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THE GIANT DINOSAUR: *Rhoetosaurus brownei*.

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With Plates I.-V. and Text-figures.

THE genus *Rhoetosaurus* was established by the writer in March, 1926, for a giant Dinosaur from Jurassic deposits at Durham Downs, Queensland, then only known from a series of caudal vertebræ and a few associated fragments¹. Through the courtesy of Mr. Arthur J. Browne, whose name was associated specifically with this remarkable fossil, I was able to pay a short visit to the actual site of the discovery in May, 1926. With Mr. Browne's assistance very important additional material was found, which adds greatly to our knowledge of this huge Sauropod. The remains were partly exposed but mostly buried under soil on a slope near the bank of a small gully, which runs into Eurombah Creek. At the time of our visit the much abraded lateral surfaces of about a dozen vertebræ could be distinguished on the surface. Some of these were practically in juxtaposition. These vertebræ and the associated matrix have apparently been weathered out of the original formation. As the result of spade and mattock work many additional fragments were unearthed, these being irregularly scattered in the soil over an area of several yards. Fully a ton of material, apart from fragments of sandstone, was recovered in this way within two days. Should other fragments of the same skeleton be present, it seems probable that these may be uncovered in favourable circumstances after heavy storms.

The specimens were then set on one side for subsequent transit. As the site was about four miles from the homestead, the fossils had to be conveyed for some distance over very rough country and across several gullies to Durham Downs. They were then sent by motor truck some forty miles to Roma, and subsequently railed to Brisbane. Mr. Browne's valuable assistance in arranging for the conveyance of this heavy material is greatly appreciated.

Horizon.—In my previous paper this was designated as "Walloon Series, Jurassic, Freshwater"; in this connection references were given to papers by H. I. Jensen, B. Dunstan, and A. B. Walkom, and the details need not be repeated here.

Material.—The additional specimens comprise about twenty vertebræ, ranging from small sections of centra or arches to fairly complete units. Some

¹ Longman, Mem. Queensland Museum, VIII., part 3, 1926, pp. 183-194, Plates XXIX.—XXXIII.

of the more complete specimens had sustained transverse fractures, but the component parts were lying in close association. When uncovered and lifted from the soil, one of the larger vertebræ, which appeared to be fairly solid, fell into scores of pieces. The vertebræ discovered include six additional caudals, the coalesced but very incomplete remains of four sacrals, representatives of at least seven dorsals, and one cervical. Short sections of a massive femur were found involved in thick matrix. Scores of fragments, many of which belonged to the pelvic girdle, were also collected. Some of the specimens have not yet been sufficiently freed from matrix to be available for description. Many of the smaller fragments, however, consist of abraded bone with but little matrix adhering.

Matrix.—As in the previously described specimens, the matrix is of two kinds. The major portion consists of masses of oxidised concretionary clay ironstone, which can be readily chipped away from the more massive elements. Underlying this on many of the specimens is a closely-investing, very fine-grained, calcareous sandstone. This proves most difficult to remove, and, up to the present, it has been found almost impossible to clear sections of this natural cement from the more friable contours of the actual fossil, even when these have been reinforced by shellac solution.

Dorsal Vertebræ.—Although the specimens representing the dorsal series are in a tantalising condition, there is definite evidence that the rib-bearing vertebræ of *Rhotosaurus*, whilst possessing special features, exhibit the remarkable characters typical of several other giant Sauropoda. There are lateral cavities or pleurocœlia in the massive centra, which are opisthocœlous. The neural arches are very complex, with bracing laminae, small, horizontal, elevated zygapophysial articulations, and extensive intra-mural cavities. The main articulating medium is composed of the extensive hyposphene-hypantrum elements.

For purposes of convenience, the five more complete specimens of dorsal vertebræ have been lettered A to E. As will be seen from further descriptions, vertebra A appears to be one of the anterior units, whilst B, C, D, and E are from a more posterior region. These massive vertebræ attain a vertical height of 65 cm. in the portion preserved. The average length of the centra is 18 cm., and the maximum breadth across the expanded articulating surface is approximately 24 cm.

Although incomplete, the vertical extent of the neural arches above the floor of the neural canal, even apart from the spine elevations, exceeds the maximum vertical extent of the centrum.

It is obvious that the vertebræ preserved exhibit the great variability recorded by several authorities for the Sauropoda. There is also evidence of marked asymmetry in the same specimen, even when all the exigencies of distortion during fossilization are taken into consideration.

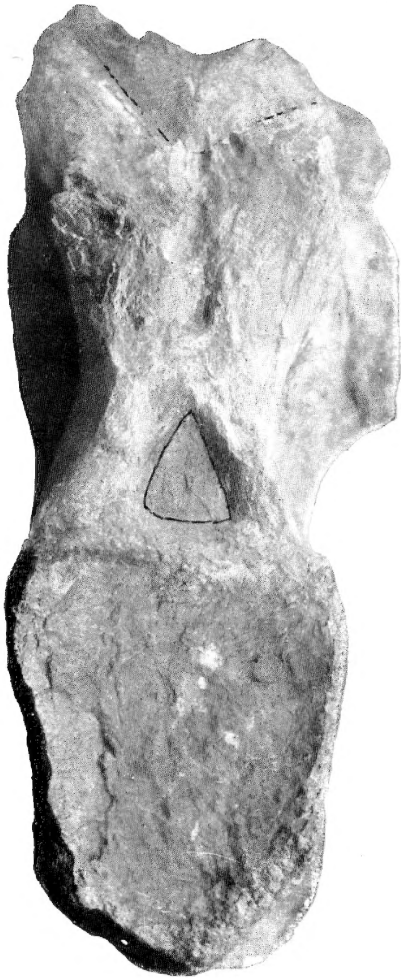


Fig. 1.



Fig. 2.

Fig. 1.—Anterior Dorsal Vertebra of *Rhatosaurus browni*, posterior view.

Fig. 2.—Anterior Dorsal Vertebra of *Rhatosaurus browni*, lateral view.

(Two-ninths natural size.)

Face page 2.



Specimen A represents a fairly-complete dorsal (Plate I., figs. 1 and 2). The centrum is much distorted and is obliquely compressed laterally. As both intervertebral surfaces are preserved the opisthocœlous character of this dorsal is well shown. This unit is of special interest because it illustrates the position of the parapophysis for the head of the rib. The parapophysis is situated in the centre of the lateral aspect of the neural arch. It arises from the infradiapophysial lamina, and forms a prominent buttress, projecting about 50 mm. from the plane of the arch. This corresponds somewhat with the position of the parapophyses in *Camarasaurus supremus* (Osborn and Mook, Plate LXXII., No. 3)², but in our specimen the process is more centrally situated. Incidentally, it may be noted that this marked variation in the position of capitular rib facets on the anterior vertebræ may be seen in a skeleton of a modern crocodile.

The total height of vertebra A, as preserved, is 57 cm. The length of the centrum is 22 cm., and it has been compressed laterally to about 11 cm. Had this vertebra not been collected in the same place and at the same time as the other remains, it might well have been considered as representing a distinct species. The pleurocele, which has not been fully outlined from the matrix, is indistinct on the Plate.

Specimen B consists of a complete although fractured centrum and the associated half of a second. The neural arches are almost entirely missing. Specimens C, D, and E represent contiguous vertebræ, the last two being fairly complete (Plate II.). The following descriptions of the chief features are mainly based on the characteristics of these two vertebræ.

The Centra.—The opisthocœlous character of the massive centra is distinctly marked, both "balls" and sockets being fairly well shown. There is a median constriction accompanied by expanded articular surfaces. The intervertebral articulations appear to have been vertical and the specimens preserved do not suggest any very marked curve in the column in the dorsal region. Each vertebra has a large oval pleurocœle extending for about two-thirds the antero-posterior diameter of the centrum, but these are not clearly shown on the Plates. The lower margin of this pleurocœle is situated somewhat above the middle line of the centrum in D and E. The opening is not so elongated as that in the dorsals of *Ornithopsis*.

On the ventral surface of Vertebra B there is a strong blunt keel running between the expanded articulating surfaces. There is no evidence of a similar keel on the other specimens.

Neural Canal.—There are extensive intra-mural cavities, now infilled chiefly with clay-ironstone, near the region of the neural canal, which is

² Osborn & Mook, Mem. Amer. Mus. Nat. Hist., Vol. III., pt. 3, 1921.

elongate-oval or sub-triangular in section. Owing to distortion there is much variability, but the canal averages about 55 mm. in height, whilst the base is about 45 mm. in breadth.

Neural Arch.—In the region of the neural spines all of the specimens are very distorted, fractured and abraded, and the difficulties of development and description seemed at first almost insuperable. In specimens C and D the extensive diapophysial elements have been crushed back towards the median line. When exposing the laminar structures from the over-lying and underlying material, it was found that some of the contours of the actual bones had been abraded before being covered with the present matrix. The original contours are thus in places very obscure. To add to the difficulties, some of the laminae are extremely thin, and could only be developed after repeated soakings in adhesive solutions.

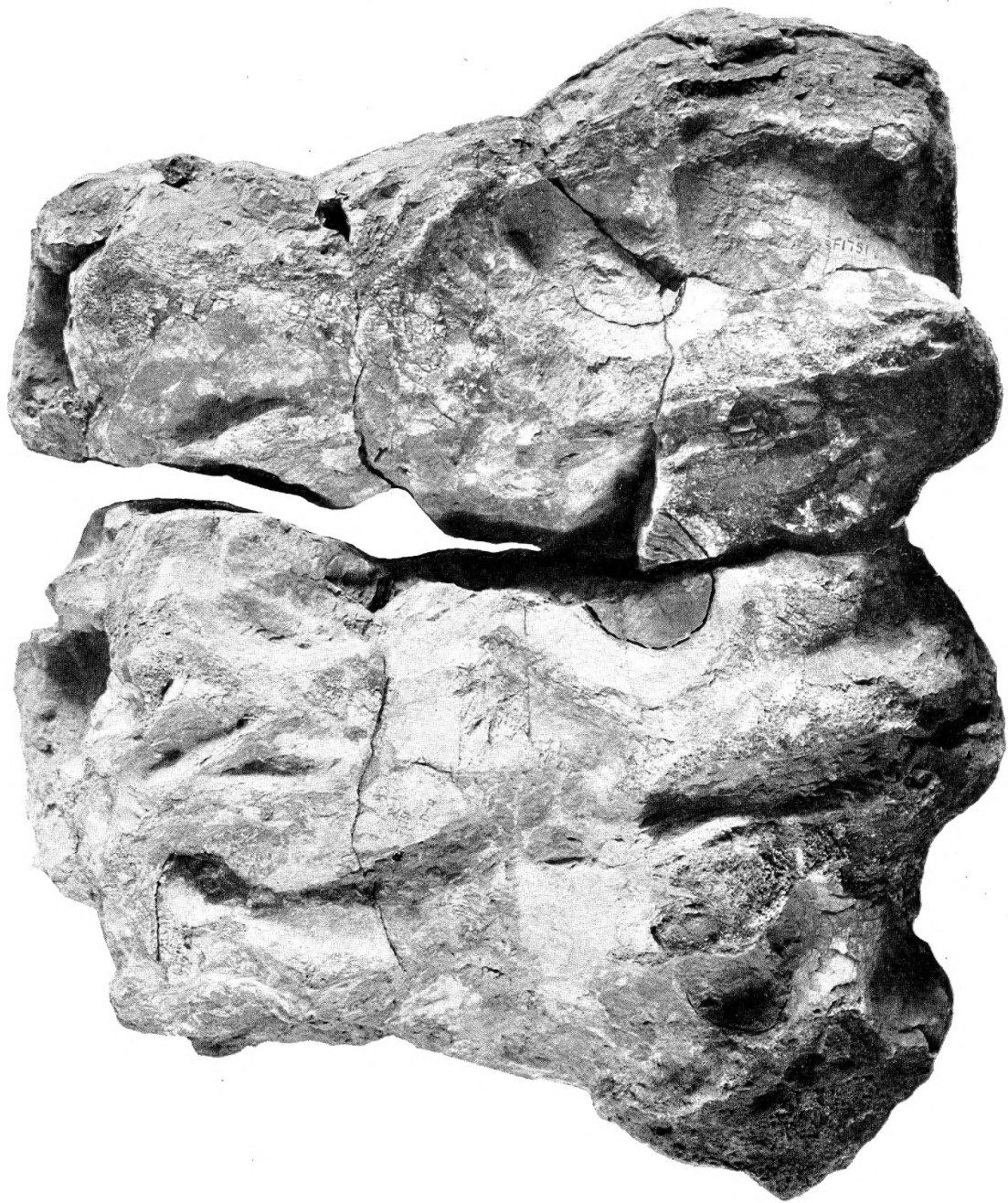
Although no specimen illustrates the complete contours of the spine, it does not appear to have had great vertical extension. On specimens D and E there are undoubtedly paired metapophyses, but these are not greatly elevated and are distinct from the true spine, being part of the diapophysial architecture. There is no evidence for a bifurcated spine in the dorsal region.

The lateral surfaces of the neural arches are mainly composed of a complex of laminae, which brace the zygapophyses and rib facets, strengthening the thin walls, behind which are extensive cavities. Of these laminae the infradiapophysial is more prominent than the pre- and post-zygapophysial structures. There may be an oblique branch from the infradiapophysial lamina, and in one specimen there is a supplementary branch uniting it to the horizontal lamina. The associated cavities are relatively shallow, much more so than in *Camarasaurus*.

It is impossible accurately to describe the characteristics of the diapophyses of the posterior dorsals. Evidently they were situated above or on a level with the zygapophysial articulations, and, judging from the position of fractured surfaces, they extended outwards and upwards.

The Zygapophyses.—These are small articular surfaces occupying an elevated position. When viewed from both the lateral and intervertebral planes these surfaces are fairly horizontal. At the lateral borders of the zygapophyses the breadth of the neural arch is actually greater than the maximum breadth of the centrum. Each facet is thus widely separated from the corresponding structure on the other side.

Hyposphene-hypantrum.—The actual hyposphenal elements are extensive when viewed in transverse section; the breadth may be equal to about two-thirds of the entire neural arch. Judging from the condition of these elements as seen in exposed fractures, the contiguous vertebræ of parts of the dorsal series were almost rigidly articulated. The articular complex, when exposed in this way, shows the shorn elements of the hyposphene still rigidly adhering



Conjoined Dorsal Vertebrae of *Rhotosaurus browni*. (Two-ninths natural size.)

Face page 4.



to the hypantral or lateral surfaces. The wedge could not be withdrawn from the antrum, but sustained transverse fracture when separation was enforced during fossilization.

The area is obscure, but the median portion of the upper part of the hyposphene is broad and much curved on its superior border, when viewed from the intervertebral plane. This structure is concave, when viewed from the lateral plane as it is produced downwards between the postzygapophyses (specimen D).

Incomplete sections of the neural arch, which have been partly cleared from matrix, bring to mind the difficulties that confronted Hulke when he first described a fragment from the Wealden as *Eucamerotus*, which he subsequently associated with *Ornithopsis*³, but the upper median portion of the hyposphene is very different from that of *Ornithopsis*⁴, as figured by Hulke (1880).

From close examination of the five dorsal elements, it is very clear that the hyposphene with its associated plates forms an articular complex which projects greatly over the centrum of the contiguous vertebra. This projection, however, is confined to the upper portion of the neural arches.

This overlapping of the hyposphenal complex appears to have been far more marked in the posterior vertebræ than in the anterior one denoted as A. From this evidence it seems certain that the posterior dorsal region of *Rhetosaurus* was much more rigidly articulated than the anterior portion. In other Dinosaurs there is evidence for a flexibility in the fore part of the body, combined with relative rigidity in the hind part and tail. This has been graphically demonstrated by the fine material so fully described by Osborn and Mook in the monograph on *Camarasaurus*, where there "were two distinct presacral regions, one mobile and the other fixed. The mobile region included the head, the cervicals and the first two dorsals, whilst the fixed region included the remainder of the dorsals."

E. D. Cope, following H. G. Seeley and J. W. Hulke, considered that the hollow vertebræ were "probably penetrated in life by branches from the lungs" and that these served as "floats" and the solid limb bones and tail vertebræ as "anchors" as they walked in the water⁵.

As the number of dorsal vertebræ varies from 10 in *Diplodocus* and *Apatosaurus* to 12 in *Camarasaurus* and 14 in *Haplocanthosaurus*, the five units noted above probably represent about half of the full dorsal series for *Rhetosaurus*.

³ J. W. Hulke, Quart. Journ. Geol. Soc., 1870, XXVI., Plate XXII.

⁴ J. W. Hulke, Quart. Journ. Geol. Soc., 1880, XXXVI., Pl. IV.

⁵ E. D. Cope, Syll. Lect. Geol. and Pal., Philadelphia, 1891, p. 43.

Ribs.—No significant remains of ribs are present, but a fragment, taken from the lateral matrix of the dorsal vertebra A, illustrated a characteristic enlargement of the rib for capitular and tubercular facets; the latter is very incomplete.

Sacral Vertebrae.—There are remains of four sacral vertebrae found ankylosed in one piece, which was heavily involved in matrix (Plate III., fig. 1). The first and fourth elements in this piece consist of very incomplete centra, and the anterior may represent a dorso-sacral, or, alternatively, the posterior may be a caudo-sacral. The centra of the two middle vertebrae are well preserved, but the neural arches are far from complete. A striking feature of these vertebrae is the transverse breadth, which is greater than the length. In the best-preserved centrum the breadth at the confluence of the ankylosed vertebrae is 23 cm. The length of the two is surprisingly irregular, the anterior being 16 cm. and the contiguous one 21 cm.

On the lower surface these vertebrae are slightly concave, when viewed laterally, but somewhat less so than in the characteristic dorsals. This lower surface is very massive; the body is much flattened transversely in this area and the breadth is a well-marked feature. The infero-lateral areas are, however, much constricted below the diapophyses.

Although the diapophyses connecting these vertebrae with the sacricostal yoke are not preserved, valuable information regarding their shape and extent is yielded by exposed areas of fracture, which are angular or \perp shaped. In the larger vertebra this area of fracture occupies the greater part of the lateral area of the centrum. The lower part is a broad band 150 mm. long and 50 mm. deep; superiorly this band is produced into a median buttress, which gradually becomes thinner until it merges into the region of the neural spines. Here it becomes quite laminar. In the more anterior vertebra the area of fracture denotes a far less massive architecture for the union with the ilium. On either side of these areas of fracture, the centra are very concave, and the periphery of the ankylosed intervertebral surfaces stands well out.

The contours of the neural arches are very confused, owing to the incompleteness of the portions preserved and fractures and compressions. The area of the neural canal, which was evidently extensive, has been much distorted.

At their origin near the centra the neural arches appear to have been ankylosed with their fellows, but the distal elements of the two central vertebrae appear to have been distinct. The neural arches are partly composed of oblique laminar buttresses, which appear to overlie portions of corresponding buttresses of contiguous vertebrae. Although the region is decidedly complex, the ossification is evidently more solid than in the dorsal series. This solidity was obviously required to strengthen the architecture of the massive pelvic girdles. The elongated laminar processes resemble in some respects those figured by Osborn and Mook in *Camarasaurus*.

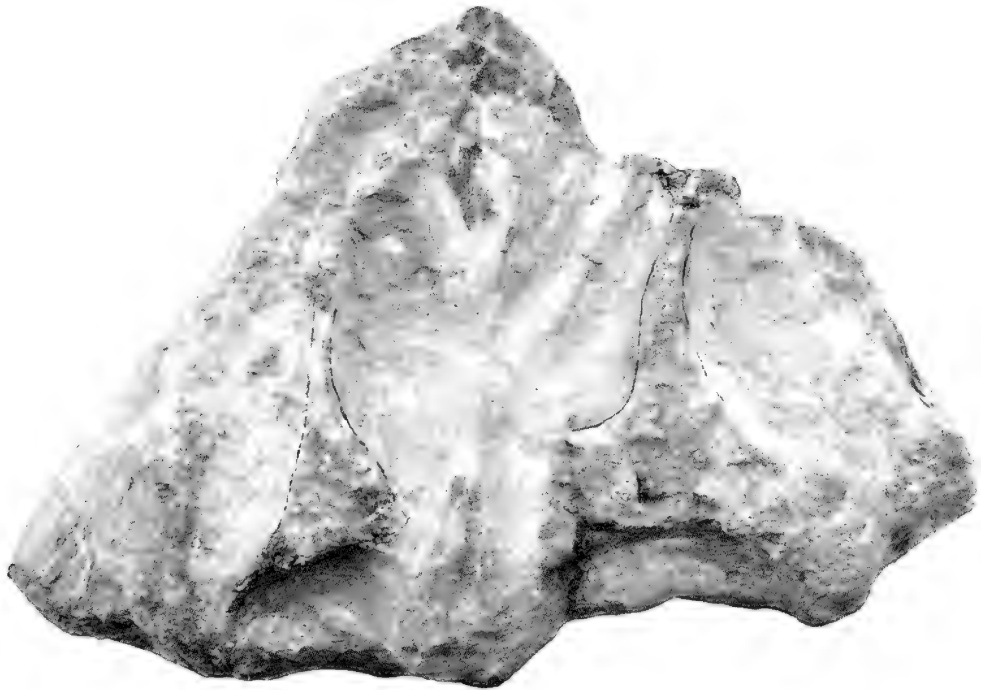


Fig. 1.—Incomplete Sacrum of *Rhatosaurus browni*.

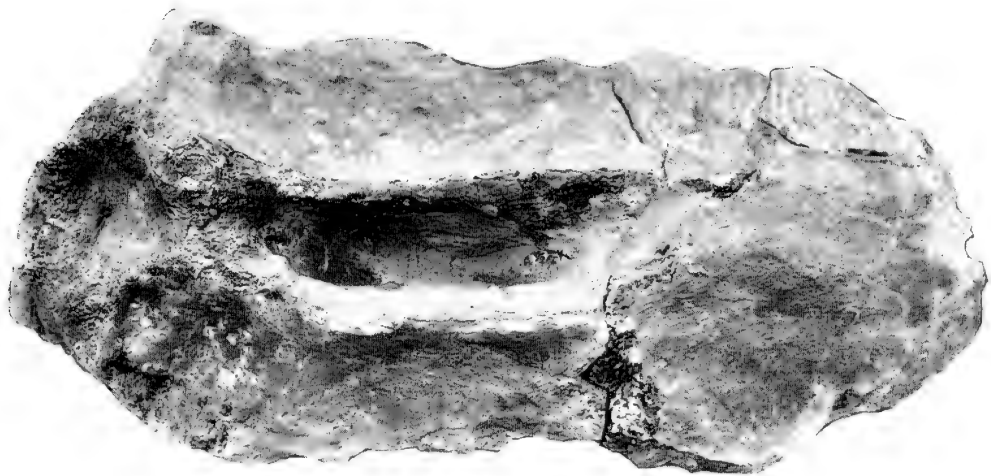
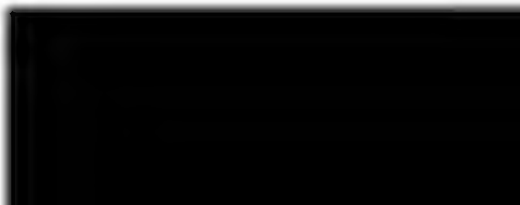


Fig. 2.—Cervical vertebra of *Rhatosaurus browni*, superior view.
(Five-eighteenth natural size.)



The portion of these sacral vertebræ preserved has a total height of 40 cm. Owing to their increase in breadth the centra in this region are almost circular in section, but they are relatively smaller than the posterior dorsals and the anterior caudals. There is no evidence of pleurocœlia.

Caudal Vertebræ.—Several additional fragmentary caudal vertebræ are now added to the twenty-two in the original description. The most significant of these are four which can be placed in serial alignment on the pelvic side of the consecutive series illustrated last year. Although "at least one additional caudal" was anticipated in my first paper, the presence of four still larger caudals is surprising. These specimens are very much abraded and do not present special characteristics apart from those previously dealt with in detail. The fourth attains a maximum height of 53 cm., but the spine is incomplete.

Pelvic Girdle.—Ilium: There are several massive fragments that represent disrupted and much abraded ilia, but they are not in a condition to admit of any satisfactory reconstruction. Fragments of the anterior crest and what is probably the pubic peduncle illustrate the immense size of the ilia, but do not lend themselves to descriptions that would be of value. An abraded portion of the iliac periphery of the acetabulum is largely embedded in matrix. It is evident that this fossil was subjected to intense strains to bring about such disruption.

Ischia.—No significant additions have been made to the fragments noted in my first paper, but it is obvious that the shaft of the ischium was relatively long and slender. The transverse sections grade from oval to sub-triangular.

Pubis.—Remains of both left and right pubes have been put together from over a dozen detached fragments and are illustrated in Plate IV., figs. 1 and 2. These pubes are of the massive elongated type of the Camarasaurian Dinosaurs, *sensu latiore*, but they do not very closely correspond with the figures of either *Camarasaurus*, *Brontosaurus*, *Ornithopsis*, *Haplocanthosaurus*, or with *Diplodocus*.

Since the right pubis was photographed, the greater part of the distal end has been located and freed from matrix. It corresponds in size and contours with the distal end of the left pubis. It is estimated that these pubes attained a length of about 1,200 cm., being thus more elongated than those recorded by Osborn and Mook for *Camarasaurus*. On the rounded anterior border each pubis attains a thickness of about 70 mm. The ischial or posterior border is very incomplete in both specimens, and there is no evidence of the acetabular surface.

There is no median thickening on the shaft, as in scapulæ, and the ischial border is much thinner than the anterior edge. When viewed lengthways the incomplete ischial border is slightly curved, and in the upper moiety

of the right pubis, as preserved, there is evidence of an extension which probably denotes a median symphysis, supplementing the distal. When viewed anteriorly there is no marked curvature on the shaft as a whole. A proximal fragment of the right pubis (?) is shown in Plate IV., fig. 2, but it cannot be placed into actual juxtaposition with the remainder.

The distal expansion is evenly convex. It attains an antero-posterior diameter of 300 mm. Here the lateral borders are somewhat less thick than the median region, which attains about 70 mm. in both specimens. There is evidence on the inner side of a rugose facet for the symphysis. In its distal contours the pubis of *Rhœtosaurus* is more evenly expanded than that of *Ornithopsis eucamerotus* as figured by Hulke⁶. In this region it more closely resembles the pubis of *Ornithopsis leedsi* (*Cetiosaurus*), as figured by Seeley, but our bone is more elongated⁷.

In comparison with the massive fragments of the ilia the pubic and ischial remains seem slight.

Femur.—(Text figures 1-4). In my previous paper only two fragments from the shaft of the large femur were available, and these were described and illustrated. Most fortunately, Mr. A. J. Browne and I were able to find five additional sections from the same bone. These were not found in juxtaposition, but were scattered over the site of the fossil and were only discovered when yards of the superficial soil had been removed. These sections were heavily involved in matrix, and, in addition, a much abraded fragment of rib was crushed obliquely into the head of the bone. When freed from matrix it was obvious that these five sections formed with the two received in 1925 an almost complete right femur. As will be seen, the dimensions of this huge bone fully justify the forecast made from the sections of the femoral shaft in the first paper, when a length of over five feet was suggested.

The femur is a massive bone, the main contours of which are somewhat similar to that of *Camarasaurus* as described and figured by Osborn and Mook (*loc. cit.*). The shaft is solid throughout, as is demonstrated by examination of the transverse sections exposed. The more central portions of the bone, however, are coarsely cancellous and in places almost spongy. The platey structure of the periphery of the shaft, when freed from matrix, showed a tendency to fracture into small elongated pieces until reinforced by adhesive solutions.

Unfortunately the distal end is still incomplete. There is a deep intercondylar groove, which gives evidence of large external and internal condyles. Judging from the broken curves these do not appear, however, to have been as massive and overhanging as in "*Atlantosaurus*" as figured by

⁶ J. W. Hulke, Quart. Journ. Geol. Soc. XXXVIII, 1882, Plate XIV.

⁷ H. G. Seeley, Quart. Journ. Geol. Soc., XLV., 1889, p. 392.



Fig. 1.



Fig. 2.

