museum, Sydney, 1913, Dr. C. Anderson furnishes a Catalogue of Australian Meteorites and gives six Queensland meteorites, of which four are of the siderite type and two are aerolites (the Legould and the Warbreccan).

The siderites are Mungindi No. 1 and No. 2 (portions of the same fall), a meteorite from Southern Queensland referred to in the Catalogue of Ward and Cooley Collection of Meteorites 1904, and the Thunda meteorite.

The only other Queensland meteorites apart from the Glenormiston one known to the author are an undescribed siderite (coarsest octahedrite) weighing $14\frac{1}{2}$ cwt., found near Gladstone and disposed of by Mr. B. Dunstan to Ward's Natural History Establishment, New York, and an undescribed collection of 102 fragments of various sizes and aerolitic in character which were seen to fall on Tenham Station near the junction of Cooper and Kyabra Creeks, in South-western Queensland, in the year 1869, by Mr. M. Hammond and his brothers.

The Mungindi No. 1 and No. 2 weigh 51 lb. and 62 lb. respectively, are finest octahedrite (off., Brezina) or fine octahedrite (of., Farrington), and were found in 1907 three miles north of Mungindi, which is on the border of Queensland and New South Wales in Lat. 29° S., Long. 149° E. The specimens are now in the Mining and Geological Museum, Sydney.

The meteorite recorded in the Ward and Coonley Collection is a broad octahedrite (og.) and came from Southern Queensland. As the only meteorite of this type known in Queensland is the Gladstone meteorite, and as a part of this has been missing for many years, it is possible that this represents the missing portion.

The Thunda siderite weighed 137 lb., is a medium octahedrite (om.), and was found in 1886 at Windorah in the Diamantina district, Lat. $25^{\circ} 25'$ S., Long. $142^{\circ} 40'$ E., some 300 miles south-east of Glenormiston. It was described by the late Professor A. Liversidge, F.R.S. (Proc. Roy. Soc. N.S.W., vol. 20, p. 73, also vol. 22, p. 341).

Its density is given as 7.78 and its composition as nickel iron containing a trace of cobalt together with sulphur, phosphorus, and carbon. "The pittings are very large and cup-like and some of them almost perforate the meteorite" (Proc. Roy. Soc. N.S.W., xxii. p. 341).

"This meteorite is also remarkable for the many nodules of sulphide of iron which it contains" (A.A.A.S., vol. ii. 1890, p. 387).

In Bull. 94 U.S. Nat. Museum the analysis by E. Cohen of this meteorite is given, and from it Cohen calculated the mineral composition to be as follows:—

	Per cent.
Nickel iron	98.85
Schreibersite	1.09
Troilite	0.05
Chromite	0.01

The following particulars relating to the Gladstone meteorite, which was purchased by Ward's Natural History Establishment, New York, some time ago, have been kindly furnished by Mr. B. Dunstan, Chief Government Geologist:—

It was found in 1914 four miles due south of Gladstone, two and a-half miles north-west from Tooloola Siding, was approximately 33 inches by 12 inches by 9 inches (mean dimensions), has a density of 7.75, and weighs $14\frac{1}{2}$ cwt.

An analysis by Mr. F. Connah of the Government Analyst's Laboratory "of chips from all over specimen of iron portion" is shown in the table of analyses in this paper.

Large nodules of troilite, of which one was 1 inch by $2\frac{1}{2}$ inches in section, occurred and "apparently there is a mixture of coarse troilite (crystals), graphite, and particles of iron in the nodules." Analysis of a nodule yielded:—

	Per cent.						
Iron	59.4
Nickel	2.0
Cobalt	0.3
Sulphur	33.4
Residue	2.3
Total	<hr/> 97.4 <hr/>

The polished section (*see* Plate VIII) after etching with dilute nitric acid exhibited very good Widmanstätten figures; the lamellæ are very coarse and range up to 4 mm. in width, the large majority being greater than 2.5 mm.

It comes within the coarsest octahedrite classification of Farrington or octahedrite (*ogg.*, Brezina).

The curious and interesting obsidian buttons or australites which have been found in other Australian States have not yet been recorded definitely from Queensland. Some years ago Mrs. Saunders, the widow of a man interested in tin-mining in Northern Queensland, presented the University Geological Department with a collection of minerals, and in a tobacco tin containing pellets of cassiterite were two small undoubted australites which had been worn and knocked about to some extent. They weighed 1.005 and 0.591 grammes respectively and have densities as follows: 2.436 and 2.581.

Whether they really came from tin-wash in Northern Queensland we will probably never be able to settle, but it is interesting to know that Mrs. Saunders did not know of their existence in the sample of cassiterite pellets.

THE GLENORMISTON METEORITE.

TIME AND PLACE OF FALLING.

The date of falling is unknown, and the only available information relating to the finding is contained in a letter from Mr. F. H. Story, dated November 14th, 1926:

" . . . I regret that I cannot give you much information regarding it, as no one knew when or saw it fall. It was discovered when one of the boys was tracking a stray horse, who brought me home a small piece. I then sent the car and got the balance of it in. It fell on a small plain about 5 miles west of Glenormiston Station House in the Boulia district or to be exact 90 miles west of Boulia." This would make its location about Lat. $22^{\circ} 54' S.$, Long. $138^{\circ} 43' E.$

SIZE AND WEIGHT.

The size on receipt at the Museum was $19\frac{1}{2}'' \times 13\frac{1}{5}'' \times 8\frac{3}{4}''$ and its weight was $85\frac{1}{2}$ lb. As indicated earlier, at least two fragments weighing together a few pounds are known to have been removed, so that the meteorite weighed at least 90 lb.

FORM.

The meteorite, owing to having distinct concave and convex surfaces with a maximum thickness between them of not more than 4 inches, may best be regarded as a deeply pitted shell-like fragment, which has a maximum length of 19.5 inches and a maximum width of 13.2 inches. When resting on its convex surface (*see* Plate V) the highest point above the table is 8.8 inches.

Both surfaces have been coated with a thin film of dark chocolate brown iron oxide crust, and only where the original surface has been broken is there any indication of the distinctly brecciated character of the meteorite.

Both surfaces are well pitted, but the concave surface has several cup-like depressions as much as 5 inches in depth in one case. The depressions are relatively smooth and run one into the other, also they may be roughly ovate or circular in form. The deepest depression perforates the mass. The convex side is more characteristically "thumb-marked," an average width for the shallow rounded depressions being $1\frac{1}{2}$ to 2 inches, while the perforation from the deep depression on the concave surface shows up as a rounded hole approximately an inch in diameter.

The shell has a maximum thickness of 4 inches, but over much of its area is rather less, perhaps 2 inches on the average.

BRECCIATED CHARACTER.

The very thin crust of iron oxide disguises rather effectively the distinctly brecciated character of the mass. The individual granules of kamacite, which in cross-section are polygonal (five or six sides being the usual number) and which are generally equidimensional in size, vary in diameter from 13 mm. to 2.5 mm., but have an average diameter of approximately 6 mm.

In between the kamacite granules plate-like crystals of t enite and probably plessite are arranged eutectically, while distributed through the kamacite crystals themselves are troilite granules and rounded to irregular granules of what is believed to be schreibersite (*see* Plates VI and VII).

CHEMICAL COMPOSITION.

The following chemical analysis was made by Mr. F. Connah, of the Government Analyst's Laboratory, on the borings made by drilling a half-inch hole to a depth of $1\frac{1}{2}$ inches.

For comparison, the analysis has been arranged in a table along with the average composition of iron meteorites as determined by Merrill,¹ with the

¹ Proc. Amer. Phil. Soc., xlv, 1926, p. 124.

analysis of the Thunda meteorite of Queensland and with the analyses of iron meteorites from Gladstone in Queensland, from Mount Edith in Western Australia, from South Australia, from Narraburra in New South Wales, and from Cranbourne in Victoria.

The general description by Professor Liversidge of the Thunda meteorite corresponds closely with that of the Glenormiston meteorite, and as the chemical analyses are so similar it is not at all unlikely that they constitute portions of the same original mass, although found approximately 300 miles apart.

	The Glenormiston Meteorite, Qld.	Average ² Compo- sition of Meteorites	Iron Nickel portion of Gladstone Meteorite, Qld.	Thunda ³ Meteorite, Qld.	Narra- burra ⁴ Meteorite, N.S.W.	Cranbourne ⁵ No. 2 Meteorite, Vic.	Meteorite, ⁶ S.A.	Mt. Edith ⁷ Meteorite, W.A.
Iron	89.74	90.85	92.9	91.54	88.605	92.34	88.85	89.45
Nickel	8.71	8.52	6.4	8.49	9.741	6.3	9.07	9.45
Cobalt	0.21	0.59	0.1	0.56	0.474	0.75	0.34	0.75
Phosphorus ..	0.36	0.17	0.18	0.17	0.429	0.19	0.27	0.35
Sulphur	0.30	0.04	Nil	0.02	traces	0.18	0.75	
Carbon	0.24	0.03	Nil	..	0.008			
Copper .. ..	..	..	..	0.02				
Chronite .. ..	..	..	..	0.01				
Difference ..	0.44							
Total	100.00	..	..	100.81	..	..	..	100.00
Density	7.621	..	..	..	7.57	..	7.693	
Fe : Ni	10.3 : 1	10.7 : 1	14.5 : 1	10.8 : 1	9.1 : 1	14.5 : 1	9.8 : 1	9.5 : 1
Weight	85½ lb.	..	..	137 lb.	71 lb.	3 cwt.	7½ lb.	350 lb.
Analyst	F. Conmah	..	F. Conmah	..	..	..	W. S. Chap- man	
Classification	Brecciated medium octahedrite (obz.)	..	Coarsest octahed- rite	Medium octahed- rite (om.)	..	Broad octahed- rite	Octahedrite	Medium octahed- rite (om.)