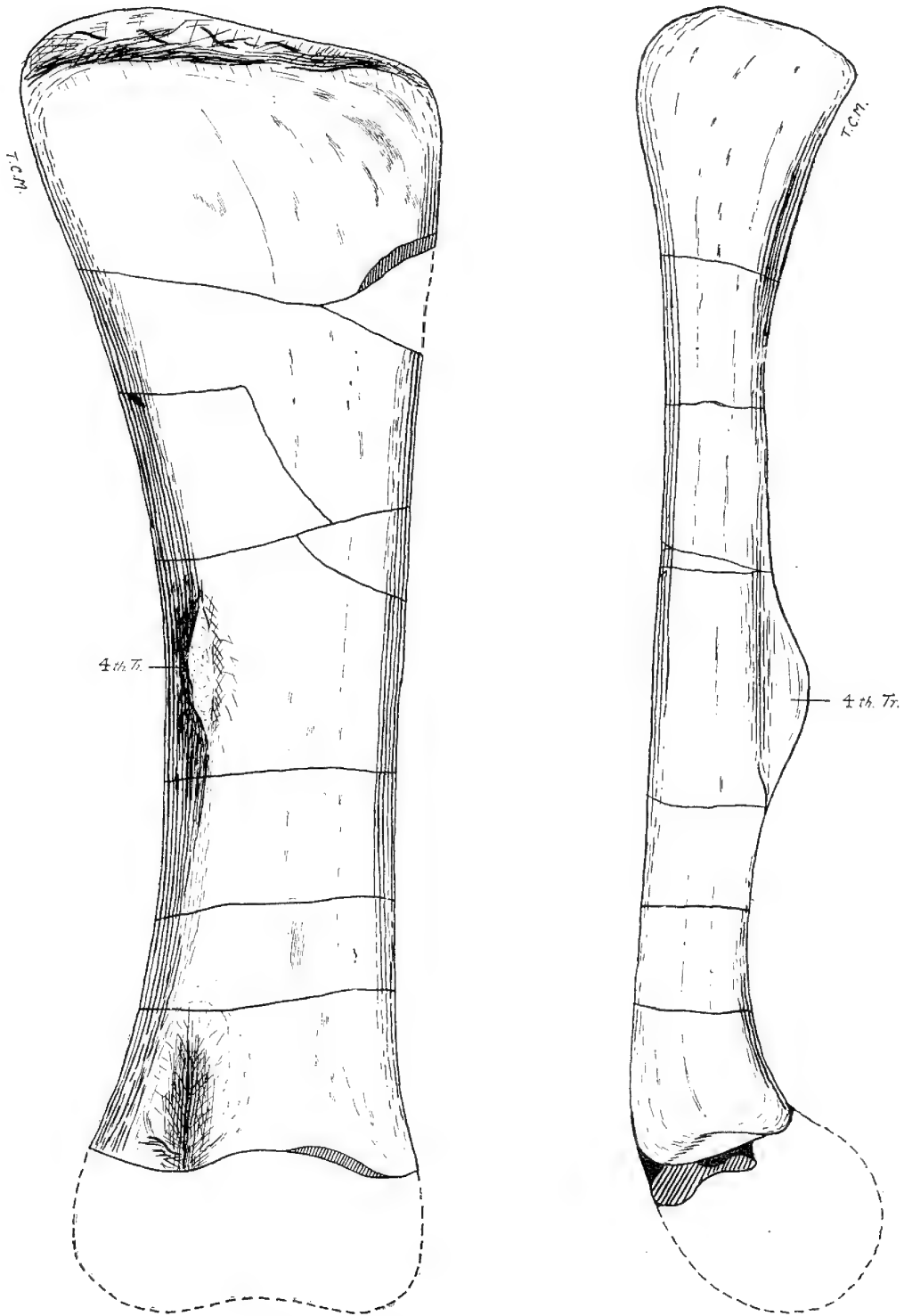
Fig. 1.—Left Pubis of *Rhatosaurus browni*. (External view.)

Fig. 2.—Right Pubis of *Rhatosaurus browni*.

(Two-ninths natural size.)

Face page 3.



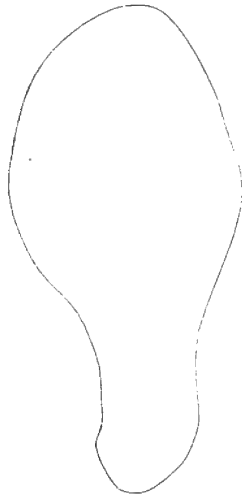


Text-fig. 1.—Femur of *Rhotosaurus browni*.

Marsh, Plate XVI⁸, but more closely resemble the distal ends of *Camarasaurus* and *Cetiosaurus*.

The actual length of the preserved portions, as placed in juxtaposition, is 137.6 cm., or just over four feet six inches. The distal portion has been tentatively reconstructed, as shown in the accompanying text-figures, making a total length of just over five feet.

The fourth trochanter is an elongated oval eminence about 150 mm. in length. The proximal and distal margins rise gradually from the shaft, but in transverse section (text-fig. 3) the eminence is much more abrupt. In this region the femur attains a maximum circumference of 79 cm., and the bone is surprisingly thick on its posterior border. The centre of the fourth trochanter is situated 76 cm. from the head of the bone, and in the reconstruction the eminence is central.



Text-fig. 2.



Text-fig. 3.



Text-fig. 4.

Femur of *Rhetosaurus brownei*.

Text-figure 2.—Section through head.

Text-figure 3.—Section showing maximum contours in region of 4th trochanter.

Text-figure 4.—Section through distal end of preserved portion. (One-eighth natural size.)

In the fourth trochanter of *Cetiosaurus leedsi* as figured by A. Smith Woodward⁹ the eminence is situated distinctly nearer to the head, but in *Camarasaurus* the position is almost identical with that in *Rhetosaurus*.

With the exception of the actual summit, the contours of the eminence in *Rhetosaurus* are very smooth.

⁸ Marsh, The Dinosaurs of North America, 16th Ann. Rep. U.S. Geol. Survey, 1896.

⁹ Smith Woodward, P.Z.S., 1905, p. 242.

The head of the femur is still somewhat involved in matrix, and there is evidence that it was somewhat abraded before being fossilized. There does not appear to have been a marked constriction between the head and the greater trochanter, for there is a fairly even curve on the proximal end of the bone. A small prominence may denote the position of the third trochanter. Below the head, in the region of the first fracture (text-fig. 1) the shaft is surprisingly thin, although still broad, the minimum constriction here being only 55 mm.

Dimensions of Femur.—

Total length of preserved portion	137.6 cm.
Estimated length of complete bone	152.5 cm.
Maximum breadth between parallels of head ..	49 cm.
Maximum breadth of incomplete distal end ..	36 cm.
Maximum circumference at 4th trochanter ..	79 cm.
Average antero-posterior diameter of shaft	29.5 cm.
Average circumference of shaft	71.5 cm.

The transverse and external contours of the femur may be seen in the accompanying text figures.

A striking distinction between the femur of *Rhætosaurus* and that of *Cetiosaurus leedsi* is the greater robustness of the shaft. In our specimen the average antero-posterior diameter goes a little over five times into the maximum length, whereas in *Cetiosaurus* it goes over six times. The femur of the English Dinosaur is relatively more slender. The femora of *Cetiosaurus* figured and described by Phillips (Diagram CVIII.)¹⁰ are also more slender than that of *Rhætosaurus*, but not so markedly as in *C. leedsi*.

The femur of *Haplocanthosaurus*, as illustrated by Hatcher¹¹, is also of the elongated type, the transverse diameter of the middle of the shaft going more than six times into the length, and this American genus obviously has no close relationship with *Rhætosaurus*.

According to W. K. Gregory and C. L. Camp the fourth trochanter is derived from the distal part of the primitive trochanteric crest and is associated especially with the following muscles:—Ischio-femoralis, pubi-ischio-femoralis, posterior and caudi-femoralis¹².

Cervical Vertebra.—(Plate III., fig. 2). Owing to its incomplete and abraded condition and its unusual characteristics, the element considered to

¹⁰ Phillips, *Geology of Oxford*, 1871, p. 280.

¹¹ J. B. Hatcher, *Mem. Carn. Mus.*, II., 1903, p. 27.

¹² W. K. Gregory and C. L. Camp, *Studies in Comparative Myology and Osteology*, *Bull. Amer. Mus. Nat. Hist.*, Vol. XXXVIII., 1918, p. 535.

be a cervical vertebra has been described last, instead of in its proper sequence. In several respects this is the most remarkable bone ever studied by the writer. It brings to mind the records of "the seventies" when fragmentary Sauropodous vertebræ were first interpreted as basioccipital or tympanic bones, and of discussions in the Geological Society of London in which Hulke, Seeley, and Owen took part.

This specimen is of the elongated type of the Sauropodous cervicals, being approximately 18 inches (actually 446 mm.) in maximum length. The maximum height, as preserved, is 230 mm. The anterior hemispherical articular surface has special and apparently unique features. The spine is posterior in position and was probably not bifurcated (incomplete). The centrum has an extensive pleurocœle, and the supero-lateral borders are produced into horizontal laminar expansions. There is no hyosphene-hypantrum articulation.

The transverse diameter of the ball (95 mm.) is slightly more than the vertical. The surface is, broadly, convex, but there is a pronounced wide median groove, which in its turn bears a central vertical rounded keel. On either side of the superior termination of this keel, but just within the articular surface, are two oval studs, each about 15 mm. by 10 mm., which project about seven mm. beyond the smooth surface of the articular region. Firmly embedded around but chiefly above these remarkable studs are remains of bone crust, which apparently represent material from either the anterior zygapophyses or from a contiguous vertebral element which has become welded into the surface during fossilization. The surface of the studs is rough and possibly incomplete.

It may be here noted that a median groove on the ball has been recorded for a cervical and the anterior dorsals of *Diplodocus* by Hatcher¹³.

The horizontal laminæ are continued almost to the articular surface, but they are here very incomplete. In the anterior region the centrum is almost cylindrical and when viewed laterally its superior border is somewhat convex. In this region there is now no evidence of the neural canal.

An extensive pleurocœle occupies over one-third of the lateral surface of the centrum, and this is best shown on the left side. Its total length is 180 mm. and the height averages 50 mm. Advantage was taken of natural fractures to separate the centrum near the middle, and it was found that the intra-mural portion consists mainly of clay-ironstone matrix. The lateral and ventral walls are very thin, mostly less than 10 mm., but the superior and supero-lateral walls are considerably thicker. The pleuro-central cavity is much more extensive than its lateral opening, but there was no positive evidence at the fracture of an inner wall or a median bar.

In one of the cervical vertebræ from Madagascar described by Lydekker

¹³ J. B. Hatcher, Mem. Carnegie Mus., I., 1901, p. 25.

as *Bothriospondylus madagascariensis* the median septum was so thin that it was broken through¹⁴. Possibly a septum existed between the lateral cavities of *Rhætosaurus*, but it has disappeared during fossilization.

The ventral surface of the centrum is abraded in places and slightly distorted, but it is very flat and even somewhat concave in its anterior moiety. In this respect *Rhætosaurus* somewhat resembles the vertebra of *Ornithopsis* as described by Hulke¹⁵. There appears to have been a small infracentral cavity, but owing to fractures and the bad state of preservation this is not clear.

The walls of the posterior part of the centrum appear to be much thicker than those of *Diplodocus* or *Camarasaurus*.

The lateral surface of the centrum is distinctly concave between the superior horizontal lamina and the infero-lateral border, which, as in *Ornithopsis*, forms a projecting ledge. The horizontal lamina is fairly straight and is situated approximately on the supero-lateral line of the centrum. In the anterior fourth the lamina, although incomplete, is too thin to suggest the presence of a strong diapophysis. Behind the centre of the bone, the horizontal lamina is thickened, and is supported by an oblique convex buttress arising from the posterior region of the centrum. The fractured surface probably denotes the area of the rib-tubercle attachment, and the buttress would then be the "infradiapophysial lamina" of Osborn. There is an enlarged area fractured on the inferior ledge, situated slightly posterior to that noted on the horizontal lamina, and this probably represents the parapophysis. This is braced by an oblique convex buttress, coming down from the posterior region of the centrum. The inferior ledge is sub-parallel throughout with the horizontal lamina.

If the above structures are correctly interpreted, it is obvious that the cervical ribs of *Rhætosaurus* are placed more posteriorly than in *Diplodocus* or *Barosaurus*. Lull points out that the position of the diapophysis "is neither constant nor progressive" in these Sauropods¹⁶.

The neural arch, which is posterior and not median in position, is massive and low, but no spinous processes are preserved. The spine was apparently single, as in the anterior cervicals of *Camarasaurus*, as recorded by C. W. Gilmore¹⁷. There are supracentral ridges, or prespinal laminae, at first parallel and subsequently slightly diverging, which extend forward from the spine region. For about one-third of the length of the vertebra these enclose a median longitudinal cavity, which is evidently more extensive than the neural canal itself. In transverse section these ridges are acutely triangular,

¹⁴ R. Lydekker, Quart. Journ. Geol. Soc., LI., 1895, p. 331.

¹⁵ J. W. Hulke, Quart. Journ. Geol. Soc., XXXVI., 1880, pp. 31-34.

¹⁶ R. S. Lull, Mem. Conn. Acad., VI., 1919, p. 13.

¹⁷ C. W. Gilmore, Mem. Carn. Mus., X., 1925, p. 369.

the superior border being thin. Anteriorly they gradually decrease in height until they are merged into the body of the centrum. Probably they supported, when complete, an extensive arch with a complex floor, as in several other Sauropods.

There are remains of lateral buttresses or postzygapophysial and post-spinal laminae which support the posterior articular region behind the spine. Part of the posterior region of the vertebra is greatly abraded and the contours are obscured. The area was so crumbly in places that several tiny rootlets of plants growing in the soil had found their way into the coarsely cancellous tissue, which is now fixed by adhesive solution. The actual posterior surface is flattened and the thick bone here exhibits a well-marked vertical arrangement of cellular tissue. This is obviously not the articular cup and it is thought to be adventitious matter from another bone. On the lower surface of the posterior third the vertebra is thickened laterally by a projection, which is only preserved on the left-hand side. Owing to the crumbly nature of the specimen the region of the neural canal is obscured and cannot be positively traced. The canal was apparently infilled with disrupted tissue from part of the neural arch.

It is suggested that this bone represents the axis or epistropheus, and that the curious keeled ball with the projecting studs is the articular surface for the odontoid, which was only partially ossified to the centrum of the axis. The remarkable thing, however, is that the studs appear to be within the smooth—one might say, synovial—surface of the ball. In the axis the prezygapophyses are, of course, much reduced, but in this specimen the laminae which supported them are produced almost to the articular surface, which suggests that the atlas itself would articulate upon a more anterior process.

C. W. Gilmore has given interesting descriptions and illustrations of the elements of the axis, atlas and pro-atlas as preserved in *Morosaurus agilis*. He considers that an intercentrum is present on the axis, as well as on the atlas, and that the odontoid has no coalescence with the axis. The posterior articular surface of the odontoid is described as "slightly cupped," and this may shed light on our specimen¹⁸.

A limited or ginglymoid articulation between the odontoid and the axis, or possibly with an intercentrum, is not improbable, although there is no parallel for the studs in *Rhotosaurus* in the extensive series of anterior cervical structures described in the valuable posthumous work by S. W. Williston (edited by W. K. Gregory)¹⁹.

Although the odontoid is free in the immature specimen of *Camarasaurus* described by Gilmore (1925, *loc. cit.*), Osborn and Mook (1921, p. 294)

¹⁸ C. W. Gilmore, Proc. U. S. Nat. Mus., Vol. 32, 1907, pp. 151-165, Plates XII-XIII.

¹⁹ S. W. Williston, Osteology of the Reptiles, 1925, pp. 99-105.



Cast of Femur of *Rhetosaurus browni*, with reconstruction of distal end.

(Mr. Marshall, who is standing by the cast made by him, is 5 feet 11½ inches.)

Photo., H. W. Mobsby.

Face page 14.



state that the "odontoid process . . . is firmly fixed with the body of the centrum" in *Camarasaurus supremus*. According to Holland the odontoid is partially co-ossified with the centrum in *Diplodocus*. There is evidently variation in Dinosaurs in these conditions²⁰.

An alternative explanation offered for the studs is that they represent the ossified bases of strong ligaments, possibly connected with the atlas, pro-atlas, or the skull. In human anatomy we find the superior limb of the cruciate, the alar and apical ligaments in this area, and Kingsley illustrates the "transverse ligament" between the dens and the atlas in the common fowl²¹. Further comparisons need not be made here, but the anterior position of the studs in *Rhœtosaurus* may suggest strong apical ligaments connected with the occipital region of the skull.

There is, of course, no positive evidence that this isolated unit comes from the anterior cervical region and additional material may reveal later that the entire series of the neck has unique features. At present the articular surface with its studs can only be conceived as allowing a slight vertical movement. This specimen has been marked X in the type series. Unfortunately it does not afford satisfactory material for photographic illustration or useful reconstruction.

Habits.—In the Jurassic period there was a favourable environment in Australia for the development of a rich Dinosaurian fauna. When summarising the palæogeography of Triassic and Jurassic times, Sir Edgeworth David stated that "a vast lake stretched from at least as far east as Brisbane more or less continuously to Lake Eyre, a distance of nearly 1,000 miles"²². Amongst the many references to these extensive fresh-water deposits mention may be made of the papers of A. B. Walkom (1918)²³ and Bryan and Whitehouse (1926)²⁴.

It seems evident that the gigantic herbivorous Dinosaurs were amphibious and that they roamed slowly, with unwieldy gait, through the vast swamps of the Jurassic period, utilising the lengthy and mobile neck when feeding on the luxuriant vegetation. It is most improbable that they were expert swimmers or that their habitat was in deep water. Probably their natural enemies, the carnivorous Dinosaurs, were more terrestrial in habit, and one may visualise mighty conflicts on the margins of swamps. The extinction of these giant reptiles may have been brought about by extreme specialization, perhaps accompanied by an unfavourable change of environment. In addition to their reptilian enemies, it has been suggested that

²⁰ Holland, Mem. Carn. Mus., II., 1906, p. 248.

²¹ J. S. Kingsley, Comp. Anat. Vert., 2nd edit., p. 56.

²² T. W. E. David, Fed. Hdbk. Aus. Brit. Ass. A. A. Sci. Mtg., 1914, p. 251.

²³ A. B. Walkom, Proc. Linn. Soc. N.S.W., XLIII., 1918, p. 108.

²⁴ Bryan and Whitehouse, Proc. Roy. Soc. Qld., XXXVIII., 1926, p. 105.

some of the primitive mammals, pioneers of the dominant vertebrate group of the future, played some part in the extinction of these huge Dinosaurs by preying on their eggs.

Palæogeography.—It is generally agreed that Australia was connected with extensive continental masses to the north, probably including Gondwanaland, in early Mesozoic times. Some authorities recognize the possibility of a Jurassic land connection with South America, but, on the whole, palæogeographic evidence suggests that the affinities of *Rhætosaurus* are more likely to be with Asiatic and European fossils. Schuchert states: "Australia became an island-continent definitely early in the Upper Cretaceous, and probably as early as Permian time"²⁵. The problem cannot be more than touched on here, but extensive references will be found in the papers by Walkom (*loc. cit.*), Bryan and Whitehouse (*loc. cit.*) and W. N. Benson²⁶.

Affinities.—There is no evidence for bifurcation in the spines of the dorsal series of *Rhætosaurus* as preserved, but these may represent only posterior units. In the magnificently preserved specimen of *Camarasaurus lentus*, described by C. W. Gilmore in 1925, the six posterior dorsals have unleft spines as in *Ornithopsis* and *Cetiosaurus*. Four of the anterior cervicals are also single in Gilmore's specimen. The significance of bifurcated spines as a diagnostic character was first pointed out by Cope and Hulke in 1879²⁷.

Comparison with European forms is complicated by the number of genera which were founded in early days on diverse fragments, a system which, as pointed out by Lydekker in 1888²⁸, had "evil results." Even the name *Cetiosaurus* (1842) according to Lydekker²⁹ is antedated by *Cardiodon*, which Owen established in his "Odontography" in 1841, but the better-known name has been used here. When describing *Ornithopsis leedsii* in 1887³⁰ Hulke including in the synonymy of the genus material described by Owen as *Cetiosaurus*, *Chondrosteosaurus*, and *Bothriospondylus*. Subsequently *O. leedsii* itself was placed in *Cetiosaurus*. As suggested by Seeley and Lydekker, the genus *Ornithopsis* may be identical with Mantell's *Pelorosaurus*, which was primarily founded on a large humerus from Sussex in 1850.

There is at present no unanimity as to the allocation of Sauropodous genera within Families. Marsh, in his studies of the Dinosaurs of North America, considered that the American Sauropoda were more highly specialized than those of Europe, and he doubted whether there was any generic identity

²⁵ Charles Schuchert, Proc. Pan. Pacific Cong., 1923, II., p. 1090.

²⁶ W. N. Benson, Tr. New Zeal. Inst., Vol. 54, 1923, pp. 1-64.

²⁷ J. W. Hulke, Quart. Journ. Geol. Soc., XXXV., 1879, p. 760.

²⁸ R. Lydekker, Quart. Journ. Geol. Soc., XLIV., for 1888, p. 60.

²⁹ R. Lydekker, Quart. Journ. Geol. Soc., XLV., 1889, p. 245.

³⁰ J. W. Hulke, Quart. Journ. Geol. Soc., XLIII, 1887, p. 695.

between the two assemblages. In earlier days Owen took exception to Cope's use of the new genus *Camarasaurus* for what he considered to be his *Chondrosteosaurus*³¹. Zittel included in the Camarasauridæ³² many European and American forms, but future revisionary work will probably lead to the establishment of several clearly-defined families. Although I have placed *Rhætosaurus* in the Family Camarasauridæ, this word has been used in the wide sense, and I have difficulty in differentiating between Cetiosaurian and Camarasaurian forms. It may be that *Rhætosaurus* will ultimately need to be placed in a distinctive Australian Family of the Sauropoda.*

As a result of his extensive and valuable phylogenetic studies, Professor von Huene considers that the Jurassic and Cretaceous Sauropoda are derived from Triassic Plateosauridæ^{33 34}.

Conclusions.—In my previous paper the affinities of *Rhætosaurus* were placed with the *Camarasaurus-Cetiosaurus* group of the Sauropoda on the evidence of the caudal vertebræ, the *Iguanodontidæ* (Ornithischia) being eliminated. Stress was laid on the special type of hyposphenal articulation in the caudals, and it was suggested that there was a significant, although not close, relationship with *Camarasaurus*, and it was placed in the Family Camarasauridæ. It is very pleasing to find that the additional material entirely confirms this forecast. This is not only borne out by the peculiar, chambered centra and complex articulations of the dorsal vertebræ, but also by the contours and size of the femur.

Until more satisfactory specimens are found, our knowledge of *Rhætosaurus browni* will be very incomplete. The length of the neck (a variable feature in this group of Dinosaurs) is conjectural, but the evidence of the fragmentary but elongated centrum, described in detail, indicates that the cervical region of the Australian Sauropod was very extensive. In my first paper, *Rhætosaurus* was summarised as "a bulky, herbivorous quadruped, with dominant hind limbs, a somewhat rigid tail and probably attained over 40 feet in length." It is now probable that this suggested length will ultimately prove to be a conservative estimate.

At present our material represents less than one half of a single specimen, and many of the bones are incomplete and much abraded. One may forecast,

* Since the above was set in type, I have received from Professor Baron Huene the valuable paper on the classification of the Sauropoda, which appears at the end of this publication. Following Article 5 of the International Rules of Zoological Nomenclature, I have used the family term Camarasauridæ in preference to Morosauridæ, the type being *Camarasaurus supremus* Cope, published August, 1877.

³¹ R. Owen, Ann. Mag. Nat. Hist. (5), II, 1878, p. 211.

³² Zittel's Text-book of Palæontology, Eng. edit., II., 1902, p. 233.

³³ F. von Huene, Ann. Mag. Nat. Hist. (9), XVII., 1926, p. 474.

³⁴ F. von Huene, Geol. u. Pal., Abh., 1926, Bd. 15, Heft 2.

however, that specimens will eventually be discovered in Australia comparable to the almost-complete skeletons found in America and Europe. Probably it will also be found that the bulky, herbivorous *Rhætosaurus* had to contend with carnivorous Dinosaurs of the *Tyrannosaurus* type, and many new forms will be made known from Australian deposits.

EXPLANATION OF PLATES.

PLATE I.

Fig. 1.—Anterior Dorsal Vertebra of *Rhætosaurus brownei*, posterior view.

Fig. 2.—Anterior Dorsal Vertebra of *Rhætosaurus brownei*, lateral view. (Two-ninths natural size.)

PLATE II.

Conjoined Dorsal Vertebra of *Rhætosaurus brownei*. (Two-ninths natural size.)

PLATE III.

Fig. 1.—Incomplete Sacrum of *Rhætosaurus brownei*.

Fig. 2.—Cervical Vertebra of *Rhætosaurus brownei*, superior view. (Five-eighteenth natural size.)

PLATE IV.

Pubes of *Rhætosaurus brownei*. (Two-ninths natural size.)

PLATE V.

Cast of Femur of *Rhætosaurus brownei*, with reconstruction of distal end.

(Mr. Marshall, who is standing by the cast made by him, is 5 feet 11½ inches.)

NEW TINGITOIDEA (HEMIPTERA) IN THE
QUEENSLAND MUSEUM.

BY HENRY HACKER, F.E.S.

(PLATES VI.-X.)

THIRTEEN species and two genera are here presented as new, bringing the total number of described Australian species to forty-two. The distribution of several of the older genera has also been extended. *Phatnoma* and *Stephanitis*, previously known from the Oriental, Ethiopian, and Neotropical regions, *Compseuta* and *Paracopium*, previously known from the Oriental region, and *Gelchossa*, known from the Neotropical region, are now all recorded from the Australian region.

FAMILY TINGITIDÆ.

DIVISION CANTACADERARIA.

Phatnoma cordata n.sp.

(Figure 9.)

Head long, narrowed in front, armed above with four porrect spines, which are arranged in two pairs, one before the other; bucculae long and narrow, extending in front of the head, reticulated; rostrum long, reaching to the apex of the third abdominal segment; antenniferous tubercles exteriorly convexly prolonged into a spine; eyes coarsely faceted, prominent; antennae long and slender; first segment thin at the extreme base, then suddenly incrassate and cylindrical; second segment shorter and less stout than the first; third segment filiform, long and very slender; fourth segment fusiform, as long as the first and second together. Pronotum somewhat depressed on the disc, narrowed and truncated in front; the lateral margins are strongly carinated and uniseriate; from the acute anterior angles the sides are shallowly convex for half their length, then more strongly convexly widened towards the base. Elytra very broad, cordate; somewhat convex along the suture, declivous to the outer margin of the discoidal area, then rising to the margin of the elytra, more steeply anteriorly; the margin is strongly arcuate at base, convexly curved at sides, and rather narrowly rounded apically; costal margin uniseriate, areolae sub-quadrate; costal area broad, of uniform width, containing eight rows of

areolæ; discoidal area large, with a central longitudinal carina, from which branch two transverse carinæ on each side, the posterior pair sub-oblique; elytra entirely reticulated; the areolæ rather small, of even size. Legs long and slender.

Colour brownish ochraceous, with dark brown markings as follows:—A transverse fascia on the costal area before middle; an obscure transverse fascia at the anteapical fovæ; a spot at the base of the elytral suture; dark reticulations in irregular spots, chiefly in the discoidal area; antennæ brownish ochraceous, the fourth segment dark brown; legs, and body beneath, brown. Length 5 mm., breadth 3 mm.

Habitat.—National Park, Q., October (H. Hacker). Two specimens. *He. 3164.*

The second specimen is uniformly pale ochraceous brown, the median transverse fascia being represented by a slightly darker stain on costa, and the irregular dark spots on the discoidal area are absent.

DIVISION SERENTHIARIA.

Serenthia vulturna Kirk.

(Figure 17.)

Habitat.—National Park, Q., December; Kobbler Creek, Q., December

This species has not been previously figured.

Epimixia alitophrosyne Kirk.

(Figure 16.)

Habitat.—National Park, Q., December; Kobbler Creek, Q., December (H. Hacker).

This species has not been previously figured.

DIVISION TINGITARIA.

Paracopium australicus (Stål).

Catoplatus australicus (Stål).

(Plate VI., Figure 1.)

The colour variation in a series of specimens is considerable, ranging from pale buff to dark brown, and in three examples to almost black. They generally present a mottled appearance, due to irregular darker reticulations on the discoidal and apical areas of the elytra, the alternate light and dark colour of the carinæ, and the costal membrane which is white, while the cross nervlets and small sections of the costa joining them in twos and threes are dark brown; the acute point of the posterior process is pale. The entire insect is clothed with microscopic golden pubescence.

Habitat.—National Park, Q., November; Bunya Mountains, December; Southport, November (H. Hacker) Twenty-eight specimens.

This species was doubtfully identified as *Catoplatus australicus* Stål, and a photograph of it was forwarded to W. E. China, of the British Museum, who replied that it was undoubtedly a *Paracopium* Dist. The photograph was sent on to the Stockholm Museum, and on being compared with Stål's type material (consisting of three specimens) by Dr. A. Roman, was found to be identical. It is therefore necessary to transfer *Catoplatus australicus* Stål, to *Paracopium* Dist.

***Paracopium albofasciata* n. sp.**

(Plate VI., Figure 2.)

Oblong-ovate. Head armed with two spines basally at sides, adpressed; vertex transversely ridged, somewhat prominent in the centre; antennæ short and stout, the first segment incrassate, the second segment thinner basally, shorter than the first, the third segment slightly narrower at base, gradually becoming thicker apically, one and a-half times longer than the fourth segment, which is stout, sub-clavate, and microscopically sparsely pilose; the bucculæ not prominent; from side view anteriorly rounded. Pronotum closely punctured, slightly swollen on disc, tricarinate, carinæ paralleled, the central one percurrent; the anterior margin is slightly sinuate, the lateral margins straight, acutely carinate; posterior process acute, cellular, areolæ moderate. Elytra flat, reticulated; sides very slightly outwardly curved to middle, and then evenly curved in towards the rounded apex; costal membrane rather wide, irregularly biseriate, areolæ sub-triangular; costal area narrow, triseriate, areolæ small; discoidal area with larger areolæ than costal membrane, borders well defined, outer border almost straight.

Colour luteo-ochraceous; a pure white tomentose transverse band at the base of pronotal collar; irregular rows of nervlets brown, chiefly on discoidal and apical areas; legs and three basal antennal segments, pale ferruginous, fourth segment black; lateral carina, collar, bucculæ, pale luteous, carinæ slightly darker on the disc. Length 5 mm., breadth 1.5 mm.

Habitat.—Prairie, Q., January (J. Chisholm). Two specimens. *He.* 3165.

This species differs from *P. australicus* in possessing two rows of areolæ in the costal membrane. The number of rows is not stated by Distant in his generic diagnosis, nor is it mentioned in the description of his genotype *P. (Dictyonota) cingalensis* Walk. In other respects it conforms well with *Paracopium*.

***Malandiola similis* n. sp.**

(Plate IX., Figure 11.)

Elongate-ovate, glabrous. Head as long as wide; two small concolorous spines anteriorly on vertex, close together, adpressed; antennæ moderately long,

first segment a little longer than the second, both cylindrical; third segment filiform, about three and a-half times as long as the fourth; fourth segment slightly shorter than the first and second together, clavate, and finely pubescent; bucculae somewhat elevated, closed and rounded in front, rostral groove narrow, sub-parallel. Pronotum rather long and narrow, closely punctured, lateral margins carinate anteriorly, and smoothly rounded behind, disc slightly swollen; posterior angle acute. Elytra at middle, a little wider than the pronotum, and extending beyond the abdomen, closely and finely punctured.

General colour pale yellowish brown; head and the two basal antennal segments, extreme apices of the tibiae, the coxae, and mesosternum reddish brown; tarsi brownish black; eyes, and the fourth antennal segment, black. Length 3 mm., breadth 1 mm.

The male is smaller; length 2.5 mm., breadth .75 mm.; the pronotum and the apical area of the elytra are pale brown, a little darker than in the female; the second antennal segment is also darker, being reddish brown.

Habitat.—Sunnybank, near Brisbane, Q., October (H. Hacker). Fourteen specimens. *He. 3166*.

Close to *M. simplex* Horv., but differing from his description in the absence of a black border at the base of the meso and metasternum; and from his illustration by a deeper collar, longer pronotum, longer and narrower apical area.

Teleonemia vulturna Kirk.

Habitat.—National Park, Q., November; Birkdale, Q., September (H. Hacker).

Teleonemia summervillei n. sp.

(Plate VI., Figure 4.)

Moderately elongate, subquadrate, thinly clothed with minute golden appressed pubescence.

Head armed with two slender, slightly curved spines, basally at sides, appressed; antennae long, rather stout, and finely pilose; first segment slightly longer than the second; third segment stoutest apically, a little more than twice as long as the fourth; fourth segment longer than the first and second together. Pronotum closely and deeply punctured, disc convex, sides straight; lateral edges narrow, rib-like, uniseriate; carinae strong, uniseriate, the median one percurrent. Elytra longer than the abdomen, sides slightly sinuate; costal membrane uniseriate, the areolae rather large, sub-quadrate; costal area narrow, biseriate, the areolae small; discoidal area sharply defined, the outer border slightly sinuate.

General colour dark brown; head and the fourth antennal segment, black; the three basal segments dark reddish black; pronotum and carinae, reddish

brown; lateral keels of pronotum, and costal membrane of elytra white; the cross nervlets, and the outer edge at middle and apex, blackish; reticulations on posterior process and elytra blackish, brown at base of elytra and sides of membrane; legs and ventral surface, reddish brown; head spines and bucculae, sordid brown. Length 3.75 mm., breadth 1.25 mm.

Habitat.—Palm Island, N.Q., May (W. A. T. Summerville). Four specimens on *Scævola Kænigii* Vahl. *He.* 3167.

The cellular margins on the sides of the pronotum, and the cellular carinae, distinguish this species. It has a general resemblance to the figure of *T. lantana* Dist.,¹ but the antennae are longer and the sides of the elytra are slightly less ampliate in the middle.

***Ischnotingis setosus* n. sp.**

(Plate VI., Figure 3.)

Elongate; with fine sparse white pubescence, most distinct on the sides of the carinae, and the inner margins of the discoidal areas. Head armed with four slightly curved spines; two basally at sides, adpressed, and two smaller ones close together in front; first antennal segment slightly longer than the second, both cylindrical and rather stout, third segment filiform, two and a-half times as long as the fourth segment, which is clavate and about as long as the first and second segments together. Pronotum closely punctured, the disc moderately convex, tricarinate, the carinae depressed on the disc; lateral margins straight, constricted in front to the collar, which is the same width as the head across eyes; posterior process areolated, apically acute. Elytra longer than the abdomen, the sides slightly sinuate, lateral area narrow, biserially areolated; legs rather short and stout; the femora are provided with four or five erect, setose bristles, most distinct on the anterior pair.

General colour reddish brown; the two basal antennal segments, femora, tarsi, and the body beneath, dark ferruginous; the third antennal segment, and the tibiae, yellowish brown; head including eyes, and the fourth antennal segment except basally, a transverse band at the base of collar, tarsi, and claws, black; pronotum and elytra reddish brown, darker about centre of the elytra, on costal area; a broad transverse fascia embracing the posterior process, and the base of the elytra; a narrow fascia interrupted in the middle, on the costal area and the apex of the discoidal cell, whitish. Length 2.75 mm., breadth .83 mm.

Habitat.—Mount Coot-tha, Q., July, at flowers of Acacia; North Pine River, October; Sandgate, Q., August; National Park, Q., November (H. Hacker). Eighteen specimens. *He.* 3168.

The erect setose bristles on the femora will distinguish this species from the two Western Australian species described by Horvath.

¹ H.S.P.A. Bull., No. 16, p. 75, 1924.

Tingis (Tropidochila) trivirgata Horv.

Habitat.—North Pine River, October, November; Sunnybank, October; Bunya Mountains, Q., December (H. Hacker).

Cysteochila (Parada) tæniophora Horv.

Habitat.—Upper Brookfield, November; National Park, Q., November; Tooloom, N.S.W., January (H. Hacker).

Cysteochila (Parada) camelinus n. sp.]

(Plate VIII., Figure 10.)

Robust, rather elongate species, with a cone-shaped elevation on the pronotum.

Head transverse, armed with five spines; two basally at sides, adpressed; a small semi-erect darker spine in the centre, and two in front converging and touching; bucculae not prominent; first antennal segment cylindrical, one and a-half times longer than the second; third segment slender, filiform, three times as long as the fourth; fourth segment widest towards the apex, slightly longer than the first and second together. Pronotum finely pilose; disc convex; from the truncated anterior margin rises a reticulated cone-shaped vesicle, highest about the middle of the disc, and bounded at the sides by the lateral carinae; paranota reflexed, adpressed, reticulate, three to four rows areolate; interior border slightly sinuate, posteriorly rounded; medium carina very distinct from the top of pronotal vesicle to the apex of posterior process; lateral carinae convergent behind the discal elevation. Elytra much longer than the abdomen, sides gently swollen to middle, somewhat constricted beyond, and then paralleled to the apex; costal membrane anteriorly recurved, areolae small; the posterior half wider, horizontal, biseriate, with larger irregular sub-quadrangle areolae; costal area triseriate, areolae small.

Head including eyes, pronotum, fourth antennal segment, and the underside of body, black; carinae, reticulations on pronotal vesicle, paranota, and greater part of the elytra, ochraceous brown; head spines, bucculae, and costal membrane, whitish; posterior process basally, inner and posterior parts of discoidal cell, centre of membrane, a spot on each side of elytra apically, and the cross nervlets on costal membrane, fuscous; legs, and third antennal segment, flavo-testaceous; wings smoky. Length 5 mm., breadth 1.5 mm.

Habitat.—Tooloom, N.S.W., January (H. Hacker). Five specimens. *He.* 3169.

This species conforms to the paranotal characters given by Horvath for his subgenus *Parada*. When viewed laterally it will be easily recognised by the cone-shaped vesicle on the pronotum.

Oncophysa vesiculata Stål.

Habitat.—Tooloom, N.S.W., January (H. Hacker). On *Pimelia* sp.

Froggattia olivina Horv.

Habitat.—Roma, Q., December (A. A. Girault). On olive trees.

Hypsiyrgias telamonides Kirk.

Habitat.—North Pine River, October, Ashgrove, near Brisbane, Q. (H. Hacker).

Monanthia amitina Horv.

(Figure 18.)

Habitat.—Bunya Mountains, Q., December; National Park, Q., November, December (H. Hacker). This species has not been previously figured.

INOMA n. gen.

Broadly ovate, with the pronotal carinæ, the carinate borders of the discoidal areas, and the entire outer border except a small part at the apex of the elytra, armed with straight equidistant spines. Head sub-triangular, armed with two slightly divergent spines inserted behind the base of antennæ; a spine on each side on the vertex, and a divergent double spine in the middle, between these two; the rostrum extends to the intermediate coxæ; bucculæ prominent, extending slightly beyond the head, closed in front; in side view, broadly rounded anteriorly. Pronotum broad, convex on disc, closely punctured, tricarinate; the lateral carinæ slightly convergent on the base of pronotum, the median carina percurrent; all three strongly elevated, uniseriate, the areolæ sub-quadrate; hood strongly keeled and sharply elevated in the middle, covering about half of the head, truncated anteriorly; armed with two spines on the dorsal keel, and three on each side of the anterior margin; lateral borders uniseriate, with rather large quadrate areolæ; the posterior process is short, pointed, and reticulated. Legs and antennæ slender.

Type.—*I. multispinosa* n.sp.

This genus is allied to the Indian genus *Urentius* Dist., but differs in possessing non-setose antennæ, and a regularly tricarinate pronotum without any foveate areas.

Inoma multispinosa n. sp.

(Plate IX., Figure 12.)

Brachypterous form.

Antennæ moderately short, glabrous; the two basal segments short and stout; the third segment very long and filiform; the fourth segment clavate. Elytra broad, the sides convexly curved and somewhat sharply rounded

posteriorly; the membrane very short, and declivous to posterior margin; costal area nearly as wide as the discoidal area, with four rows of areolæ; costal membrane uniseriate, with moderately large quadrate areolæ.

Head, pronotum, elytra, and underside excepting the abdomen, bright chestnut brown; hood; sides of pronotum, and the carinæ, whitish; a broad transverse fascia at the base of the elytra, and another at the apex of the discoidal cells, white; legs, antennæ, bucculæ, and the membrane apically yellowish brown; abdomen, fourth antennal segment, eyes, and tarsi, black.

Macropterous form.

Elongate-ovate. Elytra as much longer than the wings, as the wings are longer than the abdomen; sides of the elytra about the same width to the apex of the discoidal cell, then gradually narrowed, and broadly rounded behind; costal membrane wider than in the brachypterous form, widest beyond the middle, and furnished with two irregular rows of areolæ; the membrane is longer and more flattened, reticulated, the areolæ becoming slightly larger apically. The colour dorsally is somewhat darker, ferruginous brown. In all their other characters the two forms are similar. Length 2 mm., breadth .80 mm. (Brachypt); length 2.125 mm., breadth .80 mm. (Macropt).

Habitat.—Sunnybank, Q., August, September (H. Hacker). Four specimens. *He.* 3170.

***Compseuta ampliatus* n. sp.**

(Plate VII., Figure 5.)

Head transverse, armed with five minute spines, two close together between the antennæ, one central, and two basally at sides; antennæ finely pilose, the two basal segments moderately stout, the second shorter than the first; third segment very long, nearly two and a-half times as long as the fourth, fourth segment slightly stouter than the third, and longer than the first and second together. Pronotum narrow anteriorly, broadening out basally to twice the width; hood small, elevated, sharply keeled, slightly projecting in the middle over the base of head, reticulated; central carina percurrent, more elevated than the lateral ones, one row areolate; lateral margins of the pronotum uniseriate, thinly fringed with fine pubescence; posterior process short, rounded apically. Elytra twice as long as the abdomen, somewhat separated posteriorly, each elytron is widest at the middle; the areolæ on the costal membrane are rather small basally, much larger from the amplified central portion to the apex of the elytron; costal area strongly sinuate, narrow, biseriata; the discoidal cell is widest towards the apex, with five rows of small areolæ.

Head spines, carinæ, posterior process, and bucculæ, whitish; elytra iridescent, the reticulations pale flavous, a narrow transverse brown fascia about one-quarter from the base; legs, and antennæ yellowish-brown; head, and

pronotum blackish, in fresh specimens covered with a white mealy substance; apical half of the fourth antennal segment, and the entire ventral surface, black. Length 3.25 mm., breadth 2.125 mm.

Habitat.—Southport, Q., October (H. Hacker). Fourteen specimens. *He.* 3171.

Compseuta secundus n. sp.

(Plate VII., Figure 6.)

Fine scattered pubescence, and a thin fringe on the sides of the pronotum, also the elytra, except apically.

Head transverse, armed with five minute unicolorous spines; antennæ finely pilose, the segments about the same length as in *C. ampliatus*; the shape of the hood, pronotum, and the carinæ are also very similar. The elytra are narrower and not so widely separated posteriorly, the sides being sub-parallel; each elytron is widest behind the middle.

Colour entirely composed of brown and black shades; hood, bucculæ, pronotal carinæ, and elytral reticulations, pale yellowish brown; pronotum including the posterior process, discoidal cells, legs, and three basal antennal segments, brown; eyes, fourth antennal segment except basally, a transverse fascia across the costal membrane opposite the middle of the discoidal cells, and the ventral surface, black. Length 3.125 mm., breadth 1.62 mm.

Habitat.—Bunya Mountains, Q., December; Tooloom, N.S.W., January (H. Hacker). Six specimens. *He.* 3172.

The narrower sub-parallel elytra, and the brown colour with an absence of white markings, are the chief characters which separate this species from *C. ampliatus*.

Gelchossa elegans n. sp.

(Plate VII., Figure 7.)

Head transverse, armed with five slender blunt-tipped spines; two diverging basally at sides; one placed centrally, and two anteriorly near the base of antennæ; the two latter converge between antennæ, reaching to nearly the length of the first segment; antennæ long, slender; first segment cylindrical, twice the length of the second; third segment filiform, twice the length of the fourth, which is elongate and scarcely thicker than the third; bucculæ rather prominent and narrowly opened in front, biserially areolated. Pronotum with three strongly raised carinæ, the lateral ones composed of one row of subquadrate areolæ; the median carina more strongly raised than the other two, highest above disc, where there are two rows of areolæ; posteriorly there is one row of large oblong areolæ; hood narrow, considerably raised, strongly keeled above, and angularly produced in front, reticulated; paranota moderately wide, recurved, with three rows of areolæ; disc finely and densely punctate. Elytra rather long, extending far beyond the apex of the abdomen, moderately wide;

sides broadly rounded from base, almost parallel laterally, very slightly constricted about the middle; costal membrane wide, unevenly reticulated, with five rows of rather small areolæ on the basal third, four rows of larger areolæ at about middle, decreasing to one row posteriorly; costal area declivous, with four rows of small areolæ; discoidal area narrow, not reaching the middle of the elytra, slightly concave, sides, especially the outer one, sharply raised, areolæ small; membrane unevenly reticulated, areolæ small at the base, becoming larger towards the apex of the elytra.

Head spines, bucculæ, reticulations on hood, carinæ, paranota, posterior process apically, and costal membrane basally, white; second and third antennal segments, legs, reticulations on elytra apically, flavous; disc of pronotum, discoidal cells, first and fourth antennal segments, yellowish brown; a narrow transverse fascia on elytra before middle; a diffused spot near base of membrane; reticulations in centre of the median carina, and the tarsi, fuscous; head, pronotum anteriorly, and body beneath, black. Length 3.25 mm., breadth 1.66 mm.

Habitat.—Upper Brookfield, Q., November (H. Hacker). Four specimens. *He. 3173*.

This is the first species of *Gelchossa* to be recorded from Australia. In general shape it resembles *G. (Leptostyla) costofasciata* Drake, but differs in the more slender fourth antennal segment, narrower transverse elytral fascia, more rows of areolæ in the paranota and costal membrane.

***Stephanitis queenslandensis* n. sp.**

(Plate VII., Figure 8.)

White, hyaline, iridescent, with a pronotal and two elytral transverse dark fasciæ.

Head small, subtriangular in front, unarmed; antennæ apically thinly pilose; the first segment twice as long as the second; third segment two and a-half times as long as the fourth, which is hardly stouter than the third, and distinctly longer than the first and second together; the bucculæ are moderately elevated, closed in front; the rostrum reaches to the posterior coxæ. Pronotum closely punctured; pronotal vesicle large, ovoid, anteriorly compressed, posteriorly rounded, reticulated, covering the head, and extending slightly beyond; the median carina is arcuately elevated, as high in the middle as the vesicle, with two rows of large areolæ; paranota large, the outer sides strongly raised; the lateral borders straight, curving inward behind, to the lateral carinæ, extending anteriorly level with the eyes, and furnished with three rows of areolæ.

Legs, antennæ, and reticulations pale flavous; head, rostrum, and the fourth antennal segment testaceous; pronotum, and the body beneath, castaneous brown; eyes dark ruby; posterior process basally, and a suffusion through the centre of the median carina blackish; a transverse dark fascia about one-third

from the base of elytra, passing through the swollen discoidal areas; another sub-oblique dark fascia, from near the outer marginal apex to inner angles, just beyond the apex of abdomen; tips of the reticulations on the outer edges of paranota and elytra, fuscous. Length 3.125 mm., breath 1.68 mm.

Habitat.—Mount Tambourine; Brisbane, Q., on *Stephania hernandiæfolia* Walp., March (H. Hacker). Many specimens. *He.* 3174.

This is the first *Stephanitis* to be recorded in Australia. It differs from the description of *S. typicus* Dist., *S. suffusus* Dist., and *S. sordidus* Dist., in the black base of the posterior process, and black suffusion through the centre of the elevated median carina; from *S. gallarum* Horv., it differs in possessing two rows of areolæ on the median carina. The elytra in figure 8 are greyer than they should be, owing to the gum photographing opaque; the base of the elytra are hyaline.

AUSTRALOTINGIS n. gen.

Glabrous. Head small, transverse, armed with five slender spines; antennæ and legs moderately long and slender; the rostrum does not quite reach the intermediate coxæ. Pronotum tricarinate, the median carina strongly arcuately elevated, nearly as high as the hood medially, with two rows of large areolæ; hood large, subglobose, covering and extending slightly beyond the head; paranota foliaceously dilated and inflated, sub-reniform, extending from the front of eyes to the base of elytra; elevated as high as the hood, and enclosed on three outer sides; leaving a semicircular dorsal opening on each side of the hood; the inflated part touches the hood anteriorly, posteriorly it curves inwards, covering part of the lateral carinæ, and nearly reaches the hood; paranota, hood, and the median carina reticulated, the areolæ of about the same size. Elytra broad, twice as long as the abdomen, basally angularly rounded, sides slightly convexly curved, sub-parallel; discoidal area wide, the outer side strongly raised, forming with the costal area a tumid elevation, which extends to a tumid spot in the centre of the discoidal area; costal membrane very wide, reticulated, areolæ moderately large anteriorly, larger on the posterior half of the elytra.

Type.—*A. Franzeni* n.sp.

This genus, in general shape, has a slight resemblance to *Dicysta* Champ, but the paranota are much more developed; it also differs in possessing three pronotal carinæ, the median one foliaceous, not inflated.

Australotingis franzeni n. sp.

(Plate X., Figure 15.)

Head with two slender spines basally at the sides, one central, and two submedial in front, the three latter apically converging between the antennæ; the two basal antennal segments cylindrical, the second thinner and shorter than the first; third segment about two and a-half times as long as the fourth; fourth segment subelavate, and sparsely pubescent; bucculæ not prominent,

rounded anteriorly. Elytra much longer than wings; costal membrane basally with four rows of moderate-sized areolæ, increasing to six rows in the widest part; the costal area has three rows of moderate size; the discoidal cell has five to six rows, smaller than those on the costal membrane.

Reticulations on the hood, paranota, posterior process, and elytra, the legs, and antennæ excepting the fourth segment, pale ochraceous; an oblique fascia on the discoidal area, about the middle, and some irregular markings behind it, form a dark ring which surrounds the tumid central spot, and extends through the middle of the costal area, the apical half of fourth antennal segment, tarsi and pronotum anteriorly, dark brown; head including eyes, and the body beneath, black. Length 3.75 mm., breadth 2.36 mm.

Habitat.—Nanango, Q., September (L. Franzen). One female. *He.* 3175.

² FAMILY PIESMATIDÆ.

³ *Mcateella splendida* Drake.

(Figure 14.)

This species was described⁴ from four specimens which were deposited in the National Museum, Washington, labelled Australia (Koebele). It occurs rather plentifully in the Brisbane district at the flowers of *Acacia cunninghamii*. These minute insects have probably been hitherto overlooked, owing to their colouration, which exactly matches that of the flowers; also owing to their appearance in July, a time when but few insects are about. The reddish brown markings on the pronotum and elytra vary considerably in depth of colour, hardly two individuals being exactly alike. *A. cunninghamii* is probably their host tree, as nymphs were obtained at the same time as the adult bugs.

Mcateella elongata n. sp.

(Plate IX., Figure 13.)

Body depressed, elongate-ovate, antennæ and legs finely and sparsely pilose. Head large, transverse; ocelli minute, unicolorous, on each side close to the pronotal border; base of antennæ inserted in a rounded depression between the jugæ and the prominent antenniferous tubercles; first segment of antennæ narrow at base, suddenly becoming greatly incrassate, half as long again as wide; the second segment about equal length, but only slightly swollen; third segment slender, slightly longer than the second; fourth segment longest, fusiform; rostrum short, not reaching to the intermediate coxæ. Pronotum closely punctured, depressed from the truncated anterior border for one-third

² Greek *piesma*, a pinching or squeezing, gen. *piesmatos*, stem *piesmat*. *Vide* Dr. R. J. Tillyard.

³ Incorrectly spelt *Macateella* in the Zoological Record, 1925.

⁴ *Proc. Ent. Soc. Wash.*, Vol. 26, p. 86, 1924.

its length, where there is a reniform callose spot on each side, behind which the pronotum is moderately transversely convex, widest at the broadly rounded posterior angles; paranota keel-like, uniseriate, rounded and widest anteriorly, becoming narrower and disappearing before reaching the base. Elytra narrow, slightly longer than the abdomen, widest near base, and evenly punctured; costal membrane narrow, uniseriate; costal area broad and declivous, with five rows of punctures; the discoidal area has about seven rows at its widest part, which is behind the middle, boundaries well defined, the outer border almost straight.

Body entirely pale olive buff, unicolorous; antennæ and legs, yellowish brown; abdomen beneath, green; rostrum and tarsi fuscous. Eyes reddish black. Length 2.25 mm., breadth 1.87 mm.

Habitat.—National Park Q., October; Kobbie Creek, Q., December. On flowers of *Acacia decurrens* (H. Hacker). Five specimens. *He.* 3176.

This species is easily distinguished from *M. splendida* Drake by the more depressed pronotum, the more elongate shape, and uniform greenish colour.

EXPLANATION OF PLATES.

To facilitate comparison, all the figures have been enlarged to a uniform magnification of sixteen diameters.

PLATE VI.

- Fig. 1.—*Paracopium austraticus* (Stal).
Fig. 2.—*Paracopium albofasciata* n.sp.
Fig. 3.—*Ischnotingis setosus* n.sp.
Fig. 4.—*Tecconemia summervillei* n.sp.

PLATE VII.

- Fig. 5.—*Compseuta ampliatus* n.sp.
Fig. 6.—*Compseuta secundus* n.sp.
Fig. 7.—*Gelchossa elegans* n.sp. (Fourth antennal segments missing.)
Fig. 8.—*Stephanitis queenslandensis* n.sp.

PLATE VIII.

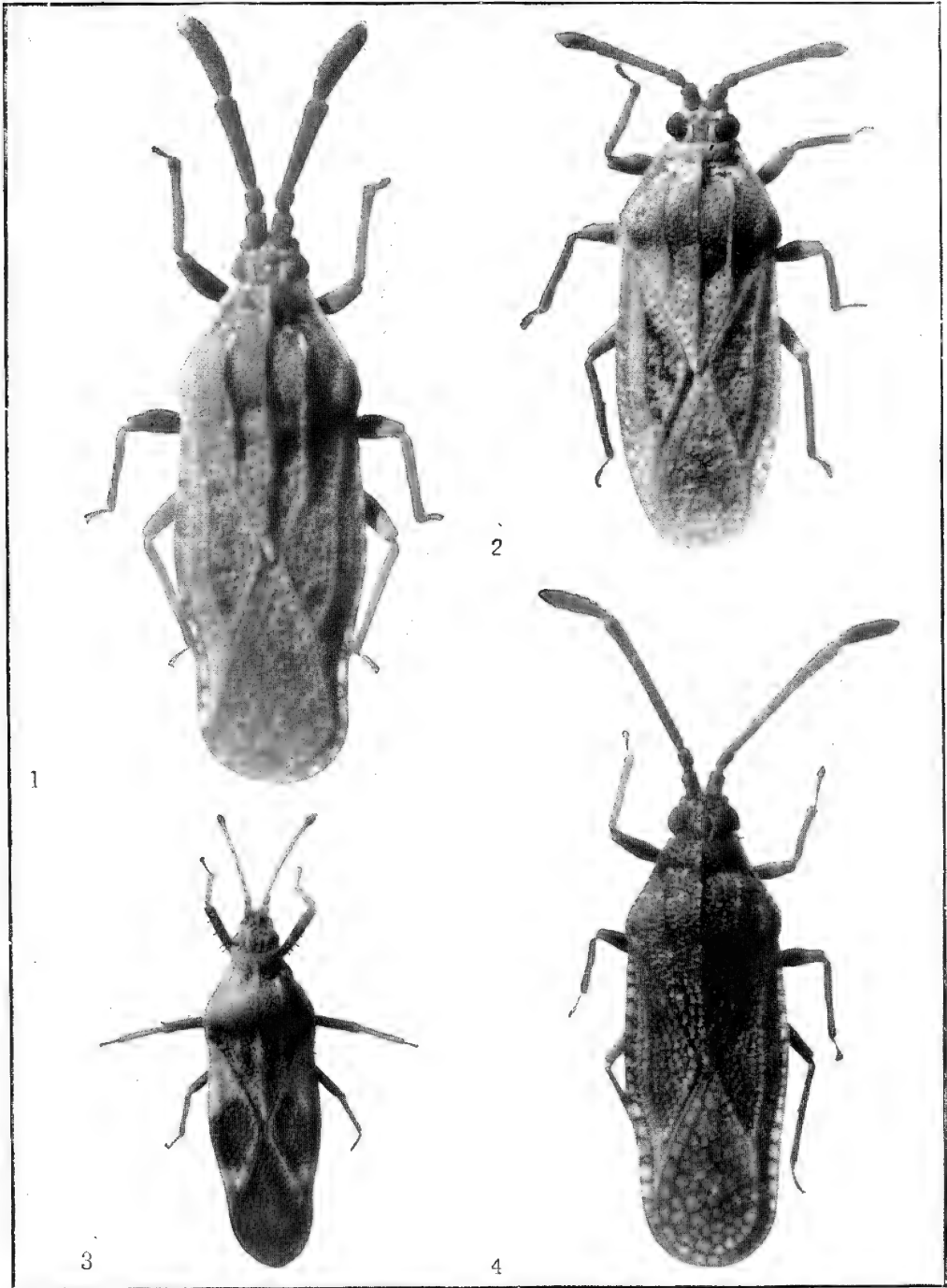
- Fig. 9.—*Phatnoma cordata* n.sp.
Fig. 10.—*Cystcochila (Parada) camelinus* n.sp.