The chemical analysis shows nothing abnormal or unusual in any way, and is closely comparable with that of several iron meteorites from Australia and elsewhere.

In comparison with the average composition of iron meteorites it appears to be a little deficient in cobalt but much richer in phosphorus, sulphur, and carbon. Such a comparison, however, may be deceptive as it is not likely that there is a linear variation of the constituents of iron meteorites, and comparison with an average composition may be very misleading.

² Proc. Amer. Phil. Soc., xlv, p. 124.

³ Bull. 94, U.S. Nat. Mus., p. 158.

⁴ Proc. Roy. Soc. N.S.W., xxxvii.

⁵ Mem. Nat. Mus. Melb. No. 6, p. 22.

⁶ Proc. Roy. Soc. S. Aust. 1901, p. 11.

⁷ Bull. 59, Geol. Surv. West Aust., p. 212.

The relationship between the structure as revealed by etching polished surfaces and the percentage of nickel has been well established by O. C. Farrington and adopted by G. P. Prior⁸ and others.

The cubic irons or hexahedrites have an iron to nickel ratio greater than 13 : 1, while the octahedral irons or octahedrites which constitute the main bulk of the meteoric irons range between 13 : 1 and 6 : 1.

The Glenormiston iron with its ratio of 10.3 : 1 is, therefore, in the group of octahedrites on this basis, and one might expect it to show the minerals and structures characteristic of that placing. On etching a polished surface, however, one does not obtain the Widmanstätten structure so characteristic of the octahedrites, but instead there is developed the structures shown in the cubic irons or hexahedrites. The fact that the meteorite is so definitely brecciated may account for this.

On the iron-nickel ratio the Glenormiston meteorite is a medium octahedrite.

Examination of the figures in Plate VI will show the uneven distribution of the troilite, schreibersite, and the tænite throughout the main mass of kamacite crystals, and the borings analysed may perhaps be not truly representative of the mass as a whole. The correct sampling for analysis of a brecciated iron meteorite of this type is a very difficult matter unless an undue quantity of material is dissolved.

EXAMINATION OF POLISHED AND ETCHED SURFACES.

Structures and Minerals present.

The meteorite is distinctly tough and the extreme labour and slowness associated with even quite small cuts with a hacksaw pointed to a rather high carbon content in the material. By means of a carborundum saw a face $5\frac{1}{2}$ inches long and 3 inches wide was obtained and subsequently polished. This was cut from one end of the meteorite as shown in Plate III.

The polished surface showed clearly the brecciated character and angular eutectic intergrowths of tænite and plessite could be seen in reflected light, while small nodules of troilite and larger nodular masses of schreibersite alone or mixtures of schreibersite and troilite could be detected by the use of reflected light without magnification and without artificial aid (*see* Plate VI).

The surface responded very readily to attack by dilute nitric acid; the troilite nodules became dissolved leaving small rounded pits. The crystals of kamacite showed very well indeed the Neumann lines, while the angular platy intergrowths of tænite (and plessite) stood out in relief from the surface of the kamacite as it dissolved away. A beautiful damascene effect on some of the kamacite faces showed up in parts of the etched surface in the early stage of the attack and before the Neumann lines had been very well developed.

⁸ Miner. Mag., vol. xix.

When the etching was carried out still further the damascene effect became lost, the Neumann lines were well developed and the surface of the kamacite crystals became rough owing to the greater resistance of small pin-point portions which do not appear to an equal extent in all the kamacite surfaces, but which seem to have an even and rather systematic network distribution throughout the whole mass. These more resistant pin-points may indicate the existence of minute segregations of carbon throughout the kamacite.

The richer nickel-bearing material which has filled in the interstices between the kamacite crystals is very reminiscent of the form which quartz assumes in its intergrowth with felspar in graphic granite. These sharply angular and triangular masses have a distinctly yellowish reflecting surface compared with the kamacite, and not infrequently appear to have a marked border, rather thin but distinctly lamellar (*see* Plate VII, fig. 1). It may be that in these cases we may have an outer lamellar envelope of tennite wrapping up the plessite.

The troilite granules are all small, averaging little more than 1 mm. in diameter, though some reach 2 mm. They are abundant and distributed somewhat unevenly, occur indiscriminately in the kamacite, in the tennite and plessite, and sometimes form a compound granule with what is believed to be schreibersite.

This latter mineral occurs as irregular-shaped nodules, brittle in character, with a paler yellow reflecting surface than the troilite, with surfaces showing cleavage faces and much rougher than the nickel rich material filling the interstices, and offers considerable resistance to the attack of quite strong nitric acid.

Separate chemical analysis has not been carried out on this material, but it is believed to be schreibersite (iron-nickel phosphide).

The kamacite crystals are arranged, as one might expect in a brecciated octahedrite, with the Neumann lines of adjacent grains generally showing no relationship whatever to one another (Plate VII, fig. 2).

When the etched surface as a whole is viewed by reflected light, great variation is noted between adjacent crystals or adjacent groups of crystals in their surface illumination according to the incidence of the light. This so-called "schiller" effect of some writers on meteorites is very pronounced owing to the different orientation in different groups of plates, and is illustrated in the three figures of Plate VI, in which the same surface has been photographed with light coming from different directions. The curved line on the top surface of each figure marks the base of one of the cup-like depressions, and it is noteworthy that the fresh metallic material has only the thinnest oxidised coating. In the photographs on Plate VI the Neumann lines on the kamacite (*k*) plates are seen clearly. Schreibersite (*s*), tennite and plessite (*t*), and troilite (*tr*) may also be identified in the figures.

To Mr. H. A. Longman, Mr. B. Dunstan, Dr. F. W. Whitehouse, and Mr. A. N. Falk I wish to extend thanks for help in connection with the illustrations in this paper.

SUMMARY.

The Glenormiston meteorite, which weighed nearly 90 lb., may be regarded as a brecciated octahedrite of medium composition with a density 7.621.

It is composed essentially of crystals of kamacite averaging approximately 6 mm. in diameter and which are not orientated according to any definite arrangement as shown by their reflected surfaces, but which show well-developed Neumann lines after etching.

Tenite and plessite occur as eutectic intergrowths with the kamacite crystals, while troilite and schreibersite in the form of rounded or irregular nodules sometimes simple but often compound occur in moderate abundance.

Widmanstätten structure is not present.

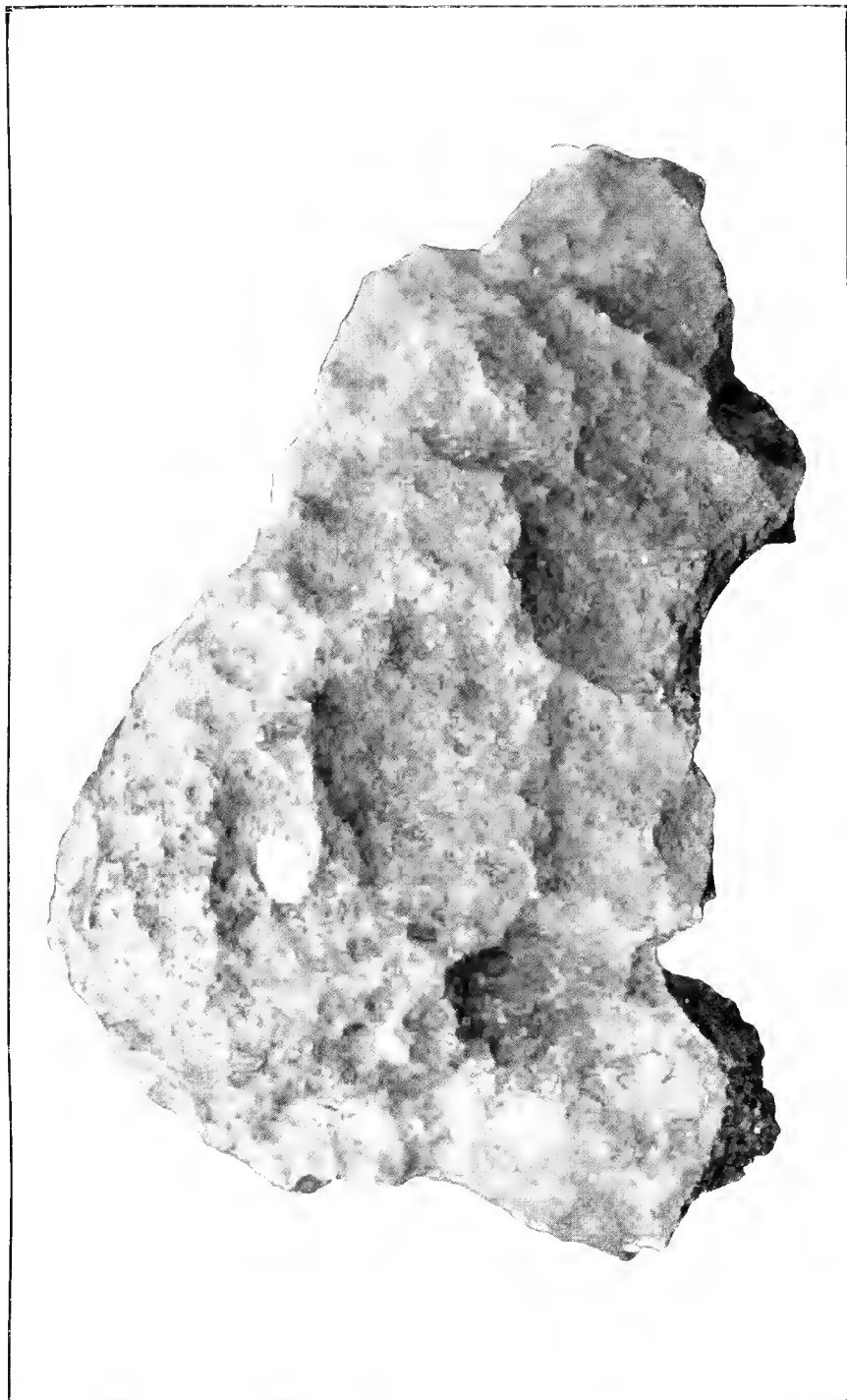


THE GLENORMISTON METEORITE.

Showing the concave surface with cup-like depressions, many of which are confluent. The portion marked at the left has since been sawn off for examination purposes. The material for chemical analysis was derived from a fragment torn off the right-hand corner which shows clearly the breccia-like character beneath the original thin glazed oxide crust. Maximum length $19\frac{1}{2}$ inches.

Photo., H. H. Mabsby.

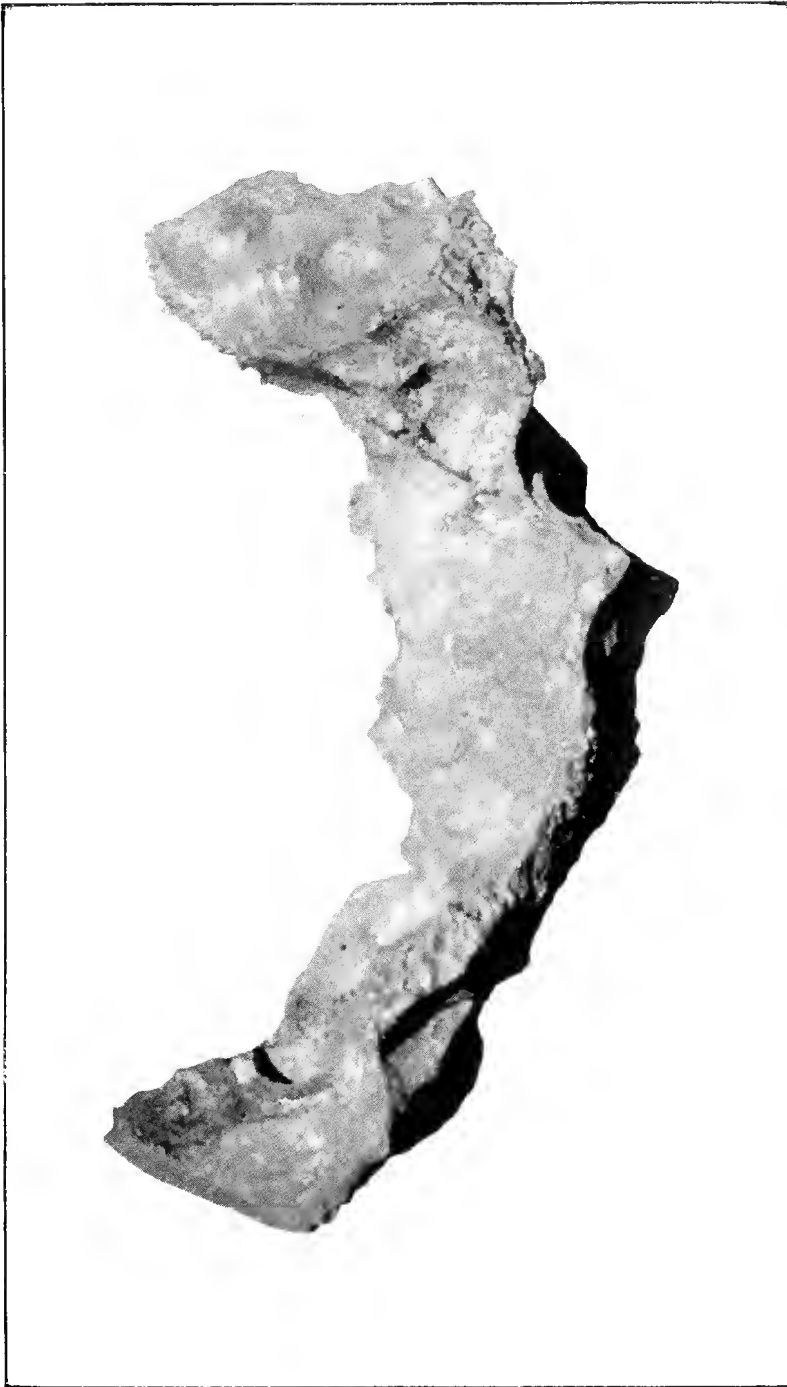




THE GLENORMISTON METEORITE.

Showing the convex surface with its thumb-like depressions, also the perforation at the base of a deep cup-like cavity on the concave surface. Maximum length is $19\frac{1}{2}$ inches and maximum width is $13\frac{1}{2}$ inches.

Photo., H. W. Mobbs.

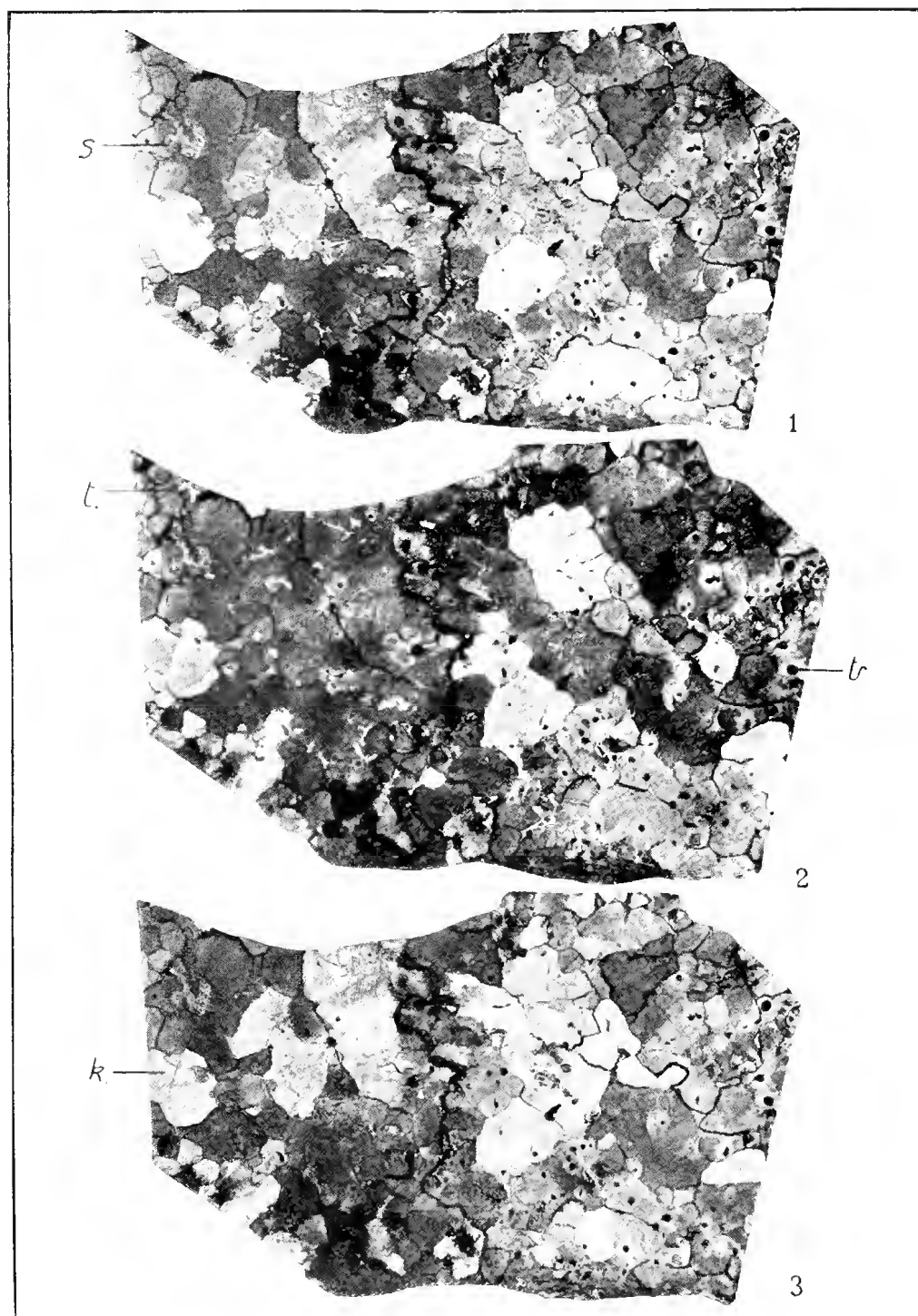


THE GLENSMISTON METEORITE.

Side view showing its shell-like character. The maximum thickness between the concave and convex surfaces is 4 inches. The maximum height of the view is $8\frac{1}{4}$ inches. The photograph was taken after the portion referred to in Plate III was removed.