PLATE IX.

- Fig. 11.—*Ma'andiola similitis* n.sp.
Fig. 12.—*Inoma multispinosa* n.g. et sp.
Fig. 13.—*Mcateella elongata* n.sp.
Fig. 14.—*Mcateella splendida* Drake.

PLATE X.

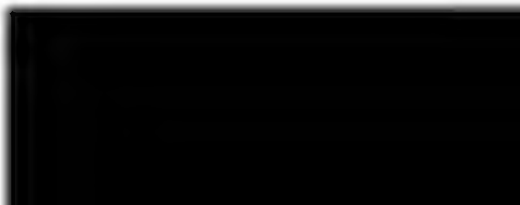
- Fig. 15.—*Australotingis franzenii* n.g. et sp.
Fig. 16.—*Epimixia alitophrosyne* Kirk.
Fig. 17.—*Serenthia vulturaa* Kirk.
Fig. 18.—*Monanthia amitina* Horv.
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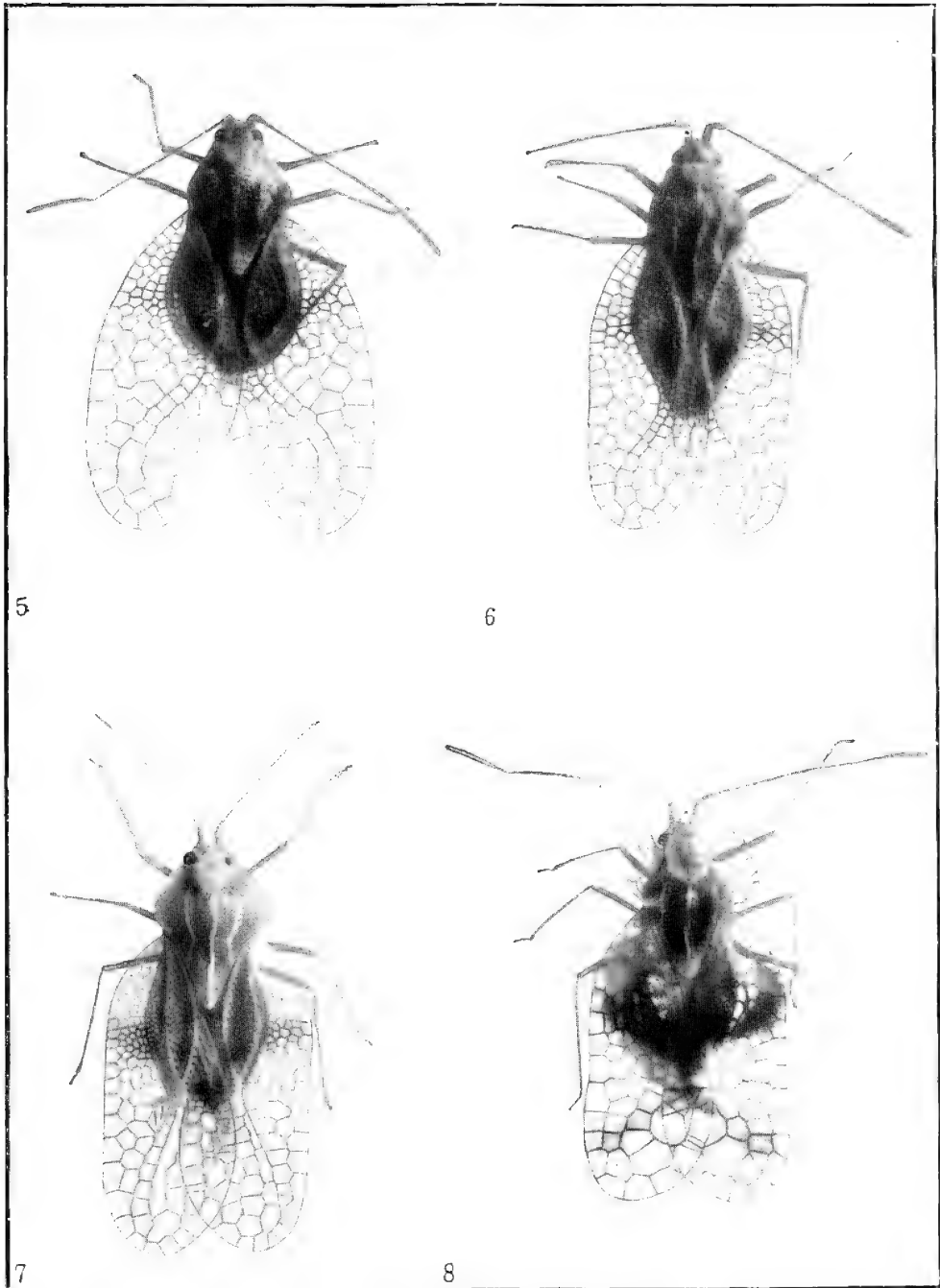


QUEENSLAND TINGITIDÆ.

Photos., H. Hacker.

Face page 32.



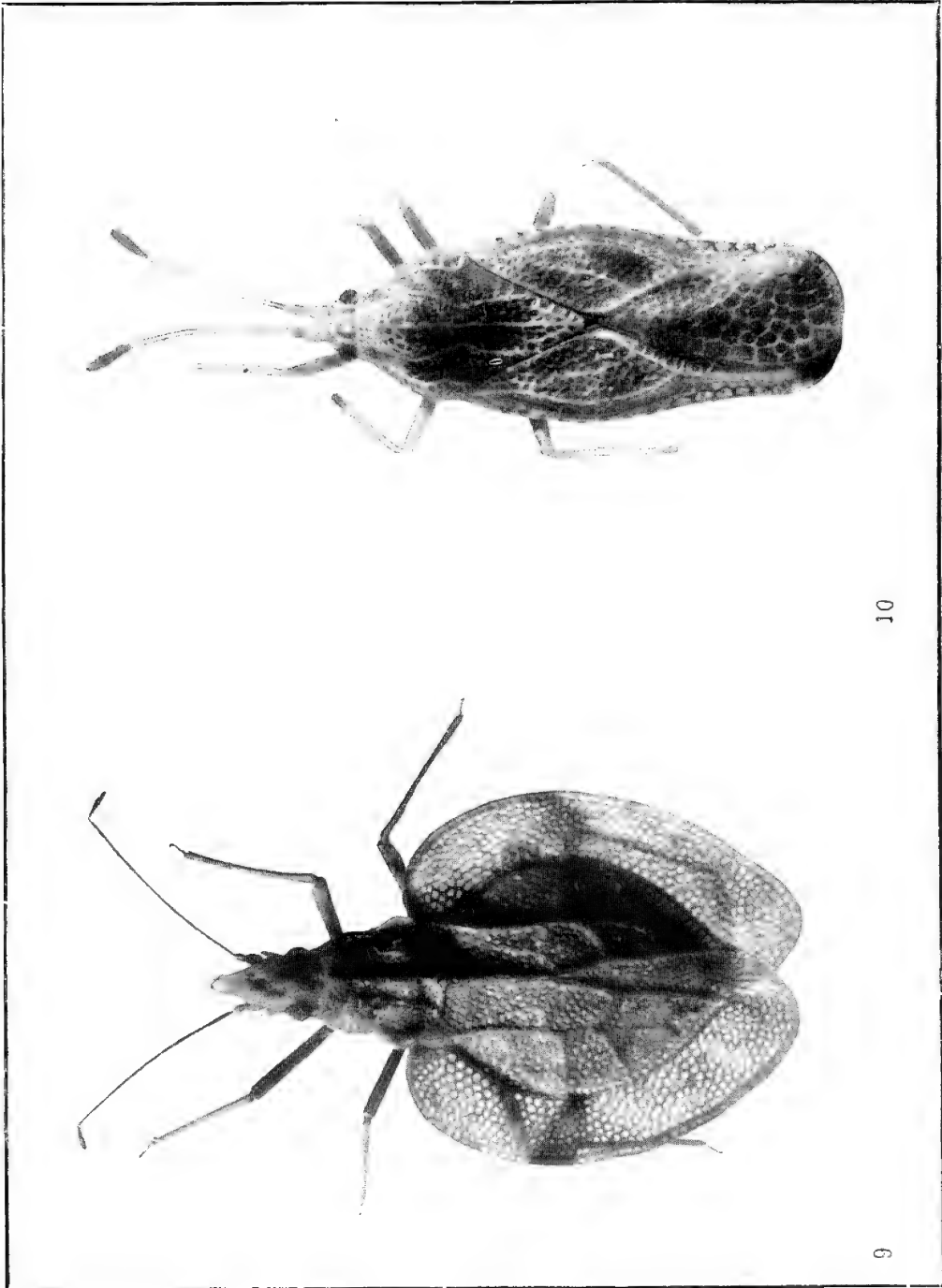


QUEENSLAND TINGITIDÆ.

Photos., H. Hacker.

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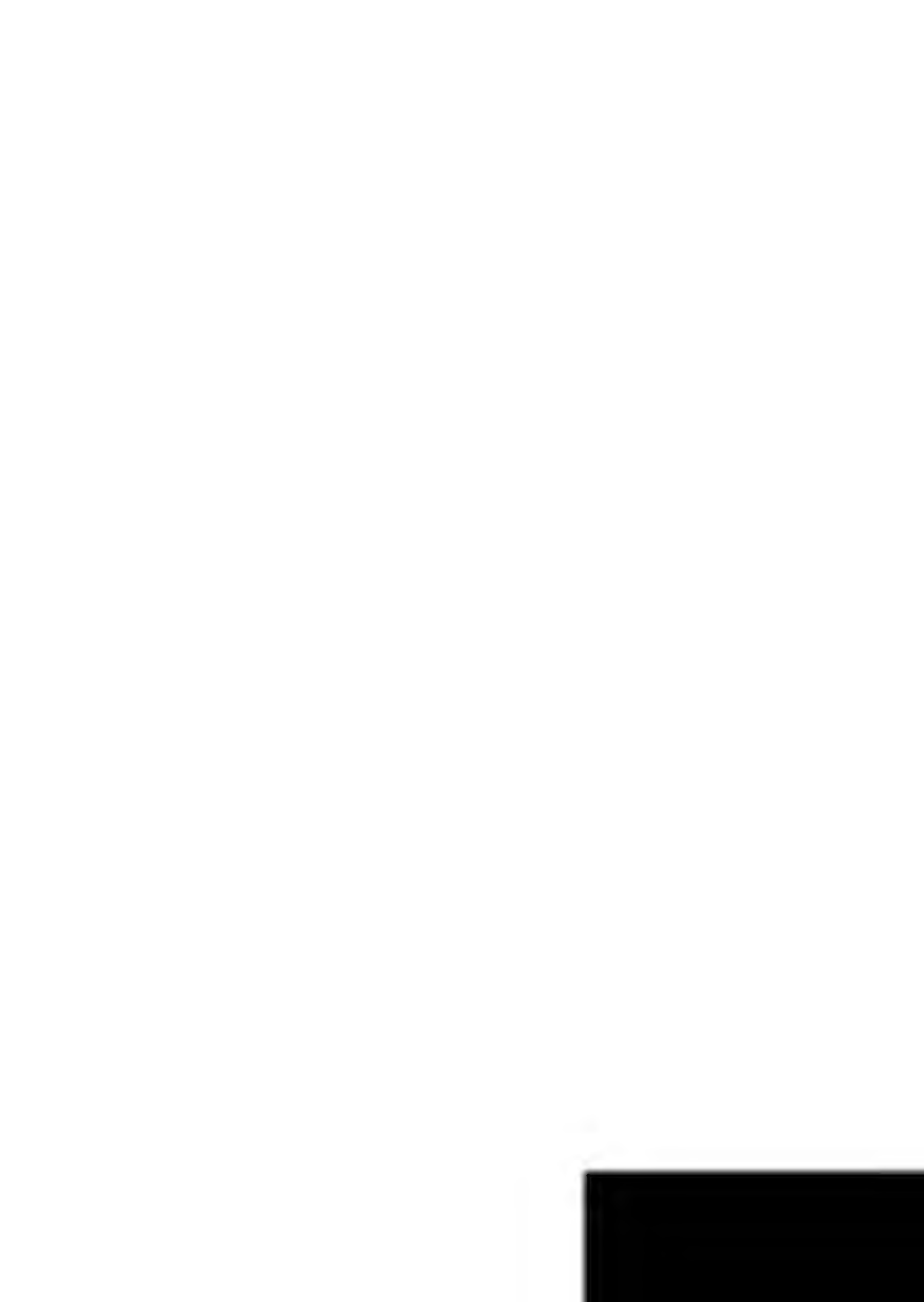


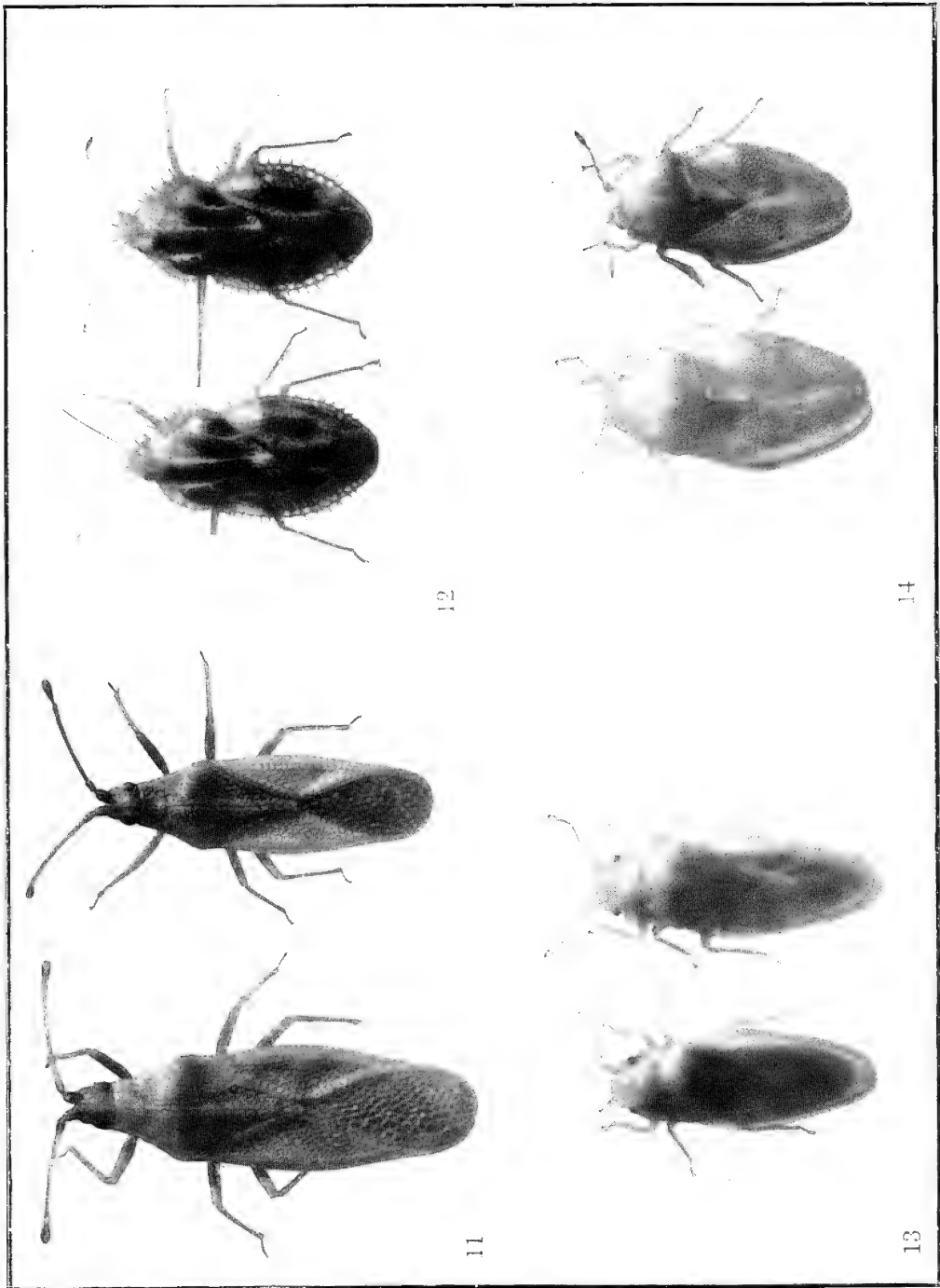


QUEENSLAND TINGITIDÆ.

Photos., H. Hacker.

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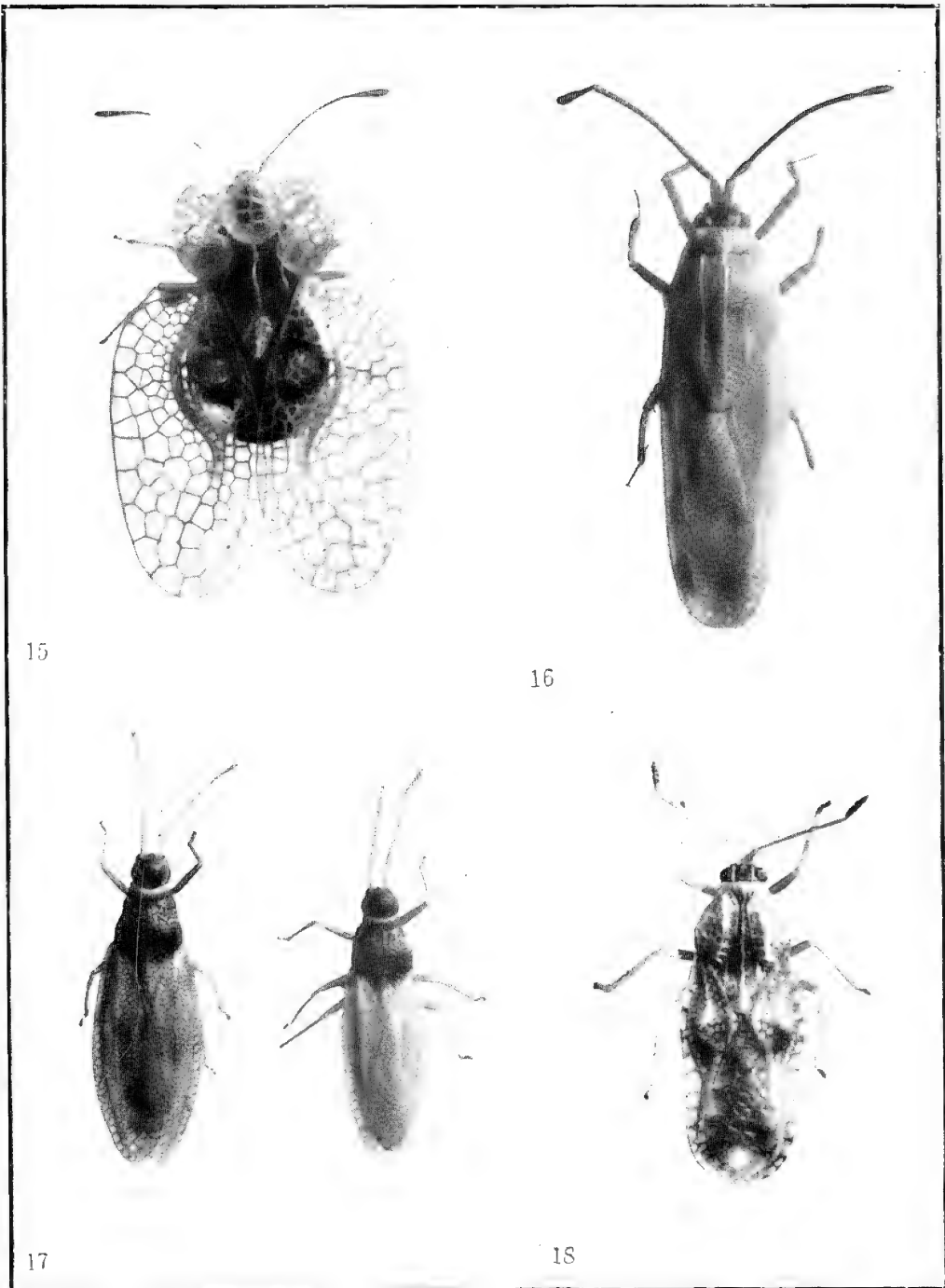


QUEENSLAND TINGITIDÆ.

Photos., H. Hacker.

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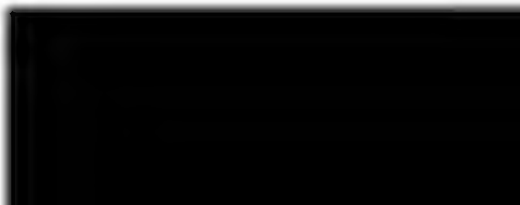




QUEENSLAND TINGITIDÆ.

Photos., H. Hacker.

Face page 32.



NEW COLEOPTERA.

Fam. TENEBRIONIDAE.

Sub. Fam. CYPHALEINAE.

BY H. J. CARTER, B.A., F.E.S.

AMONGST Coleoptera recently sent for determination by Mr. A. P. Dodd occur two fine new members of the Cyphaleinae. This group contains some of our handsomest beetles, of striking metallic lustre, and is geographically almost confined to the Austro-Malayan region, India, Japan, and Chili being credited each with a single species. The great majority of the genera and species being endemic in Australia suggests this continent as the original home of the sub-family.

As the new species in question are from tropical Queensland and, unfortunately, unique specimens, Mr. Dodd has generously suggested their presentation to the Queensland Museum, and it is further appropriate that their description should appear in its Memoirs.

OREMASIS FORMOSUS n. sp.

Oblong ovate, moderately convex, acutely attenuate behind, above and epipleurae brilliant metallic green, with purple gleams at sides; underside darker green; tibiae, base of femora and front tarsi yellow, the rest of legs blue or purplish, antennae and palpi blue.

Head labrum prominent, antennal orbits squarely angulate in front, eyes large, round and prominent, front strongly punctate—densely and finely on epistoma, more sparsely and coarsely between the eyes; antennae long and slender, 3 as long as 4–5 combined, four apical joints enlarged—less so than in *O. cupreus* Gray—8–10 piriform, 11 elliptic longer and wider than 10.

Prothorax apex arcuate emarginate, base bisinuate, all angles acutely produced, sides widening from apex to base in a very slight curve, extreme border reflexed, a concave depression, coarsely punctate, between border and the rather flat disc, the last without medial line and with fine, sparse, punctures and striae.

Scutellum large, triangular with rounded sides, finely punctate.

Elytra as wide as prothorax at base, parallel for the greater part, rather abruptly narrowed behind, apices produced into two acute, adjacent, teeth; surface irregularly, finely and sparsely punctate, the punctures more evident near base, obsolete at apex.

Episterna and epipleurae coarsely punctate, abdomen smooth, rest of under surface with fine shallow punctures, basal segments of front tarsi enlarged, basal segment of hind tarsi shorter than rest combined.

Dimensions.—19 × 6.5 mm.

Habitat.—North Queensland, Ravenshoe (A. P. Dodd). A single ♂ example of this beautiful insect has been handed to me for description. It is easily distinguished from its congeners *O. haagi* Bates and *O. cupreus* Gray by colour, less convexity, more elongate apical spines, and the differently formed antennæ (longer third and less transverse penultimate segments). Holotype presented to the Queensland Museum. Reg. No. C. 3177.

TRISILUS INSIGNIS n. sp

Elongate, oblong, convex, nitid; head and pronotum green, the latter slightly purplish at base, elytra purple—with some irregular green patches, posterior half of suture and sternal regions cyaneous, epipleuræ green, abdomen black, antennæ greenish black, legs blue black.

Head coarsely and densely punctate on clypeus, sparsely so at base; eyes large, reniform, widely separated, antennal sockets short and rather sharply raised (as in *T. femoralis* Haag), antennæ extending slightly beyond base of prothorax, five apical segments moderately enlarged, 3 shorter than 4–5 combined, 9–11 shorter and rounder than preceding.

Prothorax apex arcuate-emarginate, base strongly bisinuate, all angles moderately produced and subacute, sides widest at middle thence arcuate in front and (less strongly) behind; extreme border narrowly reflexed, without sublateral sulcus, disc irregularly and sparsely punctate a cluster of large round punctures near basal depression towards each side, and a cluster of smaller punctures towards the front angles, medial region almost laevigate.

Scutellum large, triangular with rounded sides, a row of punctures round margin.

Elytra rather wider than prothorax at base, very convex, shoulders well rounded, sides parallel for the greater part, apices with short unevenly produced points—the left rather longer than the right—a very narrow horizontal border, not seen from above, anterior half of surface closely covered with large, round, unevenly spaced punctures, the punctures becoming smaller on posterior half and subobsolete on apical declivity, a faint indication of longitudinal impressions occurring in this region; with fine rimæ. Underside smooth save for a few scattered minute punctures, the short prosternum as in *T. femoralis* Haag, the medial carina less defined.

Dimensions.—19 × 9.5 mm.

Habitat.—North Queensland, Cairns (A. P. Dodd).

A fine species, structurally very like *T. femoralis* Haag, but easily distinguishable by larger size, colour, the much grosser and closer elytral sculpture and the small but distinct apical teeth. The holotype is probably female, and has been presented to the Queensland Museum. Reg. No. C. 3178.

ON *STOREUS*, *EMPLESIS*, AND OTHER
CURCULIONIDÆ, MOSTLY FROM QUEENSLAND.

BY ARTHUR M. LEA, F.E.S.

(Contribution from South Australian Museum.)

Storeus and *Emplesis* are genera represented by many small Australian weevils; to distinguish the genera, with certainty, the claws must be closely examined, in most cases a hand lens being insufficient. This not having been done on many occasions some confusion has resulted. Fortunately types, cotypes, or authentic specimens of most of the previously named species are before me, in addition to many new ones.

Storeus (type *variegatus* Fab.).

Emplesis (type *scolopax* Pasc.).

Artematocis (type *longirostris* Lea).

The typical species of *Storeus* is *variegatus*, a common and well-known weevil from Sydney, but which occurs also in Victoria and Tasmania; of *Emplesis* it is *scolopax*, a rare South Australian weevil.

Pascoe referred these genera to two sections of the Eirrhinides: *Emplesis* to the Cryptoplides, and *Storeus* to the Storeoides; on the same page¹ he associated *Lybæba* and *Enide* with *Storeus*, and placed *Diethusa* in the *Eirrhinides vrais*, noting of *Storeus* "Pectus not canaliculate." In this he was in error, but no doubt he examined a specimen without removing its head.