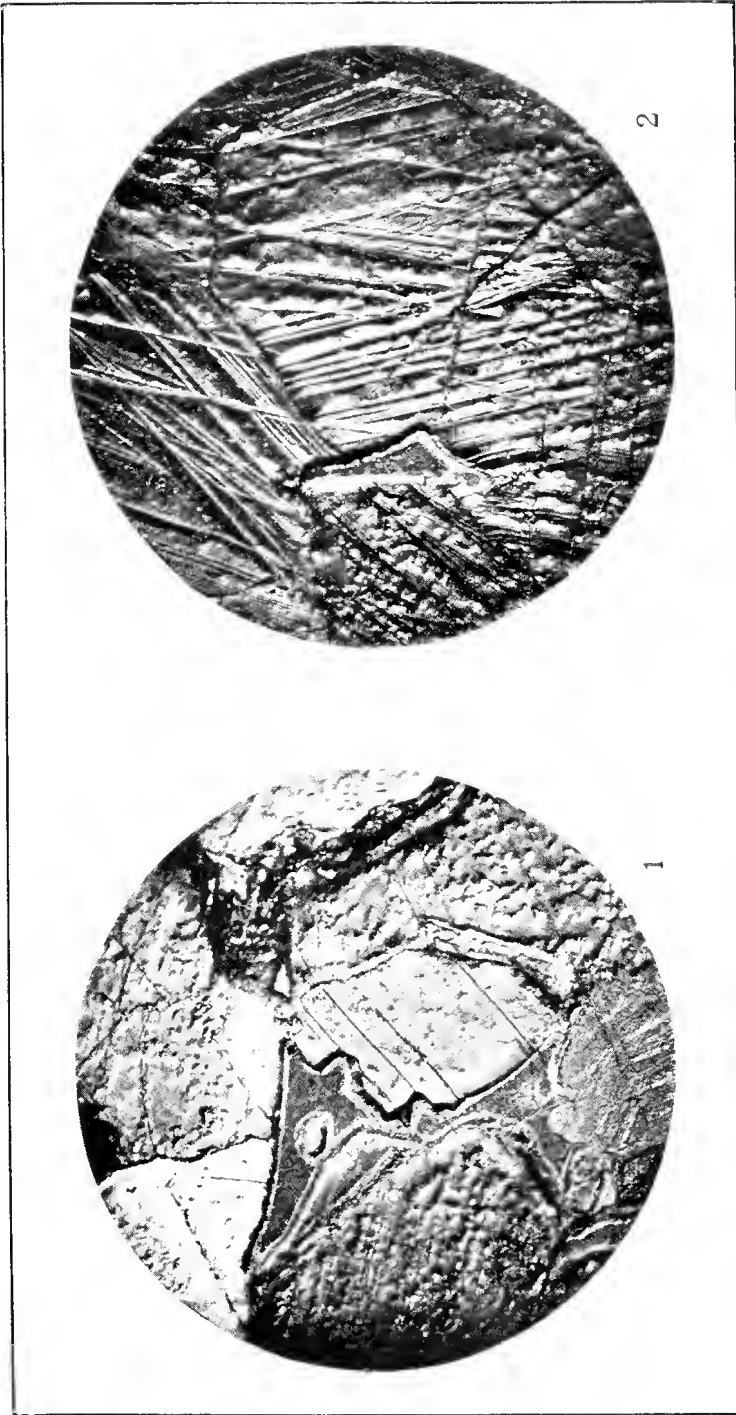
Photo., C. S. Eijer.





THE GLENORMISTON METEORITE.

Three photographs by reflected light, natural size, of etched surface. See page 71 of text.
Photos., A. N. Falk. Face page 72.



THE GLENORMISTON METEORITE.

Fig. 1.—Microphotograph, x 12, in reflected light, of eutectic intergrowth of Tavite (and Plessite) with Kamacite on portion of surface in the figures in Plate VI, 0.7 inch from the right-hand margin along horizontal centre line.

The banding parallel to the margin of the Tavite shows clearly, as also do the small pin-points of ? graphitic material left behind on the surface of the deeply etched Kamacite plates.

Fig. 2.—Microphotograph, x 12, in reflected light, of etched Kamacite plates on portion of surface in the figures in Plate VI, one half-inch below the top and one half-inch to the right of the vertical centre line.

The Neumann lines on the Kamacite crystals show up very clearly, also a triangular patch of Tavite and Plessite filling an interstice at the junction of three Kamacite crystals.

Photos., J. V. Falk.



THE GLADSTONE METEORITE.

View of the etched surface of the Gladstone Meteorite showing Widmanstätten figures and oval patches of graphitic material containing sulphurous matter. Maximum length of polished fragment 1.5 inches.

QUEENSLAND MOLLUSCAN NOTES, No. 2.

BY TOM IREDALE.*

(Plate IX.)

CONTINUING these notes,† new species are described and rectifications of identity are recorded. These are determined mainly from the collections made by Mr. Melbourne Ward and Mr. William Boardman, of the Australian Museum, who have dredged successfully in Port Curtis, and off North-west Island, Capricorn Group. Successful shore collecting was also done by them on the mainland and islets, and this has proved of service for comparison, showing clearly the distinction between the fauna of the mainland and that of the coral reef.

The accompanying illustrations were prepared by Miss J. K. Allan, of the Australian Museum, to whom my best thanks are here tendered.

Melaxinæa labyrinthica gen. & sp. nov.

(Plate IX, figs. 1-4.)

Under this name is described the shell which in recent years has been called *Glycymeris vitreus* Lamarek. Beautiful living specimens were dredged by Mr. Melbourne Ward in Albany Passage, 9-12 fathoms, and upon checking Lamarek's reference many discrepancies were noted. Firstly, it was described from "Mers australes" collected by Péron, and this shell is only taken by the dredge in Queensland waters where Péron did not collect. This created suspicion, and the description called for a thin brittle shell, which this species is not, and then it was found that Reeve had figured the unique valve. Reeve's figures definitely showed a differently shaped shell with a more complex sculpture, the ears especially differing.

Shell semi-orbicular, very compressed, thin but solid, a little oblique. Colouration dirty cream or fawn marked with brown spots irregularly. The straight ligamental edge shows a narrow compressed ligamental area above which the umbones almost meet. The sculpture in the adult shows close radial lines of nodules on a groundwork of concentric crinkled threads. The minute juvenile here figured shows that the sculpture begins as about twenty defined nodulose ribs, the interstices minutely concentrically threaded. With age these ribs split, the nodules being less continuous, and in the adult fifty or more ribs can be

* By permission of the Trustees of the Australian Museum.

† *Memoirs of the Queensland Museum*, vol. ix, part 3, 1929.

seen, some still showing their duplicate nature. The hinge is composed of two straight rows of teeth, meeting angulately in the juvenile, separated by the ligamental area intruding in the adult. The inside colouration is white in the juvenile but mostly marked with brown in the adult. The crenulation of the edge is deep and regular when young but less marked though still definite in the adult.

Length 37 mm.; height 38 mm.; diameter 12 mm.

Habitat: North Queensland (only dredged). Type from Albany Passage, 9-12 fathoms. Also collected at Michaelmas Cay, 9-12 fathoms.

Probably Lamarck's *vitreus* came from West Australia, as Odhner (Kungl. Svensk. Vet. Akad. Handl., Bd. 52, No. 16, p. 22, pl. 1, ff. 12-13, 1917) has figured a young specimen from off Cape Jaubert, North-west Australia, which differs from ours in detail, and in shape fits Reeve's figure of Lamarck's type well.

Family TELLINIDÆ.

A curious Tellinid was included in a fine collection brought back by Mr. Melbourne Ward from the islands in the Whitsunday Passage. It proved to be identical with a shell from New Caledonia identified in London as *Tellinungula bruguieri* Hanley. *Tellina bruguieri* was described from the island of Panhay, Philippines, and the Australian specimen differs from the description and figure in the shorter posterior side and the more produced anterior edge, the concentric sculpture more pronounced and the radial nearly obsolete; the teeth are even larger and the pallial sinus of greater extent. These features can be distinguished with the subspecific name *refecta* nov. Regarded as referable to the genus *Macoma* on account of its lack of lateral teeth, it was separated by H. Adams (Proc. Zool. Soc. 1860, p. 369) with the name *Macalia*, introduced for it alone. Twelve years later Römer, monographing the Tellinidæ in the Conch. Cab. ed. Kuster, Bd. x, Abth. 4, p. 268, 1872, and ignorant of H. Adams's action, again recognised its distinction, giving the name *Tellinungula* to the section for the single species. Bertin in his monograph of the Tellinidæ left it in *Macoma*, with which genus it has probably no close affinity; and Dall, without comment, in the Trans. Wagner Free Inst. Science, vol. iii, p. 1044, 1900, allowed it as of sectional value under the subgenus *Macoma*, probably from no close attention to the shell, as it is of striking appearance, recalling *Tellina inflata* Gmelin and *Tellina spectabilis* Hanley. The latter has been classed under *Motis*, which name, long known to be preoccupied, has, at the second attempt, been emended to *Apolymetis* by Salisbury (Proc. Malac. Soc. (Lond.) vol. xviii, p. 258, Nov. 1929). Hanley's *spectabilis* does not appear to me to be congeneric with *meyeri*, the type of *Apolymetis*, and is therefore here differentiated with the new generic name *Leporimetis*. Hanley's *Tellina spectabilis* and *bruguieri* were both described in the Proc. Zool. Soc. (Lond.) 1844, pp. 141-2, Dec., from the Philippine Islands.

Prophetilora arizela gen. & sp. nov.

(Plate IX, figs. 10, 11.)

A toothless "Lucinid" with delicate concentric sculpture and somewhat indistinct radials, which can be easily visualised as being like a large embodiment of the shell described as *Lucina ramsayi* by Smith (Rep. Chall. Zool., vol. xiii, 1885, p. 174), for which I have recently introduced (Rec. Austr. Mus., vol. xvii, 1930, p. 390) the genus name *Monitilora*. In the present case the cardinal is missing, the lunule still more impressed, and the interior inside the pallial line chalky and pustulose.

Shell semi-circular, subglobose, subequilateral, equivalve, umbones small, attingent. Colour white, somewhat glassy, translucent, thin but strong. Lunule small but deeply impressed, anterior side somewhat pointed, posterior side subangulate. The sculpture consists of fine concentric well-marked lire obscurely striate with fine radials which form a subrenulation only discernible with a glass. An indistinct radial groove marks off the posterior wing. Interior chalky inside the pallial line, vitreous outside. Hinge edentulous. Muscle scars normally lucinid, rather narrow and elongate.

Length 38 mm.; height 34.5 mm.; depth of single valve 10 mm.

Habitat: North Queensland. Type from Friday Island, Torres Strait. Also collected at Michaelmas Cay.

Fallartemis amina gen. & sp. nov.

(Plate IX, figs. 14, 15.)

Mr. Melbourne Ward brought back a large quantity of shells and shell-sand from the beach at Friday Island, Torres Strait, and many Dosinids were present. Two very distinct forms are here named: the commonest species in the collection being *Dosinia deshayesii* which was well figured by Smith (Rep. Chall. Zool., vol. xiii, 1885, pl. i, fig. 1). The present genus is based on a comparatively smooth shell of the *sculpta* Hanley series which is here named *Fallartemis amina*, and is named as type of the genus, there being a number of species related to *sculpta*.

Shell small, subcircular, thin but strong, broader than high, fairly compressed, lunule small, rather shallow, escutcheon obsolete. Colour white, with faint radial underlying translucent streaks, more noticeable medially. The sculpture consists of fine lamellae set very closely, and comparatively smooth medially; they develop on each edge into fine frilled puckers more pronounced. At each side radials also appear, these being most marked on the anterior side, and missing on the medial portion that appears smooth and rather shining. Hinge line shallow, more spread than in *Pardosinia*, the adductor muscle scars rather small and narrow. Pallial sinus of median length, reaching about half-way across both as to height and breadth.

Height 29 mm.; length 32 mm.; depth of single valve 8 mm.

Habitat: North Queensland. Type from Friday Island, Torres Strait.

There is a species described by Deshayes as *Dosinia semiobliterata* (Cat. Conch. Coll. Brit. Mus., pt. i. p. 6. 1853) from Australia, collected by Strange, which has apparently not been figured nor localised. The description reads something like this species but it is more probably *sculpta* Hanley.

Semelartemis ætha gen. & sp. nov.

(Plate IX, fig. 18.)

A curious Dosinid recalling *Semele* in appearance and of different shape from most of the family, the texture also distinctive.

Shell somewhat elongately subcircular, inequilateral, thin, rather fragile, somewhat compressed, lunule small, impressed, escutcheon notable, a little winged. Colour white. The sculpture consists of rather prominent closely set lamellar ridges, finer umbonal, and little frilled at the edges. There is no radial striation present. The extraordinary prolongation of the posterior side differentiates this from all other Australian Dosinid groups. Hinge very broad shallow, adductor muscle scars small. Pallial sinus long and rather narrow, reaching more than halfway across the interior. The escutcheon is very much lengthened and winged recalling that of *D. alata* in the immature, but less noticeable in the adult.

Height 46 mm.; length 52.5 mm.; depth of single valve 12 mm.

Habitat: North Queensland. Type from Friday Island, Torres Strait.

Coralastele allanæ gen. & sp. nov.

(Plate IX, fig. 5.)

A beautiful Trochoid of no close relationship to any other Australian species. Shell thin, delicate, truly conical, pseudo-umbilicate, columella arcuate, not plaited, outer lip thin. Colour rosy or brownish pink with regular brownish red markings on the ridges and intervals. Whorls eight, excluding a somewhat tilted one-whorled protoconch. The last whorl seven-eighths of the bulk of the shell, semi-shouldered, the gently rounded periphery showing three equidistant elevated thin ridges, sometimes with a faint thread between; the shoulder also bears a similar ridge; the base is rounded, similarly cingulate with eight ridges, a few threads sometimes between. The preceding whorl is similarly ornamented, two main cinguli present, the antepenultimate showing only one with radial threads overriding which are obsolete or absent on the later whorls. The earliest whorls show more prominently the radial sculpture as radiating ribs. The mouth is circular, the outer lip thin, columella well arched ending abruptly in a projecting tip and meeting the body whorl with a sweep, a thin glaze joining the outer lip. The pseudo-umbilicus is narrow and deep.

Height 14 mm.; breadth 13 mm.

Habitat: Queensland. The type is from North-west Island, Capricorn Group.

Hedley collected this species alive at Murray Island in crevices of coral blocks, and the operculum is thin, horny, multispiral. Specimens were compared in the British Museum (Natural History) and were pronounced novel. This beautiful species is named for Miss J. K. Allan, who has furnished so many excellent paintings of Australian molluscs to accompany papers by Hedley and myself.

Family CERITHIIDÆ.

As noted in my last paper I had not solved the problems surrounding the generic names to be used in this family, and here offer some notes with regard to the names under consideration. The acceptance of the names given by Martyn in the *Universal Conchologist* has been a source of much trouble, and Winckworth's conclusion, that, as Martyn was not using a binomial nomenclature in the explanation to the plates, Martyn's names be rejected, is herewith confirmed. The beautiful figures provided by Martyn have never been excelled, but his proposed system of nominating them was never published, and the recognition of Martyn's temporary names has caused much confusion without creating any benefit. The name *Clava* used by Martyn in 1784 is therefore ignored, and we can pass on to *Cerithium* introduced by Bruguière in 1792, when a whole series of species was named but no type indicated, and from this point we must determine the usage of this name. Lamarek in 1799 cited *Murex aluco* L. only, but in 1801 named *Cerithium nodulosum* Bruguière as examples. The first type designation was made by Montfort in 1810 when *vertagus* L. was selected. Gray in 1847 included "*Cerithium* Adans. Brug.," with type "*Murex radula*," but since then *Cerithium* has been used with *nodulosum* as example, a solution quite unacceptable. *Clava* was correctly introduced by Humphrey in the *Museum Calomnianum* in 1797, but Gmelin had used the name in a different sense in 1791, so *Clava* can be absolutely dismissed from this problem. *Cerithium* then seems only valid for the *vertagus* series, which have been commonly called *Vertagus* following Schumacher in 1817, but this usage was bad as Link in 1807 had pre-empted *Vertagus* for different shells. At the same time Link introduced *Aluco* for some cerithioid shells of which *Cerithium adansonii* was the first species, and is here named as type. The West African forms are not congeneric with the Pacific shells, so that *Aluco* does not come into use in Australian nomenclature.

In 1899 Hedley described a new generic form *Contumax*, which later proved to be the very juvenile shell of *nodulosum*, a huge, massive, coral reef shell of very different appearance when adult. Yet Hedley's name appears to be the only one available for the group about *nodulosum*, while *Pseudovertagus* Vignal proposed for *aluco* can be used independently. The change from the juvenile to adult shown in *nodulosum* is somewhat paralleled in *aluco*, as described below in connection with the new species *Pseudovertagus excelsior*. The details regarding *Clava* can be studied in Dall. (Trans. Wagner Free Inst.

Sci., vol. iii, p. 290, 1892), Pilsbry (Proc. Acad. Nat. Sci. Philad., 1901, p. 392), Cossmann (Essai Paléococh. comp. livr. 7, pp. 66-84, 1906), Dall. (Proc. Acad. Nat. Sci. Philad., vol. 59, p. 363, 1907), and Winckworth (Proc. Mal. Soc. (Lond.), vol. xviii, p. 228, 1929). These results may be written thus:—

- Cerithium* Bruguière .. Type by Montfort, 1810: *Cerithium vertagus* Linné.
- Aluco* Link Type here named *Cerithium adansonii* Bruguière. Not Australian.
- Contumax* Hedley Type, *C. decollata* = *C. nodulosum* Bruguière.
- Pseudovertagus* Vignal .. Type, *Murex aluco* Linné.
- Many further subdivisions will be discussed later.

***Pseudovertagus excelsior* sp. nov.**

(Plate IX, fig. 17.)

An elegant Cerithioid nearest *C. sowbyi* Kiener, which I have renamed *C. phylarchus*, but more subulate.

Shell awl-shaped, tapering rapidly, earlier whorls clathrately sculptured, later whorls smooth, columella not plaited, canal very much recurved. Colour greenish white marked with more or less regular squarish purple-brown spots, the ground colour appearing as spiral lines, the darker as irregular radial marks. The last whorl shows a semi-absorbed varix at the third, but no previous varices are to be seen; basally fine grooving, to the number of four, surrounds the whorl but these can scarcely be seen on the penultimate, and on the penultimate the intervening spaces appear more as elevated scarcely nodulous ridges. Normally the adult is truncate, about twelve adult whorls being counted; the earliest of these shows a very distinct radial ribbing of about ten to twelve ribs overrun with close threads very different from the later whorls. The suture is linear but threadlike and distinct. The mouth is obliquely oval, the outer lip circular, heavy, thickened, subvaricose, the columella not plaited, inner lip as a heavy glaze extending across the body whorl to the outer lip where just inside there is a prominent notch and entering ridge. The canal is long but bent back at right angles and narrow, no umbilical chink being present.

Length 74 mm.; breadth 24 mm.

Habitat: North Queensland. Type dredged in 11 fathoms, Michaelmas Cay.

A correction may be here added as in my last notes I proposed *Cerithium problema* for *Cerithium lemniscatum* Quoy & Gaimard, and I find that Cossmann (Essai Paléococh. comp. livr. 7, July 1906, p. 123, footnote) had made the alteration, providing *Cerithium philippinense*, a correction not recorded in the Zoological Record.

Family CONIDÆ.

Many species of Cones have been recognised from Queensland. Hedley admitted forty-three species, a number so inadequate that Shirley immediately suggested the addition of twenty-one more, but as he included extralimital shells of illegitimate origin none of his additions can be incorporated without confirmation. I recorded eleven legitimate accessions and there are still more. As with Cowries, Cones have long been a source of delight to amateur shell-collectors, their form and beauty deservedly being admired. Nearly a thousand species have been named, and it is now very difficult to determine the identity of a species among so many, as subdivision has not been systematically carried out. An attempt is here made to fix the major groups as a preliminary to more accurate nomination.