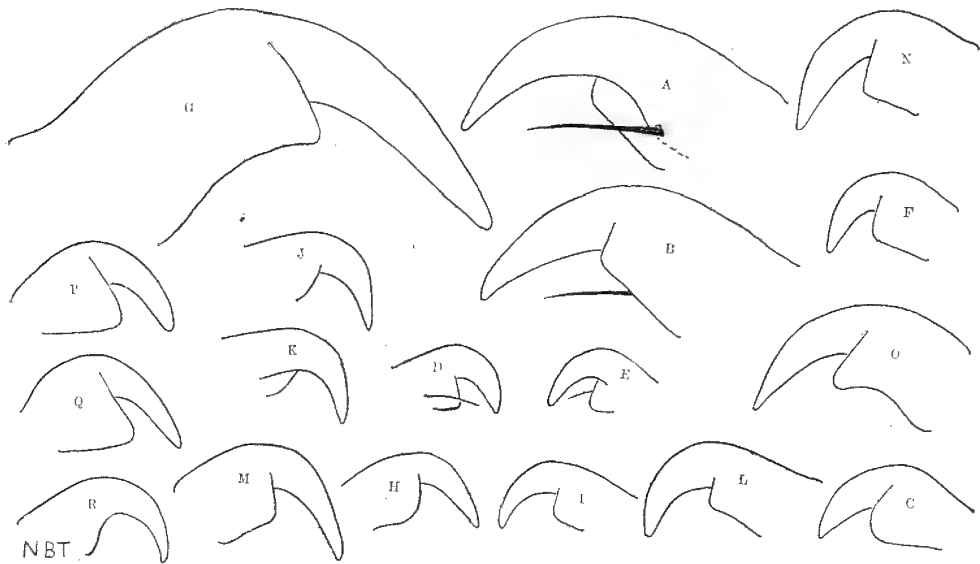
Blackburn in dealing with the two genera considered they might be separated by the abdominal segments, or by the femora: dentate in *Storeus* (although *S. signatus* was described as having edentate femora) and edentate in *Emplesis*.

In 1899² I referred all the species of *Emplesis* to *Storeus*, and named many new ones. I had examined the claws of many species and presumed them all to be simple. *Storeus* was regarded by Lacordaire, Pascoe, and Blackburn as belonging to the Eirrhinides; and *Emplesis* by the two latter entomologists as a closely allied genus, differing only in the femora and abdomen, and as all their species have a well-defined pectoral canal, and agree in so many other features, it seemed desirable to unite them.

¹ Pascoe, Ann. and Mag. Nat. Hist., 1873, p. 182.

² Lea, Trans. Roy. Soc., S. Aust., p. 159.

Having occasion recently to examine many species of the Eirrhinides and Tychiides, and in particular some large species of *Storeus* belonging to the Queensland Museum, the claws of several species of that genus were seen to be appendiculate, I could not see that the claws of *S. variegatus* were appendiculate under a hand lens ($\times 12$), but under a microscope they were distinctly so, as the outlines (figs. A and B) drawn under the camera lucida render certain; the genus must, therefore, be transferred to the Tychiides. The claw joint is seldom extended much beyond the lobes of the third, the claws are strongly divergent, and are drawn strongly backwards, so that it is difficult to see them clearly, on account of the large size and clothing of the third joint; on many of the tessellated species of *Emplexis* they regularly and slightly increase in width to the base as on other Eirrhinides, but on some of them the increase is more decided. I found it impossible to be sure of some of the claws by examination with a hand lens, especially as a speck of dirt or grease may make a considerable difference in the appearance of a claw. For the outline drawings



Text-fig. 1.—Claws of species of *Storeus*.—A, B.—*variegatus* Fab.; C.—*albosignatus* Blackb.; D, E.—*setosus* Lea; F.—*variabilis* Lea; G.—*maximus* Lea; H, I.—*baeodontus* Lea; J, K.—*scutellaris* Lea; L.—*acutidens* Lea; M.—*carinirostris* Lea; N.—*specularis* Lea; O.—*armipennis* Lea; P.—*aurifer* Lea; Q.—*minimus* Lea. Of *Emplexis*.—R.—*storeoides* Pasc.

(made by Mr. N. B. Tindale under a fairly high power of the microscope) claw joints were detached, and the claws themselves separated under pressure, afterwards being mounted in Canada balsam on slides. A tactile seta is present on each claw but this was usually omitted from the drawings.

The most striking feature of species of both genera is the possession of a

pectoral canal, fairly deep in front and bordered by sharply defined walls, but narrowed between the front coxæ, much as in many species of *Diethusa* and *Melanterius*; it is often difficult to see the canal until the head has been removed. On this being done, however, it may be seen clearly on all the species, and to start from an incurvature of the apex of the prosternum. Blackburn's line for *scolopax* in his table of *Emplesis*: "Prosternum not (or scarcely at all) concave in front of the anterior coxæ"; is not reliable, as the canal, after removal of the head, is as well defined on that species as on most of the genus. In fact many species with the head resting on the breast (the usual position of unset specimens) have quite the normal appearance of members of the Cryptorhynchides. In commenting on *Emplesis* he said³: "Some of them having a most unmistakable channel running down the front part of the prosternum, which, according to M. Lacordaire, would take them out of the Eirrhinides altogether." In *Bagous* there is a somewhat similar channel, and there is an approach to it in some species of *Cydmæa*, on species of which the front coxæ may or may not be in contact, but that they belong to the Eirrhinides appears to be certain. Subsequently Blackburn⁴ considered that Pascoe was wrong in transferring *Diethusa*, *Lybæba*, and *Enide* from the Eirrhinides to the Cryptorhynchides, on account of the short pectoral canal and slightly separated front coxæ. The three latter genera have since been amalgamated, that they are closely allied to *Melanterius* is certain, and that the latter is close to *Euthebus* is also certain; the latter genus has a deep pectoral canal and can only be referred to the Cryptorhynchides. Blackburn further considered that if *Diethusa*, &c., were transferred to the Cryptorhynchides, *Storeus*, *Emplesis* and *Bagous* should follow it. *Storeus*, in fact, seemed to be a connecting link between the Eirrhinides and Cryptorhynchides, and several genera that appeared to be close to it are placed with the latter subfamily.

Blackburn referred no species to *Storeus*, but his *albosignata* and *majuscula* referred to *Emplesis*, have appendiculate claws, and must stand under *Storeus*.

S. captiosus, *contortus*, *falsus*, *setosus* and *variabilis* Lea also have appendiculate claws and must remain in *Storeus*.

Boheman referred *signatus* to *Storeus*, although noting its femora as edentate. It must remain in that genus until the type or an authentic specimen can be examined. It is evidently a prettily marked species and appears to be close to several *Empleses* before me, but the length and exact locality were not noted, and quite possibly it does not belong to either *Storeus* or *Emplesis*.

In the Munich Catalogue *Eirrhinus australis* Montr., from Lifu, is referred to *Storeus*. I do not know that species, but am able to name three Fijian ones.

³ Blackburn, Proc. Linn. Soc. N.S. Wales, 1890, p. 330.

⁴ Blackburn, Trans. Roy. Soc. S. Aust., 1893, p. 301.

Paying special attention to the claws on a re-examination of *S. pulchricollis* these were seen to be truly simple; its pectoral canal is deep, and the intercoxal process of the mesosternum has a small process on each side, the femora are strongly dentate, and it appears now desirable to transfer it to the Cryptorhynchides, and to associate it with a species of *Ephrycellus* from Lord Howe Island.

All the other species referred to *Emplesis* by Pascoe, Blackburn, and Faust (several of which, however, are unknown to me) must now be referred back to that genus, together with the species referred by myself to *Storeus* (with the above-noted exceptions). I did not specially examine the claws of *S. metasternalis* (the type is now in the British Museum) but probably it is an *Emplesis*.

Artematocis was proposed for two species having distinctly appendiculate claws, and was correctly referred to the Tychiides, although its resemblance to *Storeus* (then presumed to have simple claws) was pointed out. The genus may well be retained, and probably several others will be proposed at the expense of *Storeus*.

All the genera have the rostrum long, and usually considerably longer on the female than on the male; eyes with coarse facets, pectoral canal distinct, and third and fourth segments of abdomen usually distinctly curved. In *Emplesis* the femora are usually edentate, in the other genera they are usually dentate.

On each side of the prosternum of all the species of *Storeus* there is a fovea that is usually fairly deep, and has at its bottom a very thin membrane, through which an eye can look when the insect has its rostrum resting in the pectoral canal; on some of the species the depression appears as a fairly large round fovea, on some it is semi-double, on others it appears as a thin curved furrow; it undoubtedly serves as a "peep-hole"; for further comments see under *S. specularis*. An apparent remnant of it may be seen on many species of *Emplesis*.

The previously described species of the genera, as I now understand them, are :—

STOREUS.

<i>albosignatus</i> Blackb.	<i>setosus</i> Lea.
<i>captiosus</i> Lea.	<i>signatus</i> Boh.
<i>contortus</i> Lea.	<i>variiegatus</i> Fab.
<i>falsus</i> Lea.	<i>variabilis</i> Lea.
<i>majusculus</i> Blackb.	

EMPLESIS.

<i>ænigmatica</i> Blackb.	<i>juvenca</i> Lea.
<i>amæna</i> Lea.	<i>lineigera</i> Pasc.
<i>assimilis</i> Blackb.	<i>lithostrota</i> Lea.
<i>bellula</i> Lea.	<i>macrostyla</i> Lea.
<i>brachyderes</i> Lea.	<i>mediocris</i> Lea.
<i>canaliculata</i> Lea.	<i>metasternalis</i> Lea.
<i>consueta</i> Lea.	<i>monticola</i> Blackb.
<i>cryptorhyncha</i> Lea.	<i>multiarticulata</i> Lea.
<i>cyphirhina</i> Lea.	<i>munda</i> Blackb.
<i>dispar</i> Lea.	<i>nigrofasciata</i> Lea.
<i>dorsalis</i> Lea.	<i>niveiceps</i> Lea.
<i>elliptica</i> Lea.	<i>notata</i> Blackb.
<i>ephippigera</i> Lea.	<i>occidentalis</i> Lea.
<i>femoralis</i> Lea.	<i>ocellata</i> Blackb.
<i>filirostris</i> Pasc.	<i>parvula</i> Lea.
<i>gravis</i> Blackb.	<i>paupercula</i> Lea.
<i>ignobilis</i> Lea.	<i>remissa</i> Faust.
<i>impotens</i> Lea.	<i>scolopax</i> Pasc.
<i>inamæna</i> Lea.	<i>storeoides</i> Pasc.
<i>indistincta</i> Lea.	<i>tessellata</i> Lea.
<i>interioris</i> Blackb.	<i>tuberculifrons</i> Lea.
<i>invidiosa</i> Lea.	<i>umbrosa</i> Blackb.

ARTEMATOCIS.

<i>longirostris</i> Lea.	<i>squamibundus</i> Lea.
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EPHRYCELLUS.

<i>pulchricollis</i> Lea.

Storeus variegatus Fab.

(Text-figure 1, A, B.)

As already noted the claws of this species are appendiculate, the bristle shown in the figures is similar to that on most species of the genus, and similar bristles may be seen on many species of *Emplexis*.

Storeus albosignatus Blackb. (*Emplexis*).

(Text-figure 1, C.)

Although each claw of this species has quite a large appendix, it is difficult to see it clearly in any light with a hand lens. The species is a common one in New South Wales, Victoria, Tasmania, and South Australia.

Storeus majusculus Blackb. (*Emplexis*).

Blackburn has already commented upon the clothing of the front tibiæ of the male of this species; each of its claws has a basal appendix, more distinct on the front ones of the male than on the others.

Storeus falsus Lea.

The front tibiæ of the male (the only sex known) of this species, are clothed much as on the preceding species, and the appendix to each claw may be seen fairly clearly in certain lights.

Storeus setosus Lea.

(Text-figure 1, D, E.)

A small variable species. Under a hand lens I cannot see that the claws are appendiculate, but under the microscope they are distinctly so; two figures are given to show the appearance of the appendix and tactile seta from inner and outer positions.

Storeus variabilis Lea.

(Text-figure 1, F.)

Another small variable species, in which the appendix can scarcely be seen without a compound power.

Storeus maximus n. sp.

(Text-figure 1, G.)

♂. Reddish-brown. Densely clothed with stramineous brown scales and setæ.

Rostrum slightly longer than prothorax, slightly curved, almost parallel-sided, sculpture concealed by clothing except quite close to apex. Antennæ inserted one-third from apex of rostrum. Prothorax strongly transverse, sides gently rounded but apex suddenly narrowed; punctures normally concealed. Elytra very little wider at base (which is trisinate) than base of prothorax, sides gently rounded; with rows of rather large, partially concealed punctures; interstices multinodose, the nodes small but quite distinct on the odd interstices, very feeble on the even ones. Third and fourth segments of abdomen combined slightly longer than fifth, and distinctly longer than second. Legs rather long, femora acutely dentate, front tibiæ with a dense fringe of long hairs from near base to apex; claws with a large basal appendix. Length, 8-8.5 mm.

♀. Differs in having the rostrum slightly more curved, abdomen more convex, and front tibiæ not fringed, although with a small apical fascicle.

Queensland (C. French), Malanda (Dr. E. Mjöberg), Cairns district (A. M. Lea).

Very distinct by its large size, nodose elytra and fringed tibiæ. There are evidently ridges on the rostrum of the male, but the clothing is so dense as to conceal them, even on the female it is clothed almost to the tip. Some of the prothoracic scales have a golden gloss in certain lights. The wall on each side of the pectoral canal in front of the coxa is produced downwards in the form of an equilateral triangle, and the "peep holes" are partly obscured by clothing.

Storeus fimbripes n. sp.

♂. Dark reddish-brown, antennæ and legs somewhat paler. Densely clothed with stramineous-brown scales and setæ, on sides and apical half of elytra variegated with feeble dark spots.

Rostrum about once and one-fourth the length of the prothorax, slightly curved, not quite parallel-sided; with acute ridges alternated with rows of squamiferous punctures to apical fourth (where the antennæ are inserted), in front of which the punctures are crowded and naked. Prothorax and elytra as in preceding species, except that the elytra are not nodose. Abdomen slightly flattened along middle, third and fourth segments each very little shorter than second, fifth as long as first. Legs moderately long, femora acutely dentate, front tibiæ with a conspicuous fringe of long hairs on lower surface, commencing near base. Length, 3.5-4.5 mm.

Queensland. Cairns (E. Allen).

In general appearance like the preceding species on a much smaller scale, but third and fourth segments of abdomen somewhat larger, the elytra not nodose, their clothing somewhat variegated posteriorly, and the ridges on the rostrum more conspicuous through the clothing. There is a distinct compound depression, "peep hole," on each side in front of the prosternum.

Storeus inustus n. sp.

♂. Dark brown, some parts almost black, antennæ and tarsi paler. Densely clothed with stramineous scales and setæ, varying to black.

Rostrum distinctly longer than prothorax, almost straight to near apex, parallel-sided; with sharply defined ridges alternated with rows of squamiferous punctures to apical fourth (where the antennæ are inserted), in front of which the punctures are crowded. Prothorax strongly transverse, sides gently rounded, becoming strongly depressed in front; punctures dense but normally concealed. Elytra at extreme base (which is feebly trisinate) no wider than prothorax; with rows of large punctures, appearing small through clothing, but each containing a seta; interstices in parts uneven or slightly nodulose. Abdomen slightly flattened along middle, fifth segment slightly longer than second, and with two apical bristles. Legs rather long; femora dentate, the front ones very feebly so; front tibiæ with a conspicuous fringe of long hairs, commencing near base of under surface, and partly continued on to tarsi. Length 5 mm.

New South Wales. Tooloom in January. Type in Queensland Museum, C/3180.

On the under parts the clothing is entirely stramineous or buff, on the upper surface more than half of the clothing is stramineous, but in parts becoming slightly infuscated; on the elytra there are numerous small black, velvety looking spots; just before the summit of the apical slope there is a conspicuous V of pale scales and setæ, extending from the suture across three interstices on each elytron, behind which the scales are entirely pale; the setæ on the V are almost white, and are slightly fasciculate in appearance. On the pronotum the clothing is in ill-defined vittæ, but many of the setæ differ in colour from the adjacent scales. The V is suggestive of affinity with *S. variegatus*, but on that species the front tibiæ are not fringed. The "peep hole" on each side of the prosternum is represented by a small fovea connected with the wall of the pectoral canal by a narrow slit. A second specimen differs from the type in having the front tibiæ shorter, with the fringe much less conspicuous but still distinct, and the abdomen slightly more convex; but as its rostrum and antennæ are as on the type, presumably it is also a male. A third specimen, taken by Mr. Hacker on Bunya Mountain, agrees well with the type in structure, but is abraded and stained; the V of its elytra is less distinct, but its middle appears as a rather distinct fascicle on the suture; many of its prothoracic scales have a golden gloss.

***Storeus humeralis* n. sp.**

♂. Black, some parts obscurely diluted with red, antennæ and legs (wholly or in part) paler. Clothed with scales varying from almost white to sooty-brown, and with a few setæ.

Rostrum slightly longer than prothorax, slightly curved, almost parallel sided; sculpture concealed by clothing up to apical fourth (where the antennæ are inserted) beyond which the punctures are crowded. Prothorax strongly transverse, parallel-sided to near apex, and then strongly narrowed; with small dense punctures, interspersed with many larger ones, all partly obscured by clothing. Elytra distinctly wider than prothorax, widest at about basal fourth, base trisinate, but only the scutellar notch distinct; with rows of large punctures in feeble striæ, the outer row concealed from above. Abdomen somewhat flattened along middle, the fifth segment slightly longer than second and third combined, sutures of second to fourth almost straight at sides. Legs moderately long; femora acutely and almost equally dentate; front tibiæ with a conspicuous fringe of long hairs from near base; claws each with a large appendix. Length, 5-7 mm.

♀. Differs in having the rostrum longer, thinner, slightly more curved, clothed only near base, elsewhere with rather small punctures, antennæ inserted two-fifths from apex, abdomen more convex, the fifth segment slightly smaller and front tibiæ not fringed.

Queensland. National Park in November and Bunya Mountains in December (H. Hacker). Type in Queensland Museum; cotype *I. 16334*, in South Australian Museum.

A large dingy species. The scales on the head, rostrum, and prothorax are mostly of a rusty-brown colour; somewhat similar scales form a large patch on each shoulder, the inner hind end of which is connected with a distinct V of pale scales, the junction of which is on the suture at the summit of the apical slope; before, beyond, and at the sides of which the scales are small and of a sooty-brown colour, but on the tips the scales are again pale. On each of the National Park specimens there is a large, obscurely reddish, patch at the base of the abdomen, the patch on the male continued on to the metasternum. The abdominal sutures are much less curved than is usual. The elytral epipleuræ are rather wide, but become narrow posteriorly, and terminate slightly before the apex of abdomen. The "peep holes" on the prosternum are fairly large.

Storeus ventralis n. sp.

♂. Black, parts of under surface obscurely reddish, rostrum, antennæ and legs (wholly or in part) paler. Moderately clothed with scales of various colours, becoming almost uniformly whitish on under parts.

Rostrum slightly longer than prothorax, gently curved; with acute ridges, alternated with rows of squamiferous punctures to apical third (where the antennæ are inserted), in front with crowded punctures. Prothorax strongly transverse, apex suddenly narrowed; with dense, normally concealed punctures. Elytra wider than prothorax at base, widest slightly before middle, base faintly trisinate; with rows of large punctures, appearing much smaller through clothing, in parts slightly nodulose. Two basal segments of abdomen with a shallow depression, third and fourth very short, fifth slightly longer than second to fourth combined, with a large depression. Femora edentate; front tibiæ with a thin fringe of long hairs commencing almost at base. Length, 3.5-4 mm.

♀. Differs in having the rostrum much longer, thinner, more strongly curved, paler, glabrous and almost impunctate, antennæ inserted at apical two-fifths; abdomen evenly convex, fifth segment not as long as second and third combined, and front tibiæ not fringed.

Queensland. Stradbroke Island in March (H. Hacker and A. M. Lea), and in December (Hacker). Type, *I. 16305*, in South Australian Museum; cotype in Queensland Museum, *C/3182*.

Distinguished from the other species with fringed tibiæ, except *S. majusculus*, by the edentate femora and very short third and fourth segments of abdomen; from that species it differs in being somewhat smaller, rostrum smaller, apical patch of elytra less defined or missing, and tibial fringe more

conspicuous. No two specimens, of the nine taken, are exactly alike in their clothing; the males have about half of it black or blackish, with slaty-grey spots or single scales scattered about, and with small stramineous patches, on which there are usually a few pale setæ; on the females the clothing is mostly of a rusty brown, with small dark spots and numerous whitish setæ (to a certain extent their clothing is as on *S. albosignatus*). The "peep holes" of the prosternum are masked by paler scales than on the adjacent surface.

***Storeus tenuirostris* n. sp.**

♀. Blackish, rostrum antennæ and parts of legs reddish. Densely clothed with stramineous-brown scales and setæ, with numerous small black spots on elytra, and three obscure ones on pronotum, underparts with almost white clothing.

Rostrum distinctly longer than prothorax, thin, cylindrical, slightly curved, glabrous, and sparsely and minutely punctate. Antennæ inserted in exact middle of rostrum. Prothorax strongly transverse, sides evenly rounded to near apex, and then suddenly narrowed; with crowded, more or less concealed punctures. Elytra subcordate, sides almost evenly rounded, base distinctly trisinate, with rows of large, partially concealed, setiferous punctures; alternate interstices very feebly elevated, and some of them slightly nodulose. Abdomen moderately convex, fifth segment slightly longer than second. Femora acutely dentate, claws appendiculate. Length, 5 mm.

New South Wales.—Sydney (A. M. Lea), unique.

In general appearance fairly close to *S. fimbripes*, but the base of the elytra is conspicuously trisinate, their epipleuræ are less defined (the curvature being continuous with the rest of the elytra) and the abdominal segments are more strongly curved. In appearance it also approaches *S. variegatus*, but the apex of the tibiæ has a much less acute projection, the elytra are without a black basal patch, the rostrum is distinctly thinner than on its female, and the appendix to each claw is smaller. Probably its male belongs to the group with fringed front tibiæ.

***Storeus bæodontus* n. sp.**

(Text-figure 1, H, I.)

Reddish-brown, rostrum antennæ and tarsi somewhat paler. Moderately clothed with greyish-white scales, slightly variegated on elytra, and frequently with a golden gloss, especially between the eyes, on underparts almost uniformly white.

Rostrum slightly longer than prothorax, moderately curved, feebly dilated at base; with fine ridges alternated with rows (squamiferous near base) to between antennæ (at apical two-fifths), in front of which the punctures are sparse and minute. Prothorax strongly transverse, sides strongly rounded, apex about two-thirds the width of base; punctures mostly concealed. Elytra elongate-subcordate, base bilobed, with rows of large, partially concealed punctures. Fifth segment of abdomen slightly longer than second. Femora minutely dentate. Length, 2.75–3 mm.

New South Wales.—Sydney (Dr. E. W. Ferguson), Jenolan (J. C. Wiburd).

Not very close to any previously described species, and in general resembling some species of *Elleschodes*, but with the pectoral canal well defined. Each "peep hole" is small, and from it there is a narrow groove extending obliquely upwards. It is difficult to see the appendix to each claw, until this has been mounted on a slide for examination. The six specimens examined have the rostrum with well-defined ridges, but clothed only at the basal third or fourth, and the abdomen evenly convex, so they are probably all females. On several of them the suture is feebly infuscated, and on two of them the metasternum is darker than the abdomen. A specimen from Hobart (A. M. Lea) apparently belonging to the species, is slightly larger and more densely clothed than the others, and but few of its scales have a golden gloss.

***Storeus scutellaris* n. sp.**

(Text-figure 1, J, K.)

Reddish-brown, suture and most of under surface black, rostrum, antennæ (the club infuscated) and tarsi reddish. Moderately clothed with white, stramineous, and sooty scales, becoming uniformly white on underparts.

Rostrum slightly longer than prothorax, moderately curved, parallel-sided; with acute ridges alternated with rows of squamiferous punctures to apical third (where the antennæ are inserted), in front with sharply defined punctures, except on a median line. Prothorax strongly transverse, sides strongly rounded, apex about two-thirds the width of base; punctures crowded but mostly concealed. Elytra elongate-cordate, base bilobed; with regular rows of large, partially concealed punctures. Abdomen with first and second segments slightly depressed in middle, fifth slightly shorter than second and third combined. Femora slightly but acutely dentate. Length, 3 mm.

South Australia.—Melrose in October (A. M. Lea). Type (unique), *I. 16299*.

A mottled species, somewhat like the following in miniature, but with a thinner and more curved rostrum, blackish club, and scutellum with snowy scales. The mottling is partly due to the derm being sparsely clothed in places. On the upper surface most of the scales are whitish, and these form two connected vittæ on each side of the prothorax; six short vittæ at their base, and many small spots on the rest of the elytra; the sooty spots are few and inconspicuous, and the stramineous scales are sparse. The "peep holes" of the prosternum are feeble. On this species the claws are certainly appendiculate, but they are nearest in approach to ones that may definitely be regarded as simple.

***Storeus acutidens* n. sp.**

(Text-figure 1, L.)

♂. Black, rostrum, parts of elytra and of legs obscurely brownish, antennæ and tarsi paler. Moderately and irregularly clothed with whitish,

stramineous and sooty scales, becoming almost uniformly whitish on underparts.

Rostrum comparatively stout, slightly longer than prothorax, straight to near apex; with acute ridges alternated with rows of squamiferous punctures to apical fourth (where the antennæ are inserted), in front of which the punctures are crowded and naked. Prothorax moderately transverse, sides rounded, at apex suddenly narrowed. Elytra elongate-subcordate, sides nowhere parallel; with rows of large, partially concealed punctures. Abdomen somewhat flattened along middle, fifth segment slightly longer than second and third combined. Legs rather long, femora acutely dentate, tibiæ thin. Length, 3.75-4 mm.

♀. Differs in having the rostrum longer, thinner, feebly and evenly curved throughout, glabrous, ridges and punctures less pronounced, antennæ inserted at apical two-fifths, abdomen evenly convex, fifth segment shorter, and legs slightly shorter.

Australia.

A large acutely dentate species, with rostrum somewhat as on *S. variegatus*, but shorter, elytra with irregularly distributed blackish spots, and without a pale V. On the male a large portion of the elytra is obscurely reddish, on the female they are almost entirely black. On the head and rostrum most of the scales are dark, on the pronotum they are mostly pale, with three obscure dark vittæ; on the elytra about half of the scales are of a slaty-white, many of the spots bordered or mixed with stramineous; with numerous small black spots. Allowing for the notches at their junction the outlines of the prothorax and elytra are elongate-elliptic; the base of the latter from directly above is seen to be evenly incurved, from behind it appears to be feebly bilobed. The "peep holes" are semi-double, but obscured by clothing.

***Storeus insularis* n. sp.**

♂. Dull reddish-brown, antennæ and legs paler, most of under surface black. Densely clothed with slaty-grey or whitish scales and setæ, with some small and ill-defined dark patches on prothorax and elytra, but the latter also with a large dark median spot, behind which the scales are paler than elsewhere.

Rostrum thin, parallel-sided, slightly curved, slightly longer than prothorax; with fine ridges alternated with rows of squamiferous punctures almost to between antennæ (these inserted at apical third), in front with crowded and small punctures. Prothorax strongly transverse, apex about two-thirds the width of base, punctures normally concealed. Elytra elongate-cubcordate, sides nowhere parallel, base feebly trisinate (from behind appearing bilobed); with rows of large, partially concealed punctures. Two basal segments of abdomen slightly depressed in middle, fifth very little longer than second. Femora acutely dentate, tibiæ rather long and thin, the apical hook acute. Length, 2.5 mm.

Queensland.—Magnetic Island in September (A. M. Lea). Type (unique), *I. 16247*.

At first glance almost appearing to belong to *Emplesis macrosticta*, but the elytral setæ are much more conspicuous, the femora are dentate, and the claws are strongly appendiculate. The dark spots on the elytra (except the large median one, beneath which the derm is also dark) are narrow, and, although ill-defined, suggest the tessellation of many of the species of *Emplesis*. The "peep holes" of the prosternum are small and partly obscured by scales.

***Storeus hoplocnemis* n. sp.**

♂. Reddish-brown, tip of rostrum and parts of legs blackish. Densely clothed with brown scales and setæ of two shades of colour, becoming paler on under parts, and snowy on scutellum.

Rostrum thin, about one-fourth longer than prothorax, almost straight to insertion of antennæ at apical fourth, and then suddenly curved; with acute ridges, alternated with rows of squamiferous punctures to apical fourth, and then shining, with numerous sharply defined punctures. Prothorax moderately transverse, sides slightly dilated to near apex, and then suddenly narrowed to apex; punctures normally concealed. Elytra distinctly wider than prothorax, widest at about apical third, base bilobed; with rows of large, partially concealed, setiferous punctures, some of the interstices feebly nodulose. Abdomen with a feeble depression on first segment, fifth about as long as second and third combined. Legs rather long; femora unarmed; front tibiæ with a distinct projection on lower surface one-third from apex; claws appendiculate. Length, 3–3.5 mm.

♀. Differs in having the rostrum longer, thinner, gently curved throughout, glabrous, only the median ridge fairly distinct, the punctures smaller, antennæ inserted at apical third, elytra wider, abdomen evenly convex, the fifth segment smaller, and front tibiæ only slightly angular at the position of the projection.

New South Wales.—Dorrigo (W. Heron); Queensland.—Bunya Mountains in December (H. Hacker). Type, *I. 16308*, in South Australian Museum; cotype in Queensland Museum, *C/3183*.

Very distinct by the front tibiæ of the male. On the pronotum the scales are of an almost uniform brown, but the setæ are mostly blackish. On the elytra the scales are of two shades, of which the slightly paler one occupies most of the apex, and is triangularly advanced on the suture, the two shades separated by small blackish spots and lines obliquely placed. There are some sparse interocular setæ. The specimen from Queensland is larger than the type, many of its body parts are black and most of the rostrum; its scales are also darker, but the two shades on the elytra are separated in the same way.

Storeus amplipennis n. sp.

♂. Blackish-brown, antennæ and tarsi paler. Densely clothed with brown scales and somewhat paler setæ, somewhat variegated on underparts.

Rostrum distinctly longer than prothorax, moderately curved, with acute ridges alternated with rows of squamiferous punctures to apical fourth (where the antennæ are inserted), in front with numerous naked punctures. Prothorax almost as long as the greatest width, apex about two-thirds the width of base; punctures normally concealed. Elytra cordate, base bilobed, beyond middle more than twice the width of prothorax; with many minute nodules posteriorly; with rows of large setiferous punctures, appearing small through clothing; each side at basal third with a lobe projecting downwards, but invisible from above. Abdomen with a shallow depression along middle of two basal segments, fifth almost as long as second and third combined. Legs rather long, femora edentate; front tibiæ with a distinct projection one-third from apex on lower surface, middle pair with a smaller projection. Length, 4 mm.

Queensland.—Mount Tambourine, in November (H. Hacker). Type (unique) in Queensland Museum, C/3184.

A very distinct species, allied to the preceding one, but larger, elytra much wider in proportion, each with a large lateral sub-basal lobe, with many small nodules posteriorly, and middle as well as front tibiæ with a projection. The femora are not dentate, but the hind pair have a distinct swelling at the position of a tooth. The scales on the upper surface are almost uniformly coloured, but the setæ are somewhat paler; on the abdomen the scales are mostly pale, becoming darker posteriorly, on the front legs the clothing is darker than on the others. There are numerous suberect interocular setæ.

Storeus carinirostris n. sp.

(Text-figure 1, M.)

♂. Reddish-brown, metasternum sometimes infuscated. Densely clothed with stramineous scales, the elytra with several dark spots, and numerous pale and dark setæ.

Rostrum slightly longer than prothorax, gently curved; with acute ridges, alternated with rows of squamiferous punctures to apical third (where the antennæ are inserted); in front with crowded but not always naked punctures. Prothorax distinctly transverse, sides strongly rounded, apex about half the width of base; punctures normally concealed. Elytra elongate subcordate, base slightly and evenly incurved, sides nowhere parallel; rows of setiferous punctures obscured by clothing. Abdomen gently convex, fifth segment very little longer than second. Femora slightly but acutely dentate; front tibiæ with a rather acute projection on lower surface two-fifths from apex. Length, 3.5–4 mm.

♀. Differs in having the rostrum distinctly longer, thinner, and more curved, its ridges, except the median one, and squamiferous punctures not passing the antennæ (which are inserted two-fifths from apex), in front with smaller punctures, all naked; abdomen more convex, and front tibiæ without projection.

New South Wales.—Dorrigo (W. Heron). Type, *I. 16281*.

The front tibiæ have a projection on the lower surface, approaching those of the two preceding species, but the general outlines differ, the femora are dentate, and the clothing is more variegated. On several specimens many of the scales are shining, or have a faint golden gloss. On the apical third of each elytron, on the third and fourth interstices, there is a rather small but distinct blackish spot, occasionally broken up into two or three very small ones, towards the sides there are several smaller ones, usually not quite as dark. From the sides the elytra are seen to have numerous suberect setæ of two colours, but from above only the pale (almost white) ones are distinct, and they are fairly numerous on the apical slope; from behind the setæ are seen to form a quite regular row on each interstice. The claws, although appendiculate, appear to be simple from most directions. The "peep holes" of the prosternum are sometimes quite sharply defined, but they are usually obscured by clothing. The sexes may be readily distinguished by the rostrum and front tibiæ, although the basal half of the former is sculptured and clothed much the same in the female as in the male; the abdomen scarcely differs sexually.

Storeus inconstans n. sp.

♂. Blackish, some parts obscurely diluted with red, part of rostrum, antennæ, and tarsi reddish. Densely clothed with scales varying from stramineous to whitish and black, becoming uniformly pale on underparts; with numerous setæ on upper surface, and a few between eyes.

Rostrum distinctly longer than prothorax, moderately curved; with acute ridges, alternated with rows of squamiferous punctures to apical fourth (where the antennæ are inserted); in front with crowded, naked punctures. Prothorax distinctly transverse, sides gently dilated to near apex, and then suddenly narrowed; punctures crowded but normally concealed. Elytra much wider than prothorax, sides gently rounded to beyond the middle, base distinctly trisinate; with seriate rows of setiferous punctures, much obscured by clothing. Abdomen with first and second segments slightly depressed along middle, the fifth almost as long as second and third combined. Femora stout, neither grooved nor dentate; tibiæ rather thin. Length, 4-4.5 mm.

♀. Differs in having the rostrum longer, thinner, more strongly and evenly curved, ridges and seriate rows of squamiferous punctures confined to base, elsewhere with small punctures, and abdomen evenly convex, with the fifth segment shorter.

Queensland.—Tambourine, in November (H. Hacker); New South Wales.—Tooloom, in January (Hacker). Type, in Queensland Museum *C/3185*; cotype, *I. 16309*, in South Australian Museum.

In general appearance somewhat like *S. albosignatus* on an enlarged scale. Considerably wider than *S. majusculus*, the dark markings more scattered, and front tibiæ of male not fringed. The dark scales on the elytra form small spots not alike on any two of the four specimens taken; they are numerous and irregularly distributed on two of them, but hardly more than stains on the others; there are also many pale spots, so that the elytral colours appear to be irregularly intermingled; on the pronotum the clothing is also variable. The blackish and whitish setæ of the elytra are about equally numerous, but from above the whitish ones appear to be in the majority, from behind they are seen to form a regular row on each interstice. On one of the females there are two small spots of black scales on the head. Each claw has a large appendix, although it is usually difficult to see it. The "peep holes" of the prosternum are usually obscured by scales.

***Storeus inconspicuus* n. sp.**

♂. Dark reddish-brown, abdomen, antennæ, and legs paler. Densely clothed with stramineous-brown scales, with a few paler and darker spots; becoming almost white on under surface. With fairly numerous setæ, subdepressed on pronotum, suberect on elytra, on the latter forming a row on each interstice.

Rostrum distinctly longer than prothorax, slightly curved; with fine ridges alternated with rows of squamiferous punctures to apical fourth (where the antennæ are inserted); in front with numerous naked punctures. Prothorax about as long as the basal width, sides strongly rounded, apex about two-thirds the width of base. Elytra subcordate, base distinctly wider than prothorax, sides nowhere parallel, base feebly trisinate; rows of setiferous punctures obscured by clothing. Two basal segments of abdomen somewhat flattened along middle, fifth very little longer than second. Middle and hind femora moderately dentate, the others edentate. Length, 2.5 mm.

Northern Queensland (Blackburn's collection).—Type (unique), *I. 16315*.

An unusually small species, somewhat like *S. albosignatus* in miniature, but with less numerous spots and some of the femora dentate. On the elytra there are some minute blackish spots on the odd interstices, and a fairly large one on the suture at the basal third, behind it there is a small V formed by minute white spots. On the elytra many of the setæ are of a snowy whiteness; on the pronotum they are nearly all dark.

***Storeus fasciculatus* n. sp.**

♂. Blackish, antennæ and tarsi obscurely reddish. Densely clothed with variegated scales and setæ, and with numerous fascicles.

Rostrum considerably longer than prothorax, almost straight to near apex, parallel-sided, with acute ridges alternated with rows of squamiferous punctures to apical fourth (where the antennæ are inserted); in front with numerous naked punctures. Prothorax about as long as the basal width, sides dilated to apical third and then suddenly narrowed, punctures normally concealed. Elytra much wider than prothorax, sides strongly trisinate before middle, and with a distinct lobe near metasternum, base bilobed; seriate rows of setiferous punctures appearing rather small through clothing. Abdomen flattened along middle, fifth segment slightly longer than second. Legs rather long, femora dentate. Length, 4 mm.

Queensland.—Cairns district (F. P. Dodd). Type, *I. 16313*.

A beautiful and well-marked species, which may be considered as worthy of generic rank, but the pectoral canal, "peep holes," and appendiculate claws are as on many species of the genus. Much of the clothing on the upper surface is of a chocolate-brown colour, changing to rusty-brown and stramineous in places; on the pronotum there is a small whitish spot on each side of the base. On each elytron there is a narrow white line, commencing immediately behind the spot on the pronotum, and running obliquely inwards to beyond the middle, the line connected with its fellow by another narrow line, which traverses the suture at the basal fifth, and much of the intervening space having velvety black scales; there is a large pale patch partly before and partly on the apical slope, bordered by velvety black scales. Many of the setæ on the upper surface and all in the rows of punctures are white, giving it a speckled appearance. On the under surface the scales are mostly stramineous or rusty-brown, the abdomen with a dark vitta on each side, commencing at the tip of the second segment, and a less distinct but longer median one; there is also a large snowy spot on each side of the base of the prosternum. Each tibia appears to have a projection at its outer base, but this is due to the setæ there being longer than elsewhere. Of the fascicles there are two conspicuous interocular ones, two semi-double ones at the apex of the pronotum, and four traversing its apical third; on each elytron there are two large and several small ones, the largest one is apparently supported on an elongated tubercle near the middle of the third interstice, the setæ composing it are mostly rusty-brown, becoming velvety-black in front, and whitish behind, the next largest is on the preapical callus, and is less variegated.

Two females, from Southern Queensland, probably belong to the species; they differ in markings, but the fascicles are the same in position, although somewhat reduced in size; the rostrum is slightly longer, much thinner, gently curved throughout, clothed only on the basal third, the ridges much shorter, antennæ inserted only slightly in front of the middle, abdomen more convex, with the third and fourth segments larger and the fifth smaller; the abdominal markings of the type are indicated, but the snowy spots of the prosternum are completely absent. One is from Stradbroke Island (H. J. Carter); on its

pronotum the two small pale basal spots are narrowly connected, and each is produced obliquely forwards so as almost to touch one of the outer fascicles; on the elytra the narrow white lines are present but less distinct, as the whole of the space between them is clothed with pale scales as a wide sutural vitta, which is suddenly dilated into a large angular patch just beyond the largest fascicles, its femora are more strongly dentate than on the type. The other female, from the National Park (H. Hacker), is in the Queensland Museum, and is smaller (3.5 mm.), most of the clothing on its upper surface is of a rusty-red, there are no white scales on its pronotum; the pale sutural patch is hardly more than indicated, and the patch beyond the largest fascicles is greatly reduced in size and almost divided in two; the femora are less strongly dentate than on the type, but the basal projections of the tibiæ are larger.

***Storeus seticollis* n. sp.**

♀. Reddish-brown, club infuscated. Densely clothed with pale brown or rusty scales, interspersed with numerous setæ, with many small whitish spots on elytra; underparts mostly with pale clothing.

Rostrum thin, about once and one-half the length of prothorax, gently curved, very sparsely clothed on basal third; with feeble rows of punctures to apical two-fifths (where the antennæ are inserted), in front with sparse and minute punctures. Prothorax moderately transverse, sides slightly dilated from base to near apex, and then suddenly narrowed; punctures normally concealed. Elytra much wider than prothorax, base feebly bisinuate, from behind appearing bilobed, sides lobed near metasternum; with seriate rows of punctures reduced in apparent size by clothing. Abdomen evenly convex, fifth segment slightly longer than second. Femora acutely dentate, claws strongly appendiculate. Length, 3.5 mm.

Queensland.—Cairns district (A. M. Lea). Type (unique), *I. 16310*.

Evidently allied to the preceding species, but markings on a different plan, fascicles reduced in numbers and size, and tibiæ no wider near base than elsewhere. On the pronotum the scales are almost uniformly brown, but there are many blackish setæ; on the elytra there are many small whitish spots, nearly all of which are crowded on a subtriangular space on each side at the basal third; the dark setæ are much less numerous than on the pronotum, and there are some whitish ones as well, from behind they are seen to form a regular row on each interstice. Some whitish setæ form a small fascicle on the third interstice about its middle, and there are two very feeble dark fascicles between the eyes. Many of the seriate punctures on the elytra are without setæ, and even when present they are below the general level. The "peep holes" of the prosternum are rather large.

***Storeus hystricosus* n. sp.**

♂. Blackish, rostrum antennæ and legs more or less reddish. Densely clothed with dingy brown scales, interspersed with numerous long erect setæ

the latter also form two feeble fascicles at the apex of prothorax, several feeble ones on elytra, and a long and very distinct one (supported on a tubercle) on the third interstice about the middle.

Rostrum about the length of prothorax, slightly curved, parallel-sided; with fine ridges alternated with rows of setiferous punctures to apical third (where the antennæ are inserted), in front with numerous naked punctures. Prothorax moderately transverse, basal half parallel-sided, rapidly narrowed in front; punctures concealed. Elytra elongate-subcordate, sides nowhere parallel, base feebly trisinate, from behind appearing bilobed; with rows of unusually large punctures, but almost concealed by clothing. Fifth segment of abdomen slightly longer than second. Femora slightly dentate, tibiæ angular near outer base, claws strongly appendiculate. Length, 2.5-3 mm.

Queensland.—Cairns. Type in Macleay Museum.

On the type there are two small fascicles at the apex of the elytra, and one on each preapical callus, the setæ so closely compacted that the fascicles resemble spines (from a second specimen the apical ones have been abraded); the long fascicle on each elytron is more than half the length of the prothorax, and readily distinguishes the species from all previously named ones. A new genus may eventually be proposed for it, but the deep pectoral canal, distinctly separated front coxæ, "peep holes" of prosternum (concealed by clothing on one specimen) and strongly appendiculate claws, are as on many species of the genus.

Storeus eurypterus n. sp.

♂. Reddish-brown, metasternum somewhat infuscated. Densely clothed with variegated scales and setæ, some of the latter forming fascicles.

Rostrum about the length of prothorax, slightly curved; with fine ridges alternated with rows of setiferous punctures to apical fourth (where the antennæ are inserted), in front with numerous naked punctures. Prothorax moderately transverse, basal two-thirds almost parallel, then strongly narrowed to apex; punctures normally concealed. Elytra at base much wider than prothorax, oblong subcordate, base trisinate; with rows of large punctures, almost concealed by clothing. Abdomen gently convex, fifth segment slightly longer than third. Femora strongly and acutely dentate, the front ones less strongly than the others; claws each with a large basal appendix. Length, 3-3.5 mm.

Northern Queensland (Blackburn's collection). Type, *I. 16314*.

A conspicuously marked species with unusually wide elytra, the long fascicle on each of which is more loosely compacted than on the preceding species, and not supported on a tubercle; the clothing generally is more variegated, and the femora are much more acutely dentate. There are a few setæ between the eyes, but they could scarcely be regarded as forming fascicles;

on the pronotum the scales are stramineous and more or less sooty brown, unevenly mingled, but mostly pale on the sides; there are numerous setæ, of which some black ones form two feeble apical fascicles. On the elytra a fairly wide dark sutural patch dilates hindwards, till it passes two large fascicles, it is then marked by a narrow white M, beyond which it is again dilated (but not quite as dark), till it covers the whole apex, leaving a large patch (curved on its inner edge) from the shoulder to beyond the middle on each elytron; of a rather pale colour, almost stramineous, but in some lights with a golden gloss; the numerous erect setæ are mostly black, and some of these form a conspicuous fascicle on the middle of the third interstice. Close beside the scutellum the clothing is paler than elsewhere, slightly accentuating the trisinnuation of the base. Another male has a white M quite as distinct as on the type, but beyond it the derm is reddish, except that there is a blackish spot towards each side. A specimen, apparently a female, differs from the others in having the rostrum slightly thinner, longer and more curved, glabrous on the apical half, antennæ inserted about the apical third, and abdomen more convex.

Storeus cognatus n. sp.

♂. Pale reddish-brown, metasternum somewhat darker. Densely clothed with pale, almost stramineous, scales, in parts with a slight golden gloss, and in places with faint brown mottlings; under surface with sparser and almost white scales. Upper surface and legs, in addition, with numerous stiff setæ, mostly pale, but about middle of elytra some distinct blackish ones.

Rostrum moderately stout, the length of prothorax, slightly curved; with fine ridges, alternated with rows of setiferous punctures to apical fourth (where the antennæ are inserted), in front with crowded, naked punctures. Prothorax moderately transverse, sides slightly dilated, becoming strongly depressed towards apex. Elytra subcordate, base gently incurved and very little wider than prothorax, sides rather strongly rounded; with rows of large punctures, but normally almost concealed. Abdomen shining, fifth segment slightly longer than second, and with a small median fovea. Femora strongly and acutely dentate, tibiæ thin, claws appendiculate. Length, 2.5 mm.

Northern Queensland (Blackburn's collection). Type (unique), *I. 16335*.

The type of this species was mounted with specimens of the preceding one, and it certainly appears to be allied to it, but it differs from the male in the clothing being more uniform and paler, without fascicles, the elytra narrower and not trisinnuate at the base, the abdomen more sparingly clothed, and with a small subapical fovea.

Storeus apicalis n. sp.

♂. Reddish-brown, antennæ and legs paler, suture and parts of under surface blackish. Densely clothed with stramineous or buff, slightly variegated

scales, but a conspicuous dark patch on apex of elytra. With numerous suberect setæ, nowhere forming fascicles, and on the elytra forming a distinct row on each interstice.

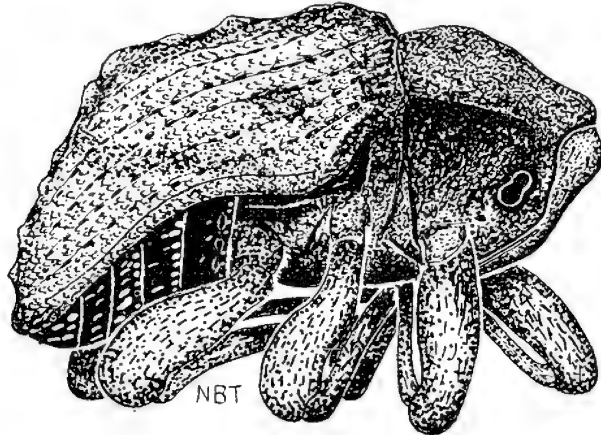
Rostrum slightly longer than prothorax, gently curved, parallel-sided; ridges and seriate punctures concealed throughout by scales and setæ. Antennæ inserted at apical fourth of rostrum. Prothorax strongly transverse, parallel-sided to near apex and then strongly narrowed; with crowded, normally concealed punctures. Elytra elongate-cordate, base bilobed, sides nowhere parallel; with regular rows of large punctures, appearing much smaller through clothing. Abdomen somewhat flattened along middle, fifth segment slightly longer than second. Femora strongly and acutely dentate, claws semibifid. Length, 4-4.25 mm.

Queensland.—Cairns district (F. P. Dodd and Dr. E. W. Ferguson). Type, *I.* 16329.

An elongate-elliptic species, with the general appearance of *Artematocis*, but the femora are strongly dentate. The rostrum is clothed to the mandibles, and the claw joints are more exerted than usual, with the appendix to each claw so large that from some directions it appears bifid. From above the setæ appear to be almost or entirely white, and just before the apical patch unusually numerous, but from the sides many of them are seen to be more or less dark brown. The elytra are evenly curved posteriorly, but at the first glance the apical patch causes them to appear abruptly vertical, as on many Bostrychidæ.

Storeus specularis n. sp.

(Text-figure 1, N.)



Text-figure 2. *Storeus specularis* Lea.

♂. Black, antennæ and legs and sometimes the tip of rostrum reddish. Densely clothed with scales and setæ, varying from stramineous to rusty-brown; a few minute sooty spots on elytra.

Rostrum almost as long as prothorax, moderately curved, feebly diminishing in width to apex, each side of base notched; with fine ridges, alternated with rows of setiferous punctures to apical third (where the antennæ are inserted), in front with naked punctures. Prothorax strongly transverse, sides gently rounded, in front strongly depressed on each side; punctures only partially concealed. Elytra subcordate, base trisinate and slightly wider than elytra, widest near base, where there is a distinct lobe on each side (hardly indicated from above); with rows of large, setiferous punctures, appearing smaller through clothing; with many small nodules. Prosternum with a semi-double fovea on each side in front, pectoral canal deep and wide, narrowed between front coxæ, but these well separated. Fifth segment of abdomen slightly longer than second. Middle and hind femora grooved and moderately dentate, the front ones feebly grooved and slightly dentate; claws appendiculate. Length, 5-5.5 mm.

New South Wales.—Toooloom, in January (H. Hacker); Queensland.—Mount Tambourine, in November (Hacker). Type in Queensland Museum, C/3186; cotype, I. 16330, in South Australian Museum.

On examining a specimen of this species with the rostrum at rest in the pectoral canal an eye was seen apparently looking out of a hole in the prosternum, even the facets were visible; on looking closer a fovea was seen on each side obliquely in front of the coxæ, the fovea is semi-double and does not go completely through, as there is a very thin membrane between it and the canal. It appears to serve as a "peep hole" for the beetle, when all its appendages are contracted together. Somewhat similar "peep holes" are to be seen on most species of the genus, although they are occasionally obscured by clothing or dirt. The specimens from Mount Tambourine are all more or less muddy, so that the scales are obscured; on the Toooloom specimens the clothing is in perfect condition, but varies somewhat; on the more strongly marked specimens a patch of stramineous scales commences on each shoulder, its inner margin runs obliquely inwards to the third interstice at the basal fourth, along which it is continued till it becomes oblique to the suture, at the summit of the apical slope; the pale scales (except for some minute sooty spots) covering about three-fourths of the surface; on other specimens the disposition is much the same, but the shades are less contrasted; the small nodules are often rather densely setose, and some of them have a fasciculate appearance. On the pronotum the clothing consists of setæ only, stramineous and brown, the former colour mostly in vittæ, but the surface is not very densely clothed, so that many of the punctures are normally visible; on the rostrum and under surface the clothing also consists solely of setæ, but on the legs of setæ and scales. Of the specimens taken by Mr. Hacker six have the rostrum with distinct ridges to the insertion of antennæ, and with

numerous sharply defined punctures in front, on five others the ridges do not extend so far, and the front part has smaller and sparser punctures; the insertion of antennæ and the abdomen, however, do not differ, and the differences are probably not sexual.

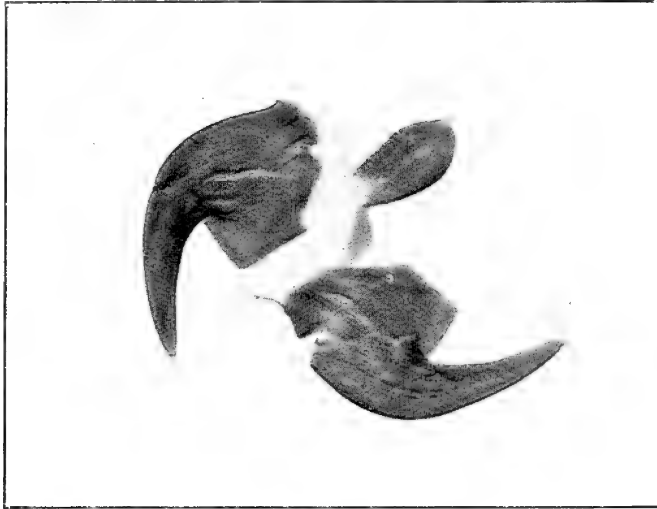


Photo., H. Hacker.

Text figure 3.—Claws of *Storeus specularis* Lea.

A female, from the Bloomfield River (C. French, junr.) probably belongs to this species, or to an allied one. Its clothing is less variegated, the setæ are stouter and more scale-like in character, the rostrum is slightly longer, more curved, much thinner, less distinctly notched at base, and elsewhere almost impunctate; antennæ inserted not quite so close to apex, and abdomen more convex, but the femora, especially the front ones, are more strongly dentate.

***Storeus armipennis*, n. sp.**

(Text-figure 1, O.)

♂. Black, antennæ reddish, parts of rostrum and of tarsi somewhat darker. Densely clothed with scales varying from stramineous, through rusty-brown almost to black, the shades irregularly distributed.

Rostrum slightly longer than prothorax, moderately curved, almost parallel-sided except for a triangular notch on each side of base; with acute ridges, alternated with rows of squamiferous punctures to apical fourth (where the antennæ are inserted), in front with naked punctures. Prothorax strongly transverse, hind angles rounded off, sides rounded, strongly depressed in front, the middle acutely produced; punctures normally concealed. Elytra strongly trisinate at base, each side strongly lobed near base, the lobe not distinct

from above, sides thence strongly narrowed to apex; with rows of setiferous punctures, alternate interstices slightly elevated and in places nodulose, but the third strongly elevated in middle; a pair of large, acutely conical tubercles, on suture at summit of apical slope. Prosternum with a large deep fovea on each side, with a triangular projection between it and pectoral canal. Fifth segment of abdomen almost as long as second and third combined. Femora strongly dentate, claws appendiculate. Length, 5-6.5 mm.

♀. Differs in having the rostrum slightly longer and thinner, ridges and scriate punctures terminated before antennæ (these inserted not quite so close to apex), punctures in front smaller and sparser, and abdomen slightly more convex.

Queensland.—Endeavour River (Macleay Museum)

A very distinct species, in general appearance very different from all others referred to the genus, but in some respects allied to the preceding species. The intercoxal process of the metasternum is strongly transverse and gently concave, much as on several species of *Melanterius*, but the appendiculate claws forbid its being placed in the Cryptorhynchides. The "peep holes" of the prosternum are unusually large, and the triangular processes near them are much as on *S. maximus*. Seen from the sides the base of the rostrum appears slightly elevated above the head, and the front part of the latter to be flattened. From the side each elytron is seen to have a large lobe, extending almost the length of the prothorax, abruptly terminated, the lobe bounded by the ninth row of punctures; each side has a strong row of epipleural punctures, concealed from above. The second segment of the abdomen is not much longer than the third or fourth. A specimen from the South Johnstone River (H. W. Brown), in the South Australian Museum, is entirely pale (except that a few of the setæ are blackish), but it is evidently immature.

Storeus lætus n. sp.

♂. Reddish, a large blackish elliptic blotch on elytra on the basal two-fifths, occupying rather more than the sutural third, metasternum deeply infuscated. Densely clothed with stramineous scales, mostly with a golden gloss, becoming white on under parts; a row of setæ on each odd interstice of elytra.

Rostrum the length of prothorax, slightly curved, not quite parallel-sided; with fine ridges, alternated with rows of setiferous punctures to apical third (where the antennæ are inserted), in front with numerous naked punctures. Prothorax strongly transverse, sides subparallel to near apex; punctures normally concealed. Elytra elongate-subcordate, base feebly trisinate, from behind appearing bilobed; rows of setiferous punctures almost concealed by

clothing. Abdomen slightly flattened along middle, the fifth segment slightly longer than second. Femora edentate, the middle and hind ones moderately grooved; claws appendiculate. Length, 2.5–3 mm.

♀. Differs in having the rostrum thinner and slightly longer, ridges and setiferous punctures scarcely extending to middle, punctures elsewhere smaller and sparser, antennæ inserted two-fifths from apex of rostrum, abdomen evenly convex, with the third and fourth segments somewhat larger.

Queensland.—Bunya Mountains, in December (H. Hacker). Types in Queensland Museum, *C/3187*; cotype, *I. 16336*, in South Australian Museum.

An elongate-elliptic species, with somewhat golden clothing. On the only male taken the abdomen is entirely pale, on three females part of the basal segment is as dark as the metasternum. The pronotum has a slightly speckled appearance, owing to the setæ, but not the scales, being opaque. The setæ forming the rows on the alternate interstices of elytra from above appear to be entirely white, but from the sides they are seen to be mixed with dark brown ones. Two females from the Clarence River (G. Compere) differ in being without the large dark patch on the elytra, and the metasternum only faintly infuscated.