The type of the genus *Conus* has been commonly regarded as *marmoreus* Linn., but the earliest type designation appears to have been made by Swainson when he named *C. litteratus* Linn. as the type (Treat. Malac. 1840, p. 148). Previously Montfort (Conch. Syst., vol. ii, 1810, p. 407) had named *C. fulgurans* = *C. generalis* Linné as type, but that species does not occur in the tenth edition of Linné's Systema Naturæ and hence is inadmissible. In the same place Montfort carried out an excellent splitting up of the Linnean genus, introducing *Cylinder*, *Rollus*, *Hermes*, and *Rhombus* for easily recognisable groups. Swainson renamed the same groups and added some more, and then Möreh (Cat. Conch. Yoldi., 1852) proposed a few more. Little attention has since been paid to this group, so that while the major groups, which may be subfamilies or even families, are named, the majority of the species have been systematically neglected.

The group known as the Textile Cones was separated by Montfort under the name *Cylinder*: there is, however, a prior *Cylindra* as noted in my previous paper in these Memoirs, so that recourse would be to Swainson's *Textilia*, but Swainson indicated *bullata* as the type, and this is not a normal textile species. As there seems to be more than one genus in this series I propose *Darioconus*, naming *omaria* Brug. as type and *Regiconus* with *auratus* Bruguière as type. In the same manner *Hermes* and *Theliconus* were proposed for the *nussatella* series, and *glans* Bruguière has been there included, but it deserves generic rank and I introduce the name *Leporiconus* with *glans* as type and here associate *coccineus* Gmelin.

When Swainson introduced his genus *Dendroconus* he nominated *striatus* as type, and as this distinct form requires a distinct designation there is this name available though hitherto it has been used for the *betulinus* series. For this latter I propose *Cleobula*, naming *figulinus* as type.

This brings us to the Cone we are most concerned with here, viz., a form of the *ammiralis* type. Whitley and I secured a small specimen at Michaelmas Cay which was referable here, but did not exactly agree, so was left unnamed. Messrs. Ward & Boardman secured a magnificent specimen of the same species

at North-west Isle, Capricorn Group, and it is here differentiated as *Leptoconus ammiralis temnes* subsp. nov. It is a more elegant form than the typical shell, with the spire longer and more concave. It is nearest Reeve's fig. IIc, but the markings are more pronounced, bold white blotches being present with dark-brown linear stripes, the median band bearing two interrupted lines of brown on a cream ocellated ground. *Coronaxis* was introduced by Swainson with *marmoreus* Linn. as type, but the name has been used for the *ebrius* series, which is here named *Virroconus*, *ebrius* being selected as type. For the *arenatus* series Swainson's *Puncticulus* is available, while Mörcb's names *Rhizoconus*, *Pionoconus*, and *Phasmoconus* can be utilised for the groups typified by *miles* Linné, *magus* Linné, and *radiatus* Guélin respectively. Many more names will be proposed before any comparative system will be brought into this family, such series as the *anemone* one of Southern Australia standing apart. For *anemone* Lamarek as type, I here propose the genus *Floraconus*, and also note that there is still confusion in connection with this species which I am attending to in another place.

***Cancellaphera amasia* gen. & sp. nov.**

(Plate IX, fig. 8.)

Shell small, subglobose, solid, spire short, shoulder of whorls tabulate, mouth somewhat triangular, umbilicus small and deep, plaits three. Colour purplish brown with the nodules paler reddish. Whorls four with a smooth glassy protoconch of two whorls, somewhat globose. Adult whorls with deep channelled shoulder, the sculpture of longitudinal ribs crossed by strong spiral threads, the ribs being twenty in number, the threads about ten on the last whorl. The umbilicus is small, bounded by a curved rib. Columella straight with three plaits situated rather deeply, forming an anterior subcanal; posteriorly, the inner lip crossing as a thin glaze meets the outer lip, the aperture being triangular in shape but not free. Outer lip thick but not varicose, eleven long entering ridges being counted inside.

Height 15 mm.; depth 10 mm.

Habitat: Queensland. Type dredged in 9-11 fathoms, Port Curtis.

May be *Cancellaria obliquata* Lamarek of Hedley's list.

Family CYPRÆIDÆ.

In my last notes I added several species but was unable to rectify the generic nomination. I have, however, to add a new species, a very unexpected event, so have endeavoured to utilise Schilder's recent Revision (Arch. für Naturg. (Wiegmann) Year 91, 1925, abt. A, heft 10, issued in 1927), and bring our species into line with recent research. Schilder's essays mark a most pronounced advance, and again completely illustrate the development of the splitter whenever intensive study is undertaken. Beginning with few genera, Schilder has now recognised eighty-four subgenera which he used in a generic sense, and, realising that this result would cause a sensation, lumped several

species equally as worthy of separation. Consequently in this note I propose several new genera to remove obvious anomalies and further assist in the correct interpretation of the difficult members of this group. I am preparing a complete account of the Mollusca collected by the British Great Barrier Reef Expedition and will go more fully into the details in that place.

Simply following Schilder's groupings, the Queensland species names will read as under; Hedley's List being followed in the first column:—

<i>Cypræa annulus</i> Linné, 1758	..	<i>Monetaria annulus</i> Linné, 1758
<i>arabica</i> Linné, 1758	..	<i>Arabica arabica</i> Linné, 1758
<i>argus</i> Linné, 1758	..	<i>Arestorides argus</i> Linné, 1758
<i>asellus</i> Linné, 1758	..	<i>Ecnaria asellus</i> Linné, 1758
<i>caputserpentis</i> Linné, 1758	..	<i>Ravitronea caputserpentis</i> Linné, 1758
<i>carneola</i> Linné, 1758	..	<i>Lyncina carneola</i> Linné, 1758
<i>caurica</i> Linné, 1758	..	<i>Erronea caurica</i> Linné, 1758
<i>clandestina</i> Linné, 1767	..	<i>Palmadusta clandestina</i> Linné, 1767
<i>cylindrica</i> Born, 1778	..	<i>Palangerosa cylindrica</i> Born, 1778
<i>eburnea</i> Barnes, 1824	..	<i>Erosaria eburnea</i> Barnes, 1824
<i>erosa</i> Linné, 1758	..	<i>Erosaria erosa</i> Linné, 1758
<i>errones</i> Linné, 1758	..	<i>Erronea errones</i> Linné, 1758
<i>felina</i> Gmelin, 1791	..	<i>Erronea listeri</i> Gray, 1824
<i>fimbriata</i> Gmelin, 1791	..	<i>Erronea fimbriata</i> Gmelin, 1791
<i>flaveola</i> Linné, 1758	..	<i>Erosaria flaveola</i> Linné, 1758
<i>helvola</i> Linné, 1758	..	<i>Ravitronea helvola</i> Linné, 1758
<i>hirundo</i> Linné, 1758	..	<i>Ecnaria hirundo</i> Linné, 1758
<i>isabella</i> Linné, 1758	..	<i>Basilitrona isabella</i> Linné, 1758
<i>limacina</i> Lam., 1810	..	<i>Staphylæa limacina</i> Lam., 1810
<i>lutea</i> Gronov., 1781	..	<i>Palmadusta humphreysii</i> Gray, 1825
<i>lynx</i> Linné, 1758	..	<i>Lyncina vanelli</i> Linné, 1758
<i>mauritiana</i> Linné, 1758	..	<i>Mauritia mauritiana</i> Linné, 1758
<i>miliaris</i> Gmelin, 1791	..	<i>Erosaria miliaris</i> Gmelin, 1791
<i>moneta</i> Linné, 1758	..	<i>Monetaria moneta</i> Linné, 1758
<i>notata</i> Gill, 1858	..	<i>Erronea notata</i> Gill, 1858
<i>punctata</i> Linné, 1767	..	<i>Ecnaria punctata</i> Linné, 1767
<i>quadrifaculata</i> Gray, 1824	..	<i>Palangerosa quadrifaculata</i> Gray, 1824
<i>saulæ</i> Gaskoin, 1843	..	<i>Palmadusta saulæ</i> Gaskoin, 1843
<i>sophieæ</i> Brazier, 1875	..	<i>Erronea chrysostruma</i> Brazier, 1880
<i>subviridis</i> Reeve, 1845	..	<i>Palmadusta subviridis</i> Reeve, 1845
<i>tigris</i> Linné, 1758	..	<i>Cypræa tigris</i> Linné, 1758
<i>valentia</i> Perry, 1811	..	<i>Leporicypræa valentia</i> Perry, 1811
<i>vitellus</i> Linné, 1758	..	<i>Lyncina vitellus</i> Linné, 1758
<i>walkeri</i> Gray, 1832	..	<i>Palmadusta walkeri</i> Gray, 1832
<i>xanthodon</i> Gray, 1832	..	<i>Palmadusta xanthodon</i> Gray, 1832
<i>ziczac</i> Linné, 1758	..	<i>Palmadusta ziczac</i> Linné, 1758

To which I have added—

<i>Cypræa becki</i> Gaskoin, 1836	..	<i>Paulonaria becki</i> Gaskoin, 1836
<i>cicereula</i> Linné, 1758	..	<i>Pustularia cicereula</i> Linné, 1758
<i>cribraria</i> Linné, 1758	..	<i>Cribraria cribraria</i> Linné, 1758
<i>contaminata</i> Sowerby, 1832	..	<i>Evenaria contaminata</i> Sowerby, 1832
<i>gaskoini</i> Reeve, 1846	..	<i>Cribraria gaskoini</i> Reeve, 1846
<i>globulus</i> Linné, 1758	..	<i>Pustularia globulus</i> Linné, 1758
<i>irrorata</i> Gray, 1828	..	<i>Naria irrorata</i> Gray, 1828
<i>mappa</i> Linné, 1758	..	<i>Leporicypræa mappa</i> Linné, 1758
<i>microdon</i> Gray, 1828	..	<i>Erronea microdon</i> Gray, 1828
<i>nucleus</i> Linné, 1758	..	<i>Nuclearia nucleus</i> Linné, 1758
<i>subcylindrica</i> Sowerby, 1870	..	<i>Palangerosa subcylindrica</i> Sowerby, 1870
<i>talpa</i> Linné, 1758	..	<i>Talparia talpa</i> Linné, 1758
<i>pyriformis</i> Gray, 1824	..	<i>Palmadusta pyriformis</i> Gray, 1824.