***Storeus aurifer* n. sp.**

(Text-figure 1, P.)

♂. Dark reddish brown, rostrum antennæ and legs paler, metasternum and sometimes the abdomen black. Densely clothed with golden scales, becoming white on under parts.

Rostrum slightly longer than prothorax, moderately curved; with fine ridges alternated with rows of setiferous punctures to apical third (where the antennæ are inserted), in front with many naked punctures. Prothorax moderately transverse, sides feebly diminishing in width to near apex, and then strongly to apex itself; with dense, normally concealed punctures. Elytra wide, subcordate, base almost truncate, sides strongly rounded; with rows of large punctures, appearing small through clothing. Basal segment of abdomen with a shallow median depression, fifth almost as long as second and third combined. Femora stout, grooved, and edentate, the front pair with a fringe on basal two-thirds of lower surface; tibiæ thin, the front pair with a fringe on most of the lower surface; claws appendiculate. Length, 3–3.5 mm.

♀. Differs in having the rostrum longer, thinner, more curved, clothed only near base, elsewhere almost impunctate, antennæ inserted two-fifths from apex of rostrum, abdomen more convex, third and fourth segments larger, and front legs not fringed.

Fiji.—Taveuni, in May (A. M. Lea). Type, *I. 16300*.

A small rather wide species, with beautiful golden scales, quite an ordinary member of the genus so far as the pectoral canal and separation of front coxæ are concerned; the "peep hole" on each side of the prosternum

looks much like a spiracle, but it is anterior to the coxa. The species is considerably smaller than any of the others with front tibiæ fringed in the male, and appears to be allied to the preceding one, on which, however, the tibiæ are not fringed. On many specimens the scales on the upper surface are entirely golden, but on many others there are numerous small ill-defined spots on which the scales are white and opaque. There are no rows of setæ on the interstices. To see the derm clearly it is usually necessary to remove the scales. On many specimens the rostrum and antennæ are almost flavous.

Storeus minimus n. sp.

(Text-figure 1, Q.)

♂. Pale reddish-castaneous, metasternum usually somewhat darker than abdomen. Densely clothed with pale scales, mostly with a golden gloss, but becoming somewhat variegated on elytra, and sparser and whitish on under parts.

Rostrum slightly longer than prothorax, slightly curved; with fine ridges alternated with rows of squamiferous punctures to apical fourth (where the antennæ are inserted), in front with numerous naked punctures. Prothorax moderately transverse, sides rounded, base almost twice the width of apex; with dense, normally concealed punctures. Elytra subcordate, base feebly trisinate, from behind appearing bilobed, sides nowhere parallel; with rows of large punctures, appearing small through clothing. Abdomen with two basal segments somewhat flattened in middle, fifth slightly longer than second. Femora grooved and edentate, claws appendiculate. Length, 2-2.5 mm.

♀. Differs in having the rostrum slightly longer and thinner, ridged and clothed for a shorter distance, antennæ inserted two-fifths from apex of rostrum, and abdomen more convex.

Fiji.—Taveuni, in May; Mokongai, in June, Viti Levu. (A. M. Lea). Type, I. 16301.

The smallest known species of the genus, but with normal pectoral canal and separation of front coxæ; the "peep hole" on each side of the prosternum is fairly large, and is connected with an obliquely impressed line. It differs from the preceding species in being smaller and narrower, with different clothing and front legs not fringed in the male; like that species it has no rows of setæ on the elytral interstices. There are usually three series of brownish scales on the elytra; a small wide V on the suture about the middle (this is seldom absent), and two longer but much less distinct ones between it and the apex; the V's are usually fairly distinct, owing to the scales in their vicinity being paler than elsewhere, but the postmedian ones are often indicated by a few small spots or are occasionally absent. On some specimens on which the golden gloss is faint or absent, the elytral clothing appears as if slightly tessellated.

Storeus inermis n. sp.

♀. Reddish-brown. Densely clothed with variegated scales, becoming uniformly pale on under parts.

Rostrum thin, considerably longer than prothorax, moderately curved; glabrous, with sparse and minute punctures, becoming seriate towards base. Antennæ inserted in middle of rostrum. Prothorax moderately transverse, basal three-fifths sub-parallel, apical two fifths much narrower; punctures normally concealed. Elytra subcordate, base almost truncate, sides rounded; with rows of large punctures, appearing smaller through clothing. Abdomen evenly convex, fifth segment slightly longer than second. Femora edentate, claws appendiculate. Length, 2.5 mm.

Fiji.—Viti Levu (A. M. Lea). Type (unique), *I.* 16312.

A small species, like *S. albosignatus* on a reduced scale. It has the general appearance of *S. inconspicuus*, but there are no setæ on the pronotum, and very few, and those short, on the elytra. On the elytra the scales are mostly fawn-coloured, but variegated with numerous small whitish spots, and about the same number of brownish ones; on the pronotum most of the clothing is pale stramineous or almost white, but with numerous brownish spots. Many of the scales have a slight golden lustre in certain lights. The "peep holes" of the prosternum are fairly large.

EMPLESIS.

As will be seen under the preceding notes on *Storeus*, it is proposed to reinstate this genus, as its species have simple claws, although on many of them there is a basal swelling. The species unknown to me are:—

lineigera Pasc. Evidently allied to *scolopax*, having "*Capite inter oculos abrupte calloso.*"

simplex Pasc. The brief description of this insect fits so many species, that it is undesirable to attach the name to any before me, without additional particulars to those given.

ocellata Blackb. A fairly large species, with a large dark spot outlined by white scales, and common to the elytra and pronotum.

remissa Faust. A small species from Western Australia, the prothorax with four white lines of clothing.

On most species of the genus the clothing of the elytra is more or less tessellated, the spots are narrow and do not pass the boundaries of an interstice; on some species, in addition to the tessellation, there are large black blotches, or white patches. On the tessellated species there are normally two subtriangular dark spots at the base of the pronotum and often a dark median line, occasionally there are four spots at the base, and usually on such specimens there is another series of four spots across the middle, the outer ones of which are usually faint.

Emplesis interioris Blackb.

The type of this species is in the British Museum. Three small specimens from Oodnadatta, in the Blackburn collection (but not even placed under the genus) evidently belong to two species, either of which may be *interioris*; two are females, distinguished, *inter se*, only by the rostrum: rather strongly curved on one, almost straight on the other; the third is a male with much shorter rostrum, which is slightly longer than the prothorax, and its curvature intermediate between those of the females (in most species of the genus the rostrum of the female is considerably longer than that of the male, but it may be more or less strongly curved). The male is distinct from all others before me by its abdomen, the third and fourth segments of which are quite unusually short, their combined length being only about one-third of that of the fifth (on each female their combined length is equal to that of the fifth). Although described as a male Blackburn gave no masculine features in the description, the abdomen not even being mentioned.

Emplesis storeoides Pasc.

(Text-figure 1, R.)

In Masters' Catalogue this species is recorded as from Champion Bay, but from Gayndah in the description. There are before me many specimens from New South Wales (one from Armidale is the nearest in that State to Gayndah), Victoria, Tasmania, and South Australia that possibly belong to the species, one of which bears Blackburn's label as *E. storeoides*. A specimen of the same species from Mount Lofty was also identified by Blackburn as *E. umbrosus*, but it is a very different species from one, in my collection, also bearing his label as *umbrosus*. They vary in length 2.5-4 mm., and somewhat in markings, but they all have a conspicuous pale short postmedian V on the elytra, the V often connected with other pale markings, so as to appear like a very short M, extending to both sides; often the letter is outlined in front with dark scales, and these may form a large patch extending almost to the base, on the apical slope there are usually also a few dark spots; not infrequently the whole of the apical third is clothed with pale scales. The V is somewhat similar to that on *Storeus variegatus*, but that species has dentate femora, and is considerably wider. The general colour of the scales varies from almost ashen-grey to bright reddish-brown. Some of the darker specimens agree fairly well with the original description; but I am doubtful if the identification is correct.

NOTES ON PARASITIC HYMENOPTERA FROM AUSTRALIA, WITH DESCRIPTIONS OF NEW SPECIES.

BY ALAN P. DODD.

(Text-figures 1-4.)

THIS paper treats of the genus *Proamotura* Girault in the *Chalcidoidea*, one new species and two new varieties being described. In the same superfamily, a description of the first Australian species of the peculiar genus *Leptofoenus* Smith is given. In the family *Scelionidae* of the *Proctotrypoidea*, one new genus is proposed, and a genus new to Australia is recorded.

The illustrations have been prepared by Mr. I. W. Helmsing, of the Queensland Department of Agriculture.

CHALCIDOIDEA.

Family CLEONYMIDÆ.

Subfamily LEPTOFŒNINÆ.

Leptofoenus Smith.

Trans. Ent. Soc. London, vol. 1, 1862, p. 43.

Pelecinnella Westwood, Trans. Ent. Soc. London, 1868, p. 35.

C. T. Brues has recently (*Psyche*, Vol. XXVI., No. 6, 1924, p. 302-304) pointed out that the genus long known as *Pelecinnella* Westwood is antedated by *Leptofoenus* Smith. The genus is a very peculiar one, forming a distinct subfamily, characterised, *inter alia*, by the very long pronotum. Five species have hitherto been recognised, all occurring in tropical America. Hence, it is with much pleasure that I am able to record the presence of these curious Chalcids in Australia.

Leptofoenus australiensis new species.

Female.—Length, excluding the ovipositor, 14 mm.; including the ovipositor, 24 mm.

Brilliant metallic blue-green, the median lobe of the mesoscutum posteriorly, adjacent areas of the parapsides largely, and posterior two-thirds of the scutellum, æneous-black; abdomen marked with pure white as follows:—An oval spot on either side of segment 3, an oval spot on either side of apical third of segment 5 the spots almost meeting above at the median line, base of segment 8 above, apex of stylus, and a long narrow area on either side of the median line of the venter of segments 6 and 7; exerted oviposital valves dark, with a pale yellow band a little before the apex; coxæ metallic green, also posterior femora, the rest of the legs yellow-brown, the anterior femora washed with metallic inwardly, the posterior tibiæ dusky for central third

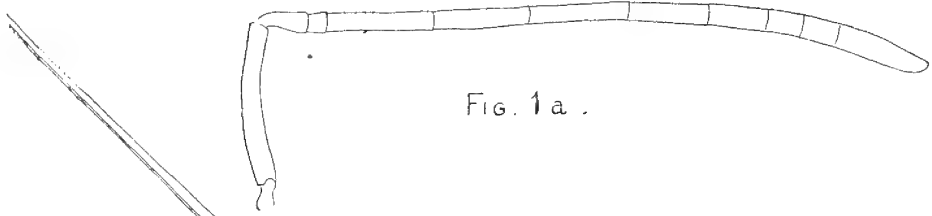


FIG. 1 a .

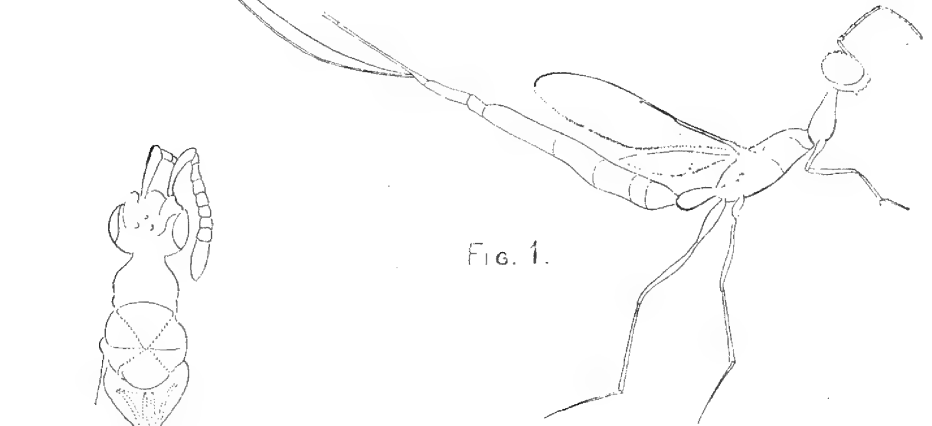


FIG. 1.

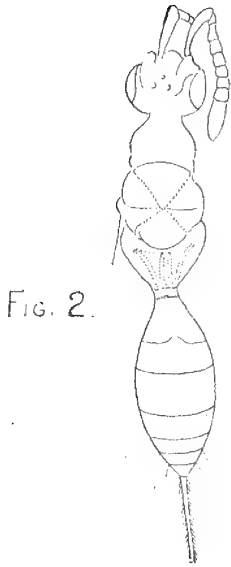


FIG. 2.

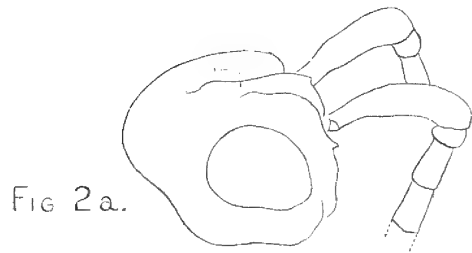


FIG 2 a.

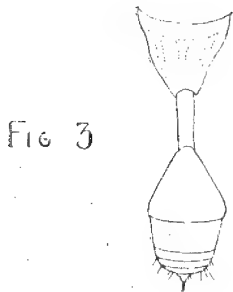


FIG 3



FIG 2 b.



FIG 3 a

I. W. HELMSING
1927.

their base with a pale whitish band; antennal scape pallid at base, dark for apical half, pedicel yellowish, the next four joints piceous, the following three joints testaceous, the apical funicle joint and the club black.

Vertex of head moderately long, with a deep broad median immargined groove or impression from the anterior ocellus to the posterior margin, this depression much wider than the raised area between it and the eye margin; anterior ocellus within the groove, the lateral ocelli situated rather far forward outside the groove against the eyes; on the frons the depression is continued almost to the mouth as a deep margined antennal groove; eyes large, reaching to the line of the mouth; just in front of the lateral ocelli the areas outside the groove have their inner borders margined and convexly produced toward and above the anterior ocellus; the sculpture on these swollen portions is coarser with three or four transverse striæ or carinæ, the fourth and anterior carina is on a line with the anterior ocellus and is somewhat raised; below this area there is a longitudinal line on either side of three short strongly raised carinæ, which are precipitous dorsally, sloping ventrally, so that from the lateral aspect the upper frons is armed with a longitudinal row of four erect teeth on either side; inside the teeth the surface slopes to the margined antennal impression, the lower three teeth being connected by short carinæ to the margin; sculpture generally finely transversely striate or wrinkled, more or less reticulate between the striæ; on the lower half of the frons there is a line of short yellow hairs against the eye margins, a line of similar pubescence against the mouth border, and scattered hairs on the surface. Antennæ inserted a little above the mouth and slightly above the line of the ventral eye margins; scape long and slender; pedicel over twice as long as its greatest width; funicle 1 very short, somewhat wider than long; 2-8 cylindrical; 2 very long, two-thirds as long as the scape, fully twice as long as the pedicel; 3-8 decreasing in length, 8 about twice as long as wide; club slender, twice as long as funicle 8. Thorax long and slender; pronotum long, slender, not or hardly longer than the scutum, narrowed anteriorly, from lateral aspect constricted at its posterior margin and well-separated from the scutum, transversely wrinkled, with an elongate smooth area laterally on its posterior half on either side; scutum convex, strongly transversely wrinkled, the parapsidal furrows deep, the median lobe produced anteriorly; scutellum large, densely reticulate for the most part with a longitudinal tendency, produced in front into a point between the axillæ; axillæ long, almost meeting at base, separated from the

EXPLANATION OF TEXT-FIGURES 1-3.

- Fig. 1.—*Leptofænus australiensis* Dodd. Female; side view.
 Fig. 1A.—*Leptofænus australiensis* Dodd. Female; antenna.
 Fig. 2.—*Proamotura insularis* var. *grandis* Dodd. Female.
 Fig. 2A.—*Proamotura insularis* var. *grandis* Dodd. Female; head and basal antennal joints.
 Fig. 2B.—*Proamotura insularis* var. *grandis* Dodd. Female; forewing.
 Fig. 3.—*Proamotura insularis* var. *grandis* Dodd. Male; propodeum and abdomen.
 Fig. 3A.—*Proamotura insularis* var. *grandis* Dodd. Male; forewing.

scutellum by a deep groove, transversely wrinkled but reticulate anteriorly; propodeum as long as the scutellum, subquadrate, strongly transversely wrinkled, without median or lateral carinæ, the spiracular sulci deep and parallel, the spiracles large. Forewings subhyaline, reaching to the middle of segment 5 of the abdomen; postmarginal vein very long, fully as long as the submarginal and extending to the wing apex, the marginal less than one-half as long, the stigmal vein short; discal cilia scattered and pointlike. Legs slender; anterior and posterior coxæ long and slender; all femora long and slender; tibiæ lengthened, armed with fine slender hairs; tarsi armed beneath with about three rows of stiff spinous setæ, the second joint plainly longer than the first or third. Petiole of abdomen very long, cylindrical, somewhat longer than the posterior coxæ, margined behind, its dorsal surface strongly transversely striate but shortly smooth at base; body of abdomen very long, from dorsal aspect strongly compressed and with a median ridge extending from the base of segment 4 almost to the apex; segment 2 somewhat shorter than the petiole, 3 a little shorter than 2, 4 twice as long as 3, 5 somewhat longer than 4, 6 two-thirds longer than 5, 7 short one-fourth as long as 6, 8 twice as long as 7, 9 forming a slender stylus and almost three times as long as 8; segments finely transversely wrinkled, but 2 is almost smooth with faint reticulation; oviposital valves exerted beyond the stylus for a length equal to that of the abdomen including the stylus.

Male.—Unknown.

Habitat.—North Queensland; Cairns district, one female taken on a dead tree trunk in the jungle in November, A. P. Dodd.

Type.—In the Queensland Museum.

FAMILY PTEROMALIDÆ.

Subfamily SPALANGIINÆ.

Proamotura Girault.

Insecutor Inscitiæ Menstruus, Washington, U.S.A., vol. viii., 1920, p. 143.

Cratomus Dodd (not Dalman), Trans. Royal Soc. of S. Australia, vol. xlvi., 1924, p. 170.

In the paper mentioned above, the writer described two insects from Lord Howe Island in the genus *Cratomus* Dalman, pointing out, however, that Dalman's genus was unknown to him except from descriptions; at the same time their close resemblance to species of the Spalangiid genera *Spalangia* Latreille and *Cerocephala* Westwood was mentioned. Mr. A. B. Gahan of the U. S. Bureau of Entomology has very kindly compared the description in my paper with the genus *Cratomus* as understood by Ashmead; he writes: "*Cratomus* as represented by Ashmead's determination of the genotype species is evidently quite a different genus from the one you discuss. It bears little resemblance

to a *Spalangia* and is quite like *Sphegigaster* except for the head which is unlike anything else in the *Chalcidoidea*, so far as I know. The head of *Cratomus*, viewed from in front, is very broad, concave down the middle with a very broad groove on each side extending obliquely from the interior eye margin towards the clypeus, the edges of this groove forming two prominent protuberances or horns on either side near the eye margins. *Cratomus* is sculptured like any other Sphegigasterine, the pronotum is short, propodeum short without distinct median or lateral carinae, the parapsidal grooves absent, and the abdomen shortly petiolate." Thus there is little doubt that the two species described by me are wrongly placed.

However, the genus has been described by A. A. Girault, the type being *Proamatura aquila* Girault. I have seen the type species, and beside the two species from Lord Howe Island, have taken a fourth species which is described herewith.

Girault placed the genus in the *Cleonymidæ*, to which family, in my mind, it cannot possibly belong. Despite the presence of two apical spurs on the posterior tibiæ, it is clearly a Spalangiid. In this determination Mr. Gahan has concurred, as follows:—"I am of the opinion that your insect must be a *Spalangiine* more or less closely related to *Cerocephala*. The long pronotum and propodeum, complete foveolate parapsidal grooves, longly petiolated abdomen, maculated wings, and smooth head and thorax certainly suggest *Cerocephala*, and do not fit anywhere else in the *Chalcidoidea* that I can think of."

Under the name *Cratomus*, I have fully described the generic characters; these characters are diagnosed in this paper in the description of the form named *P. insularis*, variety *grandis*. The genus may be distinguished from other Spalangiid genera by the deep antennal grooves, the head thus appearing tricornute, and the insertion of the antennæ in the middle of the face. The male is known in *insularis* only; in that species the petiole is very short in the female, long in the male. The tuft of hairs near the apex of the sub-marginal vein in *aquila* is absent in the other species.

Key to the Species of *Proamatura* Girault.

- | | |
|--|--------------------------------|
| 1. Forewings with two cross-bands | 2. |
| Forewings with one cross-band | <i>viridiotum</i> Dodd. |
| 2. Pronotum sub-concentrically striate; a strong tuft of hairs at end of sub-marginal vein | <i>aquila</i> Girault. |
| Pronotum smooth; no tuft of hairs on submarginal vein | 3. |
| 3. Petiole of abdomen short, transverse | <i>insularis</i> Dodd. |
| Petiole of abdomen plainly longer than wide | <i>perpulchra</i> new species. |

Proamatura aquila Girault.

Insector Insectiæ Menstruus, Washington, U.S.A., 1920, p. 143.

Female.—Length, 1.75–2.25 mm.

Head and thorax clear yellow-brown, the mesoscutum, scutellum and base of propodeum somewhat darker; abdomen metallic-purple, reddish at base;

legs fulvous, the coxæ brownish, the posterior coxæ washed with metallic above; antennal scape yellow, the pedicel and flagellum yellow-brown, the club somewhat darker.

Frons plainly convex, antennal scrobes deep and continued to the mouth, the three ridges distinct; upper frons and vertex smooth, with scattered pin-punctures; scrobes very faintly sculptured, the frons on either side pubescent with numerous punctures and longitudinal striæ; cheeks with numerous punctures. Antennal scape somewhat curved, produced at apex to enclose base of pedicel; pedicel one-third longer than its greatest width; funicle 1 distinctly longer than the pedicel, almost twice as long as its greatest width, 3 as wide as long, 6 plainly wider than long; club longer than the two preceding joints united, the divisions indicated. Pronotum densely finely sub-concentrically striate; scutum and axillæ smooth; scutellum no longer than its greatest width, smooth medially, longitudinally striate laterally, faintly reticulate posteriorly; propodeum rather strongly reticulate-rugose, the median carina hardly marked, the lateral carinæ delicate and irregular. Forewings hyaline, with two pale brown cross-bands, the first band very narrow, the second broad; discal cilia point-like, scattered in the distal three-fifths of the wing; marginal cilia along the distal margin moderately long; a strong tuft of hairs is present at the apex of the submarginal vein. Abdominal petiole a little longer than wide; body of abdomen from lateral aspect almost straight above, convex beneath, the oviposital valves exerted for a short distance; posterior margin of segment 2 sharply incised at meson.

Male.—Unknown.

Habitat.—Queensland; Brisbane, in March, H. Hacker; Ayr, three females in June, A. P. Dodd; Cairns, one female in November, A. P. Dodd. The Brisbane examples were bred from beetle-infested wood of *Mallotus philippinensis*.

Type.—In the Queensland Museum.

***Proamotura insularis* Dodd.**

Cratomus insularis Dodd, Trans. Royal Soc. of S. Australia, vol. xlviii., 1924, p. 171.

Lord Howe Island.

***Proamotura insularis grandis* new variety.**

Female.—Length, excluding the ovipositor, 4-4.75 mm.

Black, the prothorax red anteriorly; head red, with a dark spot around the ocelli; abdomen deep red, dusky at base and apex, with a broad black cross-band at one-half its length; oviposital valves pale yellowish for basal half, fuscous for apical half; antennæ wholly red; anterior and intermediate coxæ blackish, the posterior coxæ yellowish-white; all femora black, the tibiae dusky-brown, the tarsi testaceous, the trochanters red.

Frons convex and somewhat produced between the eyes, the ridges between and on either side of the deep antennal grooves very sharply defined, the central ridge appearing as a thin carina above and reaching almost to the frontal ocellus; below the antennal insertion the central ridge broadens and flattens, extends to the clypeus, and is separated on either side from the face by a thin groove; vertex smooth except for scattered small punctures bearing fine setæ, in front of the frontal ocellus with larger more numerous punctures; scrobes finely sub-concentrically striate; between the scrobes and the eyes, the frons is longitudinally striate and with shallow scattered punctures; face below the line of the antennal insertion obliquely striate, indefinitely punctate, and with fine rather dense pubescence; cheeks rather densely punctate. Antennæ inserted in the middle of the frons; 9-jointed, scape, pedicel, six funicle joints, the club solid but showing indications of two divisions; flagellum slightly clavate; scape moderately long and stout, somewhat curved, produced on either side at apex around the base of the pedicel; pedicel one-third longer than its greatest width; funicle 1 narrowed at base, longer than the pedicel, almost twice as long as its greatest width; 2-6 decreasing in length, 3 as wide as long, 6 plainly wider than long; club joint fully twice as long as its greatest width. Thorax, from dorsal aspect, twice as long as its greatest width; from lateral aspect somewhat convex above; pronotum large, as long as wide, sub-quadrate, smooth except for a few small punctures, its neck transversely striate; scutum somewhat shorter than the pronotum, the parapsidal furrows very deep and strongly foveate, the lobes convex, the surface smooth, the lateral lobes and the median lobe posteriorly with a few small setigerous punctures; scutellum as long as its greatest width, smooth, with a few small punctures near its lateral margins, faintly reticulate against the posterior margin, and just before the posterior margin on either side there is a transverse row of foveæ extending for one-third its width; axillæ meeting inwardly, separated from the scutellum by a coarsely foveate groove; propodeum rather long, narrowed posteriorly and with a short neck, the median and lateral carinæ distinct but not continued on the neck; within the lateral carinæ the surface is strongly irregularly transversely striate, outside the lateral carinæ and on the posterior neck the sculpture is coarsely rugose-reticulate. Anterior and posterior femora somewhat swollen; tibiæ slender, the posterior pair at apex with two slender unequal spines; posterior coxæ rather long. Forewings well-developed; lightly yellowish with two dark cross-bands; the first band is twice as deep as broad and is appended from the upward bend of the submarginal vein; the second band is the larger, almost as broad as deep, its distal margin convex, and is appended from the apex of the marginal and all of the stigmal vein; marginal cilia absent proximally, the distal margin with a dense rather short fringe of hairs; discal cilia absent for basal two-fifths of the wing, fine and scattered in the distal three-fifths, but coarse and dense against the distal margin; venation fuscous, very distinct; marginal vein two-thirds as long as the submarginal, the stigmal vein long and curved and about as long as the postmarginal; submarginal vein bearing a few bristles,

the marginal and postmarginal bearing dense long hairs; no tuft of bristles at the end of the submarginal vein, but beneath the distal end of the marginal and the base of the stigmal veins there is a patch of scattered coarse hairs. Abdomen convex beneath, a little convex above, rounded on its sides, no longer than the thorax; petiole short, transverse, rugose; body of abdomen smooth, finely transversely wrinkled on basal half of segments 5-7; segment 2 (first body segment) as long as 4, its posterior margin deeply concave at meson; oviposital valves stout, exerted for a length equal to one-half that of the abdomen.

Male.—Length, 2.5-3 mm.

Body wholly black, the dorsal surface with metallic green reflections; legs coloured as in the female but the posterior coxæ are broadly dark at base; antennal scape black, the pedicel deep red, the flagellum deep red basally verging to blackish apically.

Head as in the female, the sculpture similar, the frontal ridges less pronounced. Antennæ 11-jointed; scape rather short and stout; pedicel distinctly shorter than funicle 2; funicle 1 small, wider than long, like a ring-joint; 2-8 longitudinally striate, 2 somewhat the longest, 8 a little longer than wide; apical joint almost twice as long as the penultimate. Structure and sculpture of thorax as in the female. Forewings sub-hyaline, with one cross-band or blotch appended from the stigmal and apex of marginal veins. Petiole of abdomen very long, slender, longer than the posterior coxæ, more than one-half as long as the body of the abdomen, several times as long as wide, finely rugose; body of abdomen short, strongly convex above, straight beneath; segment 2 longest, a little longer than 3, its posterior margin straight; 3 very plainly longer than 4; 4-8 transverse.

Habitat.—North Queensland; Cairns district, three females, eight males, on tree trunks in November, A. P. Dodd.

Type and Allotype in the Queensland Museum.

Paratypes in the author's collection.