Cypræa angustata Gmelin, 1791, a Tasmanian species, is rejected.

Many species were added by Shirley which are not acceptable until confirmation is forthcoming, and it may here be noted that Schilder records a number of species from "Sidney" which would have been better written "New South Wales."

The type of *Cypræa* must be *tigris* Linné, not *mappa* as used by Schilder, and the new names I have introduced are here itemised:—Thus *Arestorides* is proposed with *Cypræa argus* Linné as type, this species being included in his group *Callistocypræa* provided by Schilder for *C. aurantium* Martyn, and I cannot see much close relationship between these two. *Evenaria* is given to the group, of which I select *C. asellus* Linné as type, the other Australian species associated with it being *hirundo* Linné, *punctata* Linné, and *contaminata* Sowerby, though this group may be remodelled.

For the *caputserpentis* group I introduce *Racitrona*, naming that species as type, and including *helvola* Linné. Schilder has correctly rejected *caputanguis* Philippi but proposed *caputophidii* for shells from Yokohama and Mauritius, and suggested the Australian shells regarded as *caputanguis* might belong to this species. All the so-called *caputanguis* I have yet examined appear to be merely variants of *caputserpentis*, and there is no need at present to recognise two species in Australian waters. If later two species can be separated, a new name will probably be required for the second one. A series of small shells is included by Schilder under the genus *Adusta*, which has *onyx* as type. Our shells do not correlate well with that extralimital form, and I propose *Palmadusta*, naming *clandestina* L. as type. To this genus I attach the so-called *lutea* Gronov. and *cicææ* Linné, while the series *xanthodon* Sow., *pyriformis* Gray, *walkeri* Gray will constitute a subgenus *Gratiadusta* with *pyriformis* Gray as type, and *subviridis* Reeve may be tentatively here included. The *cylindrica* group is here named *Palangerosa*, that species being named as type, the three representatives being *cylindrica* Born, *subcylindrica* Sow., and *quadrinaculata* Gray. The genus *Stolida*, to which Schilder referred them, was nameless as the

name had been used many years before Jousseaume selected it, a fact Schilder has since recognised. The beautiful shell *isabella* Linn. was placed by Schilder under *Jousseaumea* Sacco, introduced for a European fossil group of no real relationship, and I separate it under the name *Basilitrona*, naming *isabella* as type. The typical *Cypræa*, as mentioned above, must be *tigris* Lam., so for the *mappa* group, wrongly so considered by Schilder, I introduce the new genus *Leporicyprea*, *mappa* being named as type, the very rare *valentia* being included but only tentatively. The very small "Cypræas" will need much more study before they can be regarded as being well distributed. The curious little *irrorata* Gray, allowed as monotypic of *Naria*, is not unlike the *beckii* series, from which it is widely separated by Schilder. I introduce *Paulonaria* with *beckii* Gaskoin as type and will work these out better later. *Trivia* is also well subdivided by Schilder, and the following comparison of Hedley's species will enable us to systematise these better:—

<i>Trivia globosa</i> Gray, 1832	.. ..	<i>Cleotrivia pilula</i> Kiener, 1845
<i>grando</i> Gaskoin, 1848	.. ..	<i>Trivirostra edgari</i> Shaw, 1909
<i>pellucida</i> Gaskoin, 1846	.. ..	<i>Dolichupis pellucidula</i> Gaskoin, 1846
<i>producta</i> Gaskoin, 1835	.. ..	<i>Dolichupis producta</i> Gaskoin, 1835
<i>scabriuscula</i> Gray, 1828	.. ..	<i>Trivirostra scabriuscula</i> Gray, 1828
<i>staphylæa</i> Linné, 1758	.. ..	<i>Staphylæa staphylæa</i> Linné, 1758
<i>sulcata</i> Gaskoin, 1848	.. ..	<i>Trivirostra sulcata</i> Gaskoin, 1848
<i>vitrea</i> Gaskoin, 1848	.. ..	<i>Trivirostra vitrea</i> Gaskoin, 1848.

The small globular "Trivias," of which there is more than one species confused, are here separated with the new generic name *Cleotrivia*, *pilula* Kiener being named as type, *globosa* being the American species. The forms with produced extremities, following Schilder, are separated, and the new genus name *Dolichupis* proposed, *producta* Gaskoin being selected as type.

The Linnean species *staphylæa* was classed by Hedley under *Trivia*, but it is a Cypræoid form, and it is suggested here that *limacina* Lamarck is probably more closely allied to *erosa* than to *staphylæa*. Again, *carneola* is given as type of *Lyncina* by Schilder, but the apparent type was *lynx*, and this was fixed by Tryon (Struct. Syst. Conch., vol. ii, p. 198, 1883), so that I introduce the new subgeneric name *Mystaponda* with *vitellus* Linné as type. I have accepted a few emended specific names in the foregoing list, but probably many more will need consideration such as *flaveola* Linné, for which Hedley has noted in MS. *labiolineata* Sowerby as being probably the alternative name, and Schilder has used *helena* Roberts, 1868. Hedley also added *cunningii* to the Queensland list, and this species is referable to *Cribraria*. As to Hedley's *felina* this name has been replaced by Schilder by *listeri* Gray, and a new subgeneric name is here proposed for this form, *Melicrona*, of which a curious development occurs at North-west Island, having rostrate extremities and somewhat excavate under surface recalling the New Caledonian aberrations, which hitherto appear to have been restricted to that island.

An addition to the Queensland list is *Cypræa rhinoceros* Souverbie (Journ. de Conch., vol. xiii, p. 156, 1865), described from New Caledonia, which was also

collected at North-west Island. Schilder correctly points out that this is distinct from *interrupta* Gray, but falls into a curious error in citing as a synonym *coxeni* Cox, a species quite unlike. While Schilder ranges *rhinoceros* with *asellus* it is somewhat aberrant and had better be separated as *Blasicrura*, and as to *coxeni* its relationships seem to be more with *errones*, but again it would be best to provide it with a new subgeneric name, *Eclogarena*, also. By this means, errors such as the above will be obviated.

Another case of an extralimital species may be noted. Schilder includes the beautiful *guttata* Gray under the subgenus *Erosaria*, but it certainly deserves separation and I therefore introduce the new generic name *Perisserosa* for it alone. Schilder also cites the specific name from Gmelin, but, as Gmelin's first two references certainly do not refer to this species, it will be more correct to propose a new name, *Perisserosa brocktoni*, for the specimen figured by Sowerby (Thes. Conch., vol. iv, pl. xvii, ff. 104-105, 1880) under the name *Cypræa guttata* Gray. This specimen should be in the collection of my friend Mr. J. R. le Brockton Tomlin, for whom it is named.

***Nivigena melwardi* gen. & sp. nov.**

(Plate IX, figs. 12, 13.)

Shell small, pyriform, spire depressed, shining bluish white, mouth fairly narrow. The extremities are a little produced, anteriorly a little pinched, the spire appearing semi-umbilicate, the edges thickened. The back is fairly convex with obsolete spiral ridges present; the outer edge is thickened and recurved with faint suggestions of crinkling as in *Erosaria*; the contraction of the anterior end recalls that of *Stolida*, the semi-umbilicate spire similar to that of *Stolida*; the mouth is narrow, the teeth fairly large, on the outer lip sixteen deep clear teeth being counted while on the inner lip fifteen are present which are continued inwards on to the columella and visible from the outside.

Length 24 mm.; breadth 16 mm.; height 12 mm.

Habitat: Queensland. Type from North-west Island, Capricorn Group.

This beautiful species is not an albinism of any known Queensland species, differing in shape from *C. stolida* Linné which otherwise it resembles most, the mouth easily separating it from that species.

Family OVULIDÆ.

For this family Schilder uses the name Amphiperatidæ, probably correctly, based on the generic name *Amphiperas* of Gronow as used by Menschen in a binomial sense. The name *Amphiperas* will then replace *Ovula* for the two species listed by Hedley in the Queensland list under the names *ovum* Linné and *tortilis* Martyn. The rejection of Martyn's names will necessitate reversion to Lamarck's *costellata* (Ann. Mus. Paris, vol. xvi, 1810, p. 110) for the latter species. The other species included by Hedley were obviously not congeneric and I had separated them many years ago in manuscript, so I was delighted to find that Schilder had ruthlessly reorganised these species. I do not agree with his rejection of Bolten's *Volva* in favour of the later *Radius* of Montfort, and therefore use *Volva volva* for the

well-known Spindle Shell. The small species hitherto classed under *Ovula* and *Radius* have to be separated and grouped according to their facies and relationship. I had drawn up a scheme before I saw Schilder's classification, which is even more revolutionary than my own. Schilder separates the subfamily Amphiperatinae into two tribes ("supergenera" would be a better name) and, under the European genus *Simnia*, proposes a subgenus, *Prosinnia*, with type *semperi* Weinkauff, a group of small elongate species including *dentata* Adams & Reeve from Australia. As Adams and Reeve's choice had been anticipated the new name *Prosinnia renovata* is proposed. Reeve's *Ovulum angasi* is placed by Schilder under *Radius*, but seems more closely allied to *Prosinnia* and may be there placed at present. This species was described from Port Curtis and has been collected there by most workers since. Messrs. Melbourne Ward and W. Boardman recently brought back a nice series taken from coral dredged in 9-12 fathoms, and these were immediately divided into two distinct species, the smaller one being the true *angasi*. The larger one is here described as *Phenacovolva nectarea* nov., and is common as dead shells on the beach at Caloundra, and is apparently the species recorded by Shirley under the name *Ovulum birostris* Lam., and included by Hedley in the New South Wales List under the name *philippinarum* Sow. Schilder uses *birostris* Linn. for the former species, though Hauley had indicated an error in the traditional usage, and Schumacher's *Radius brevirostris* (Essai nouv. Test, 1817, p. 259) may be the valid name for the *birostris* of authorities. It may be remarked that Schumacher's *Radius* appears to have been independently proposed.

The small Ovuloid shells Schilder classes under Thiele's genus *Primovula*, introduced for a South African species *beckeri* Sowerby, and introduces a subgenus *Pseudosinnia*, naming *carnea* Poir., a European fossil, as type. As there are two or three distinct groups confused in Australian waters I introduce the new generic names *Prionovolva* and *Diminovula* for the Australian shells known as *breve* Sowerby and *punctata* DuRoi respectively. As Sowerby described his shell from unknown locality and he had East Australian shells, it may be that his species, which has been continually credited to Australia, really belongs here. Our shell shows an excellent generic feature in the curious saw-teeth in the middle of the outer lip; the strong cutting inside, the twisted posterior canal, the strong columella plait, and the callus towards the posterior canal on the body-whorl all distinguish this form from the *punctata* series with its strong sculpture; its globose form with less twisted posterior canal and obsolete plication indicate its alliance therewith, but this is negated by the weak crenulation of the outer lip and lack of body callus: the Australian shell known as *punctata* has coarser striation and larger dots placed farther apart, and may be called *Diminovula verepunctata*.

***Phenacovolva nectarea* gen. & sp. nov.**

(Plate IX, fig. 6.)

Belonging to the "*birostris*" series but of different proportions. Shell elongate, swollen medially, extremities prolonged, mouth linear. Colour pink, extremities brownish, a narrow white band round the middle. Sculpture consisting of fine striæ showing in the adult on the ends only but covering the immature.

The posterior canal is a little longer than the anterior and narrow; the anterior canal is also a little broader; the mouth is a little more open anteriorly though still narrow; the inner lip seen as a very fine glaze only with no posterior nodulation, and only a very slight swelling anteriorly. The columella shows a faint plication internally. The outer lip is thickened and rolled back and shows no internal noduling.

Length 38 mm.; breadth 9.5 mm.

Habitat: Queensland. Type dredged on corals in 9-12 fathoms, Port Curtis.

Prosimnia angasi Reeve is much smaller, stouter, extremities shorter, outer lip more thickened, and carries a notable swelling medially on the inner lip.

***Colus boardmani* sp. nov.**

(Plate IX, fig. 7.)

Shell somewhat small for this group but regularly Fusoid in shape. Shell narrow, last whorl more than half length of shell, spire long, canal very long, mouth narrow, outer lip thin. Colour white, covered with a thin brownish crinkled periostracum. Protoconch of one and a-half whorls, a little bulbous, tip planate, regular sculpture of deep rounded few longitudinal ribs overrun by spiral threads. These ribs become less pronounced as shell grows older, and only appear as a slight nodulation on the last whorl; conversely the threads become more pronounced and are regular concentric liræ with strong intervening threads on the final whorl. Ten adult whorls may be counted. The mouth is a rather small oval, inner lip as a thin glaze, columella smooth, canal very long and straight, sometimes bent with age.

Length 78 mm.; breadth 31 mm.

Habitat: Queensland. Type dredged in 9-11 fathoms, Port Curtis.

***Pleuroploca altimasta* sp. nov.**

(Plate IX, fig. 9.)

Shell broadly fusiform, spire as long as aperture, body-whorl two-thirds the length of the shell, mouth oval, canal of medium length, open. Colour brownish yellow almost hidden with dark brown, mouth fleshy buff. Sculpture consisting of spiral threads, more or less obsolete on middle of body-whorl and developed as liræ on earlier whorls. Longitudinal noduling obsolete though faint indications are suggested on the juvenile whorls. Last whorl sub-shouldered, liræ more pronounced near the suture and basally round the canal. Mouth oval, outer lip thick but not varicose, inside closely lined with fine entering ridges. Columella with three plicæ low down, the anterior one much larger than the other two; inner lip as a thin glaze only, a short ridge present near posterior angle.

Length 96 mm.; breadth 36 mm.

Habitat: Queensland. Type from Port Curtis.

This appears to be the coastal representative of the coral living *Pleuroploca filamentosa* Bolten.

Cirsotrema kelea sp. nov.

(Plate IX, fig. 16.)

Shell elegantly conical, strongly varicose, whorls well rounded, sutures deep, mouth free, umbilicus present but choked by early varix. Colouration white. Sculpture consists of very fine frilled longitudinal ridges, interstices threaded. Apical whorls missing, eight adult whorls remaining. On the last whorl, three varices are present, earlier whorls showing many, but intermediate ones lacking. The sculpture on the penultimate whorl shows about forty-five frilled laminae, and as these are recurved it is difficult to count the encircling threads. The last whorl shows three strong varices, the middle area being twice either of the other, showing twenty-seven laminae against thirteen. At one place the frills are broken off and the spiral threads appear as thin cords with three or four minor threads between, the whole series minutely crenulate. Mouth oval, free, the outer varix in the type being strongly duplicated, very thin and finely wrinkled and recurved. Operculum normal.

Length 24 mm.; breadth 13 mm.

Habitat: Queensland. Type dredged in 9-12 fathoms, Michaelmas Cay.

For quick reference the new names in this paper are here listed:—

Melaxinæa n. gen. with type *M. labyrinth* n. sp.

Melaxinæa labyrinth n. sp.

Macalia bruguièri refecta n. subsp.

Leporimetis n. gen. with type *Tellina spectabilis* Hanley.

Prophetilora n. gen. with type *P. arizela* n. sp.

Prophetilora arizela n. sp.

Fallartemis n. gen. with type *F. amina* n. sp.

Fallartemis amina n. sp.

Semelartemis n. gen. with type *S. ætha* n. sp.

Semelartemis ætha n. sp.

Coralastele n. gen. with type *C. allanæ* n. sp.

Coralastele allanæ n. sp.

Pseudovertagus excelsior n. sp.

Darioconus n. gen. with type *Conus omaria* Bruguière.

Regiconus n. gen. with type *Conus auratus* Bruguière.

Leporiconus n. gen. with type *Conus glans* Bruguière.

Cleobula n. gen. with type *Conus figulinus* Linné.

Leptoconus ammiralis temnes n. subsp.

Virroconus n. gen. with type *Conus ebraeus* Linné.

Floraconus n. gen. with type *Conus anemone* Lamarek.

Cancellaphera n. gen. with type *C. amasia* n. sp.

Cancellaphera amasia n. sp.

Arestorides n. gen. with type *Cypræa argus* Linné.

Evenaria n. gen. with type *Cypræa asellus* Linné.

Ravitrona n. gen. with type *Cypræa caputserpentis* Linné.

- Palmadusta* n. gen. with type *Cypræa clandestina* Linné.
Gratiadusta n. subgen. with type *Cypræa pyriformis* Gray.
Palangerosa n. gen. with type *Cypræa cylindrica* Born.
Basilitrona n. gen. with type *Cypræa isabella* Linné.
Leporicyprræa n. gen. with type *Cypræa mappa* Linné.
Paulonaria n. gen. with type *Cypræa beckeri* Gaskoin.
Cleotricia n. gen. with type *Cypræa pilula* Kiener.
Dolichupis n. gen. with type *Cypræa producta* Gaskoin.
Mystaponda n. subgen. with type *Cypræa vitellus* Linné.
Melicerona n. subgen. with type *Cypræa listeri* Gray.
Blasierura n. subgen. with type *Cypræa rhinoceros* Sowerbie.
Eclogarena n. subgen. with type *Cypræa coxeni* Cox.
Perisserosa n. gen. with type *P. brocktoni* n. sp.
Perisserosa brocktoni n. sp.
Nirigena n. gen. with type *N. melwardi* n. sp.
Nirigena melwardi n. sp.
Prosimnia renorata nov.
Phenacovolva n. gen. with type *P. nectarea* n. sp.
Phenacovolva nectarea n. sp.
Prionovolva n. gen. with type *Ovulum breve* Sowerby.
Diminorula n. gen. with *D. verepunctata* n. sp.
Diminorula verepunctata n. sp.
Colus boardmani n. sp.
Pleuroploca altimasta n. sp.
Cirsotrema kelca n. sp.

EXPLANATION OF PLATE IX

- Figs. 1, 2.—*Melaxinea labyrinthæ* Iredale.
 Figs. 3, 4.—*Melaxinea labyrinthæ* Iredale. Juvenile.
 Fig. 5.—*Coralastere allance* Iredale.
 Fig. 6.—*Phenacovolva nectarea* Iredale.
 Fig. 7.—*Colus boardmani* Iredale.
 Fig. 8.—*Cancellaphera amasia* Iredale.
 Fig. 9.—*Pleuroploca altimasta* Iredale.
 Figs. 10, 11.—*Prophetilora arizela* Iredale.
 Figs. 12, 13.—*Nirigena melwardi* Iredale.
 Figs. 14, 15.—*Fallartemis amia* Iredale.
 Fig. 16.—*Cirsotrema kelca* Iredale.
 Fig. 17.—*Pseudovertagus excelsior* Iredale.
 Fig. 18.—*Semelartemis ætha* Iredale.