The differences in colour and abdominal characters between the sexes is very pronounced.

After comparing this form with *insularis*, no specific differences could be detected. On account of the larger size (*insularis* 2.75 mm., *grandis* female 4-4.75 mm.) and the darker wings, it was thought advisable to separate this mainland form from the Lord Howe Island insect.

***Proamotura perpulchra* new species.**

Female.—Length, excluding ovipositor, 2.25 mm.

Head chestnut-red; prothorax, mesoscutum, axillæ, and anterior half of mesopleuræ and mesosternum, red; scutellum dull metallic-green; rest of the

thorax black; abdomen dull red, broadly purplish at one-half its length and narrowly so at apex; petiole black, white for basal third; oviposital valves reddish, the apical third dusky; antennal scape pale yellow, the pedicel and flagellum fulvous, the first flagellar joint dull brown; anterior and posterior coxæ white, the latter dusky at base above, the intermediate coxæ piceous; trochanters dusky; femora reddish-brown, darker at base and apex; tibiæ reddish-brown, the posterior tibiæ darker, the anterior and intermediate tibiæ pale yellow at apex; tarsi pale yellow.

Head from dorsal aspect transverse; from lateral aspect the frons is gently convex; the frontal ridges not strongly pronounced, shorter and not nearly reaching to the anterior ocellus; vertex and upper frons smooth, with scattered pin-punctures bearing fine setæ; cheeks with scattered punctures, finely scaly centrally; antennal scrobes and lower frons striate as in *insularis*. Antennal scape moderately slender, its apex scarcely produced; pedicel almost twice as long as its greatest width; funicle 1 slightly longer than the pedicel, fully twice as long as its greatest width; 2-6 gently clavate, 6 as long as wide; club apparently 3-jointed, longer than the two preceding joints united. Pronotum somewhat wider than long, no longer than the scutum; scutellum with a row of four black hairs against either lateral margin, without the incomplete posterior row of foveæ; pronotum, scutum, scutellum, and axillæ, smooth and polished; propodeum strongly irregularly reticulate, the median carina faintly marked, the lateral carinæ weak and irregular. Anterior and posterior femora somewhat swollen. Forewings sub-hyaline, with the two brown cross-bands as in *insularis*; discal cilia scattered and point-like in the distal half of the wing, not becoming coarse and dense against the distal margin; distal margin with a long fringe of marginal cilia; postmarginal vein somewhat shorter than the stigmal. Petiole of abdomen twice as long as wide, irregularly longitudinally striate and finely rugose; segment 2 as long as 4, its posterior margin straight or faintly concave, not incised; oviposital valves exerted for a length equal to one-half that of the body of the abdomen.

Male.—Unknown.

Habitat.—South Queensland; Mt. Tambourine, 2,000 ft., one female in January, A. P. Dodd.

Type.—In the Queensland Museum.

***Proamotura perpulchra metallica* new variety.**

Female.—Length, 1.75-2.20 mm.

Head deep reddish-brown suffused with metallic, also prothorax, meso-scutum, and mesopleuræ; scutellum and axillæ metallic green, the propodeum and metapleuræ black; abdomen wholly metallic purplish; antennal scape testaceous, joints 5-8 deep red, 2-4 brownish, the club dusky; the colour otherwise as in *perpulchra*. Second band of forewing much larger than in

perpulchra, its distal margin strongly convex (almost straight in *perpulchra*). Oviposital valves exerted for a length equal to two-thirds that of body of abdomen.

Male.—Unknown.

Habitat.—North Queensland; Cairns district, two females in April, A. P. Dodd.

Type.—In the Queensland Museum.

Paratype.—In the author's collection.

At first glance, this form appears very distinct from *perpulchra*; however, the difference lies mainly in the more extensive metallic colouration. Possibly a series of specimens would show that the colour is not constant.

***Froamotura viridiotum* Dodd.**

Cratomus viridiotum Dodd, Trans. Royal Soc. of S. Australia, vol. xlviii., 1924, p. 171.

Lord Howe Island.

PROCTOTRYPOIDEA.

Family SCELIONIDÆ.

***Oxyteleia* Kieffer.**

Ann. Soc. Scient., Brussels, vol. xxxii., 1908, p. 118.

In Das Tierreich, 1926, Kieffer states of this genus "Distinguished from *Ceratoteleia* by the 2-toothed metanotum," and lists six species from New Guinea, Brazil, and the West Indies, the type being *O. bidentata* Kieffer from New Guinea. In the Genera Insectorum, 1910, he further states that the metanotum is armed with a tooth or spine at each extremity of the posterior border.

The species described below is very similar to the many Australian species of the *Baryconus-Ceratoteleia* relationship, being distinguished from them by the teeth at the posterior angles of the metanotum.

***Oxyteleia bifurcata* new species.**

Female.—Length, 2.50 mm.

Black; legs, including the coxæ, and first two antennal joints clear golden-yellow; mandibles red.

Head, from dorsal aspect, twice as wide as long, the vertex sloping to the occipital border which is foveate, margined, and semi-circularly concave; eyes moderately large, with scattered long fine hairs; ocelli rather wide apart, moderately large, the lateral pair separated from the eye margins by less than their own diameter; cheeks and temples rather broad; frons broad, without a frontal impression; upper frons and vertex with numerous scattered punctures

of moderate size bearing long fine setæ, and with indications of short blunt longitudinal striæ; frons for the most part smooth and shining, against the eyes with a few blunt obscure striæ; lower face against the mouth strongly striate; cheeks with numerous punctures and more or less obscure striæ, strongly striate against the mouth; mandibles tridentate, the teeth acute. Antennal scape long and slender; pedicel two-thirds longer than its greatest width; funicle 1 as wide and slightly longer than the pedicel, 2 plainly shorter than 1 and not much longer than wide, 3 quadrate, 4 wider than long; club 6-jointed, joint 1 rather small, 2-5 each about twice as wide as long, 3 slightly the widest. Thorax, from dorsal aspect, one-third longer than its greatest width; pronotum very narrowly visible from above, densely punctate and with long fine hairs; scutum stout, convex anteriorly, its anterior margin broadly rounded; parapsidal furrows wide apart, complete, foveate, widening posteriorly; parapsides and anterior half of median lobe with dense punctures of moderate size bearing fine setæ, the posterior half of the median lobe smooth with a very few punctures; scutellum with its posterior margin almost straight, the anterior and posterior margins with very strong rows of foveæ, the disc smooth with scattered very fine punctures bearing fine setæ; metanotal plate strongly foveate, wide, almost as wide as the posterior margin of the scutellum, transverse, its posterior angles each with a stout tooth which are widely separated; propodeum sloping, moderately short, strongly excavated at meson, the excavated area bounded by carinæ which are wide apart at base and diverge slightly to join the true lateral carinæ, the lateral margins with a stout blunt tooth anteriorly and a small blunt tooth at the posterior angles; pro- and meso-pleuræ densely punctate, the former with a smooth area above, the depression on the meso-pleuræ smooth and very deep; a distinct narrow sclerite is present between the propleuræ and the mesopleuræ. Forewings broad, extending almost to apex of abdomen; uniformly lightly brownish; venation distinct, dusky-yellow; submarginal vein joining the costa at one-half the wing length; marginal vein short, not more than one-third as long as the stigmal, which is long, very oblique, knobbed at apex, the postmarginal a little shorter than the stigmal; basal vein not marked. Abdomen one-third longer than the head and thorax united; $2\frac{1}{2}$ times as long as its greatest width; gradually narrowed toward the base and coming to a point at the apex; segments 1-3 with a dorso-lateral carina on either side; segment 1 not one-half as wide at base as posteriorly, somewhat shorter than its posterior width, at base with a short horn or protuberance; 2 gradually widening, one-third longer than 1; 3 one-fourth longer than 2, three-fourths as long as wide; 4 less than one-half as long as 3; 5 somewhat shorter than 4; 6 somewhat longer than 5, as long as its greatest width, its lateral margins angled at one-half their length; segment 1 with five strong carinæ medially, rugulose laterally, and with one abbreviated stria on either side, the basal horn smooth; 2 shining, with strong sparse striæ which curve away somewhat from the straight median stria, the surface between the striæ coriaceous; 3 rather densely finely punctate, but posteriorly there is a median area smooth except for a few punctures, laterally

the surface is finely striate and finely punctate between the striae; 4 and 5 smooth, with scattered punctures bearing fine hairs; 6 densely granulate and with some pubescence.

Male.—Very similar to the female except in sexual characters. Punctures of segment 3 of abdomen denser and sub-confluent, the smooth posterior area small; abdomen showing eight segments, 7 and 8 very short, 6 short and punctate like 5. Antennæ black, the first two joints clear golden-yellow; pedicel not much longer than its greatest width; flagellar joints moniliform and shortly pubescent; 1 plainly longer than the pedicel, almost twice as long as its greatest width; 2-9 subequal, each a little longer than wide, the apical joint two-thirds longer.

Habitat.—North Queensland; Cairns district, one female, seven males in November, A. P. Dodd.

Type and Allotype.—In the Queensland Museum.

Paratypes.—In the author's collection.

Aratala new genus.

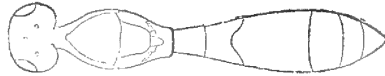
Female.—Head subglobose; occipital margin deeply convex and not margined; from lateral aspect the outline of the frons is convex; eyes small, situated rather low down on the frons, not as long as their distance from the posterior margin, bare; ocelli small, rather close together, situated behind the posterior line of the eyes; cheeks broad; face lightly depressed above the antennal insertion; mandibles bidentate, the teeth small, the outer tooth acute, the inner tooth truncate; maxillary palpi 4-jointed, the labial palpi 2-jointed. Antennæ 12-jointed, the scape slender, the funicle joints short, the club 5-jointed. Thorax slender, the dorsal surface rather flattened; pronotum long, narrowed anteriorly in the form of a neck; scutum narrowed anteriorly, as long as its greatest width, the parapsidal furrows absent; scutellum as long as wide, rounded behind, without anterior or posterior foveate lines, its margins not differentiated; metanotum short, prolonged medially into a conical flat area fitting close into the propodeum and reaching its posterior margin; propodeum long laterally and sloping, its posterior margin faintly concave, its posterior angles with a minute tooth; propleuræ large, faintly depressed anteriorly; mesopleuræ large, entire, without the usual dorso-ventral depression, faintly depressed against the coxæ; metapleuræ moderately large, entire. Femora somewhat thickened; posterior coxæ slender; posterior tibiæ slender for their basal half, thickened for their apical half; proximal joint of posterior tarsi very long, as long as the following united. Forewings well-developed; marginal cilia moderately short; discal cilia very dense but absent at the wing base; venation absent, except for a trace of a submarginal vein and a thickened mark in lieu of a marginal vein. Hindwings long. Abdomen one-half longer than the head and thorax united; slender, narrowly spatulate;

segment 1 narrowed, petioliform, depressed at its anterior and posterior margins, somewhat longer than wide; 2 no longer than 1, plainly shorter than its greatest width; 3 as long as 1 and 2 or 4-6 united, one-half longer than its greatest width; 4-6 each much wider than long.

Male.—Unknown.

Type.—*A. globiceps*, described herewith.

A peculiar genus with obsolete venation, related to *Doddiella* Kieffer, *Aneuroscelio* Kieffer, and *Mallateleia* Dodd, from which genera it may be distinguished by the form of the head, small eyes, elongate pronotum, and the conical projection of the metanotum fitting into the propodeum. The absence of the dorso-ventral impression of the mesopleuræ appears unusual for the family.



Text-figure 4. —*Aratala globiceps* Dodd. Head, thorax, and abdomen of female.

Aratala globiceps new species.

Female.—Length, 1.75 mm.

Dull black; legs, including the coxæ, brownish-yellow, the posterior coxæ at base with dense silvery pubescence; antennæ piceous, the scape yellow at base.

Head with dense fine scaly impressed reticulation and numerous scattered fine whitish hairs. Antennal scape rather short; pedicel twice as long as its greatest width; funicle joints smaller and narrower than the pedicel, 1 a little longer than wide, 2-5 each somewhat wider than long, 5 slightly widened; club compact, joints 1-4 transverse. Pronotum rather coarsely scaly, with a dense pubescence of coarse silvery hairs; scutum and scutellum with fine scaly reticulation and numerous fine silvery hairs; projection of metanotum finely longitudinally striate; propodeum smooth; propleura finely reticulate above, finely longitudinally striate below, with a few fine hairs; mesopleuræ smooth with a few fine hairs and fine striæ against the tegulæ; metapleuræ smooth. Forewings distinctly clouded, the basal third hyaline; hindwings hyaline. Abdominal segments 1-3 smooth and without sculpture; lateral margins of 1 and 2 with dense silvery pubescence; 4 smooth, but in some lights showing finely reticulate; 5 and 6 with fine reticulation and very fine pubescence.

Habitat.—New South Wales, Moonie River, three females in October. A. P. Dodd.

Type.—In the Queensland Museum.

Paratypes.—In the author's collection.

NORTHERN TERRITORY FISHES.

An annotated list of fishes collected from the waters of the Northern Territory of Australia during the cruises of H.M.A.S. "Geranium," 1923-1925.

BY W. E. J. PARADICE, M.B., Ch.M., SURG. LIEUT.-COMMANDER R.A.N., AND
G. P. WHITLEY, ICHTHYOLOGIST, AUSTRALIAN MUSEUM, SYDNEY.*

Plates XI.-XV., and Text-figures 1-3.

INTRODUCTION.

THE fishes comprising this collection were obtained by one of us †(W.E.J.P.) during the winter months of 1923 and 1924, and by the succeeding Medical Officer (Surgeon Lieutenant K. E. F. D. Hudson, R.A.N.) in 1925.

The generic and specific identification of the "Geranium" collection was the work of our esteemed friend, the late Mr. A. R. McCulloch, and his assistant (the junior author), who has now succeeded him.

The notes were made at the time of capture of the specimens by the senior author, who has also figured and described the new species appearing in the collection.

In preparing this list, we have made great use of "A List of the Fishes Recorded from Queensland Waters," by A. R. McCulloch and G. P. Whitley, published in *Memoirs of the Queensland Museum*, Vol. VIII., Part II., to which the reader is referred for references to literature, hoping that our list will to some degree serve as supplement to the former publication.

The majority of the fish mentioned in our list appear in the former publication, and we feel sure that those fish mentioned by us, which were collected at Sir Edward Pellew Group (our main collecting ground), and have not so far been recorded from Queensland waters, will in time be collected from there, as these islands are situated in the Gulf of Carpentaria only a few miles from the Queensland border.

The other localities from which fish were collected were Cape Wessel and Port Darwin, and fish from these localities might reasonably be expected to occur at least occasionally in Queensland waters.

* By permission of the Director of Naval Medical Services, and of the Trustees of the Australian Museum, Sydney.

† I desire here to record my thanks to Commander H. T. Bennett, D.S.O., R.N., who commanded H.M.A.S. "Geranium" during these years, for enabling me to avail myself of every possible opportunity to collect biological specimens and for securing no mean number himself. The officers and men of the ship interested themselves in collecting, and further enhanced my personal collection. To Sick Berth Petty Officers Beatty and Kirkwood, who helped Dr. Hudson and myself with the preservation of specimens, my thanks are also tendered.—W.E.J.P.

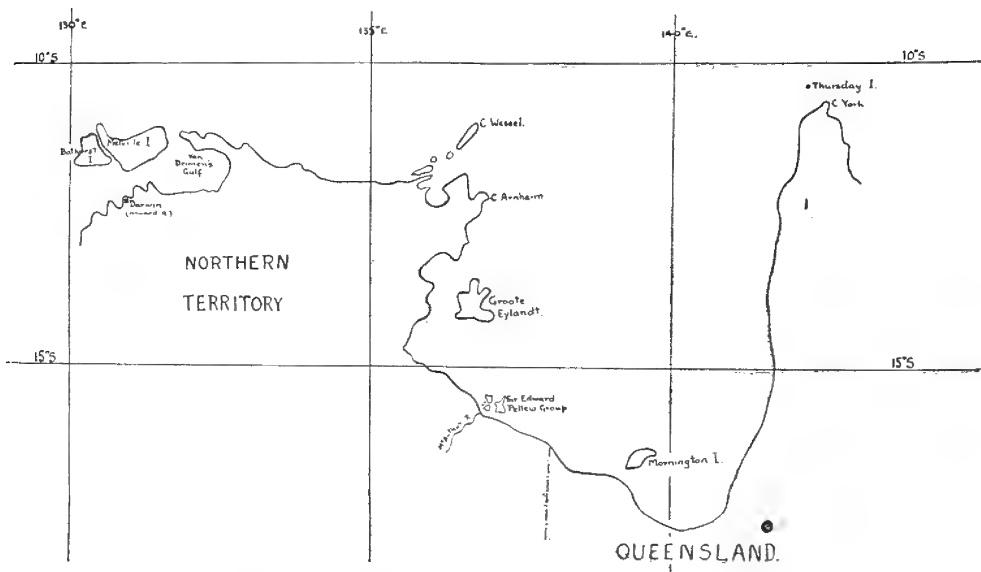
The "Geranium" collection has been presented to the Australian Museum, where it is now housed. A series of duplicates is being prepared for the Queensland Museum.

Attention is drawn to the fact that the word Pellew in this report invariably refers to Sir Edward Pellew Group of Islands in the Gulf of Carpentaria, Australia, and not to any other locality of somewhat similar name.

LIST OF FAMILIES REPRESENTED IN THE COLLECTION.

(In the order in which they are dealt with. The name of a well-known species is given after the Family.)

- | | |
|---|--|
| 1. GALEIDÆ.—Sharks. | 29. LETHRINIDÆ.—Grey Snapper. |
| 2. DASYATIDÆ.—Sting Rays. | 30. SPARIDÆ.—Bream. |
| 2A. RHINOBATIDÆ.—Shovel-nosed
Rays. | 31. GERRIDÆ.—Silverbelly. |
| 3. CHIROCENTRIDÆ.—Wolf Herring. | 32. MULLIDÆ.—Red Mullet. |
| 4. CLUPEIDÆ.—Herrings. | 33. SILLAGINIDÆ.—Whiting. |
| 5. DOROSOMIDÆ.—Hair-Backed
Herring. | 34. MONODACTYLIDÆ.—Silver Bat Fish. |
| 6. ENGRAULIDÆ.—Anchovy. | 35. PLATACIDÆ.—Bat Fish. |
| 7. PLOTOSIDÆ.—Eel-tailed Cat Fish. | 36. DREPANIDÆ.—Spotted Bat Fish. |
| 8. ARIIDÆ.—Salmon Cat Fish. | 37. SCATOPHAGIDÆ.—Butter Fish. |
| 9. MURÆNESOCIDÆ.—Eels. | 38. CHÆTODONTIDÆ.—Ornate Coral Fish. |
| 10. MURÆNIDÆ.—Reef-eels. | 39. SIGANIDÆ.—Black Trevally. |
| 11. BELONIDÆ.—Long-toms. | 40. PARALICHTHYIDÆ.—Flounders. |
| 12. HEMIRHAMPHIDÆ.—Garfish. | 41. SYNAPTURIDÆ.—Soles. |
| 13. EXOCETIDÆ.—Flying Fish. | 42. CYNOGLOSSIDÆ.—Tongue Sole. |
| 14. GADIDÆ.—Cod-like Fish. | 43. SCORPÆNIDÆ.—Red Rock Cod. |
| 15. ATHERINIDÆ.—Hardyhead. | 44. PLATYCEPHALIDÆ.—Flathead. |
| 16. MELANOTÆNIIDÆ.—Freshwater
Sunfish. | 45. POMACENTRIDÆ.—Demoiselle. |
| 17. MUGILIDÆ.—Mullet. | 46. LABRIDÆ.—Parrot Fish (with sep-
arate teeth). |
| 18. SPHYRÆNIDÆ.—Sea Pike. | 47. SCARIDÆ.—Parrot Fish (with fused
teeth). |
| 18A. POLYNEMIDÆ.—Cooktown Salmon. | 48. PERIOPHTHALMIDÆ.—Mangrove Fish. |
| 18B. SCOMBRIDÆ.—Mackerel. | 49. ECHENEIDÆ.—Sucker Fish. |
| 19. CARANGIDÆ.—Trevally. | 50. BLENNIDÆ.—Blenny. |
| 20. LEIOGNATHIDÆ.—Pony Fish. | 51. CONGROGADIDÆ.—Dagger Fish. |
| 21. APOGONIDÆ.—Soldier Fish. | 52. BATRACHOIDIDÆ.—Frog Fish. |
| 22. AMBASSIDÆ.—Perch-like Fish. | 53. ANTENNARIIDÆ.—Angler Fish. |
| 23. LATIDÆ.—Giant Perch. | 54. TRIACANTHIDÆ.—Three Spined Leather
Jacket. |
| 24. EPINEPHELIDÆ.—Rock Cod. | 55. MONACANTHIDÆ.—Leather Jacket. |
| 25. PSEUDOCROMIDÆ.—Coral Fish. | 56. PSILOCEPHALIDÆ.—Long Leather
Jacket. |
| 26. LUTIANIDÆ.—Red Snapper, Hussar. | 57. OSTRACIDÆ.—Box Fish. |
| 27. POMADASIDÆ.—Sweet Lips. | 58. TETRAODONTIDÆ.—Toado. |
| 28. TERAPONTIDÆ.—Grunter. | |



LOCALITY SKETCH.

Class ELASMOBRANCHII.

Subclass SELACHII.

Order EUSELACHII.

Family GALEIDÆ. [1.]

Galeocerdo arcticus Faber. Pellew.

The tiger shark frequents these waters in considerable numbers. It affords great sport to the sailors who capture it by hook and line. On one afternoon five of these sharks ranging from seven feet to thirteen feet in length were captured. They were found to contain refuse from the ship, a partly digested green turtle, carapace intact, and some small birds of the sandpiper type.

Aprionodon acutidens Rüppell. Pellew.

Small sharks of this species from eighteen inches to three feet in length were at times caught in considerable numbers by line. They obviously move about in shoals.

Hypoprion macloti Müller and Henle. Pellew.

Appears to be similar in habit to the preceding species.

Order BATOIDEI.

Family DASYATIDÆ [2].

Himantura arnak Forskal. Pellew.**Tæniura lymma** Forskal. Pellew.

Both these rays were captured from time to time on the sand flats.

There are many Elasmobranchs in Pellew waters, although the number of species appears limited. The commonest species of all is

not represented in the collection, as all our specimens were between six and seven feet long and therefore could not be preserved in our receptacles. This species, which appears from a photograph to be **Rhinobatus armatus** Gray [2a]*, is found basking in the shallow water of the sand flats, often where it is barely deep enough for it to submerge completely.

Class PISCES.

Subclass ACTINOPTERI.

Order ISOSPONDYLI.

Family CHIROCENTRIDÆ [3].

Chirocentrus dorab Forskal. Pellew.

This fish was met with in schools of four or six at various times. As a table fish it is extremely bony.

Family CLUPEIDÆ [4].

Harengula kanagurta Bleeker. Pellew.

A new record for Australia. Figured herewith (Plate XII., Fig. 1).

Harengula bulan Bleeker. Darwin.

A new record for Australia.

Neosteus ditchela Cuvier and Valenciennes. Pellew.

Our specimen of this species agrees very well with Bleeker's figure (Atl. Ichth. vi. 1870-2, p. 117, plate 269, fig. 2) as **Ilisha hoëvenni**.

Herrings are met with in small numbers in the winter months. I am informed that large shoals of these fish make their way up to Pellew waters from February to April, but not having witnessed this myself I am unable to say which species take part in this migration. (W.E.J.P.)

Family DOROSOMIDÆ [5].

Nematalosa come Richardson. Darwin.

Family ENGRAULIDÆ [6].

Anchoviella carpentariæ De Vis. Pellew.

Very small fish of this species were met with moving in small shoals over the shallow sand flats during the winter months.

Thrissocles hamiltoni Gray. Darwin.

Order NEMATOGNATHI.

Family PLOTOSIDÆ [7].

Tandanus (Neosilurus) hyrtlilii Steindachner. Howard River, Darwin.

This freshwater catfish was found dead among the weeds. It had only recently died, as there were no obvious signs of decomposition.

* Two small specimens of *Rhinobatus armatus* Gray have since come to hand from the Northern Territory, collected by Surg. Lieut. G. Courtney, of H.M.A.S. "Geranium" (1926).

Family ARIIDÆ [8].

Arius (Tachysurus) græffei Kner and Steindachner. Pellew.

This was the only marine species of catfish met with, two or three being caught by line on several occasions. A new record for Australia.

Order APODES.

Family MURÆNESOCIDÆ [9].

Murænesox arabicus Bloch & Schneider. Pellew.

Family MURÆNIDÆ [10].

Gymnothorax undulatus Lacépède. Pellew.

Order SYNENTOGNATHI.

Family BELONIDÆ [11].

Tylosurus strongylurus Van Hasselt. Pellew.

Tylosurus giganteus Temminck and Schlegel. Pellew.

The commonest species.

Tylosurus ferox Günther. Pellew.

Tylosurus caudimacula Cuvier. Pellew.

The various species of **Tylosurus** above mentioned are caught in company with garfish in the shallow water of the sand flats. They are all good table fish.

Family HEMIRHAMPHIDÆ [12].

Hemirhamphus far Forskal. Pellew and Darwin.

This is the commonest and largest species. It was commoner at Pellew during July than later in the year. Caught by net on the sand flats.

Hemirhamphus welsbyi Ogilby. Pellew.

This species is distinguished by one black spot on the side below the dorsal fin. A few specimens were caught at night alongside the ship and others were taken by net. Also taken at Thursday Island. Previously known only from the two cotypes. Figured herewith (Plate XI., Fig. 3).

Hemirhamphus quoyi Cuvier and Valenciennes. Pellew.

A fairly common species. Figured herewith (Plate XI., Fig. 2).

Arrhamphus sclerolepis Günther. Pellew and Darwin.

Next to the Carangidæ, the Hemirhamphidæ are the commonest fish in Pellew waters. They move in large schools in the shallow water of the sand flats accompanied by longtoms, and are usually taken by net. As in the Mugilidæ the northern species are commonly of a larger size than the southern species. All the garfish are excellent table fish.

Family EXOCETIDÆ [13].

Parexocetus brachypterus Richardson. At sea between Cape Wessel and Cape York.

A single specimen of this species flew on board.

Flying fish are common in the Gulf of Carpentaria, but all seen by us were of small size.

Order ANACANTHINI.

Family GADIDÆ [14].

Bregmaceros maclellandi Thompson. Darwin.

Our only specimen of this rare species was of juvenile form and was obtained in a pool in a coral reef. See McCulloch, *Rec. Austr. Mus.* XV., 1, 1926, p. 30.

Order PERCOMORPHI.

Suborder PERCESOCES.

Family ATHERINIDÆ [15].

Hepsetia pinguis Lacépède. Pellew.

Family MELANOTÆNIIDÆ [16].

Melanotænia nigrans Richardson. Howard River, Darwin.

This species was present in large numbers.

Family MUGILIDÆ [17].

Mugil (Liza) waigiensis Quoy and Gaimard. Pellew.

Fish of this species of all sizes are common. The adults frequent the sand flats whilst the young are often found in sandy bottomed pools among rocks. Commoner in July than later in the year.

Mugil longimanus Günther. Pellew.

This is the commonest species. Maximum number present in November.

The Mugilidæ are all good table fish. The flesh is oilier than that of most fish and large specimens are coarse. In northern waters they grow to a larger size than further south.

Family SPHYRÆNIDÆ [18].

Sphyræna altipinnis Ogilby. Pellew.

A common species, the majority of specimens being 24 to 30 inches in length. A new record for Australia.

Suborder RHEGNOPTERI.

Family POLYNEMIDÆ [18A].

Polynemus (Eleutheronema) tetradactylus Shaw. Pellew.

Two specimens of this species between twenty and thirty inches in length were captured on the sand flats. They do not appear in the collection, having been used for table purposes, their flesh being of good quality.

Series SCOMBRIFORMES.

Family SCOMBRIDÆ [18B].

No representative of this family appears in the collection, but small schools of fish about two feet long were seen in Pellew waters, and one specimen was captured but not preserved.

They certainly belonged to this family, and from superficial observation I believe them to be young of **Scomberomorus commerson** Lacépède. (W.E.J.P.)

Series CARANGIFORMES.

Family CARANGIDÆ [19].

Caranx speciosus Forskal. Pellew.

This is the commonest species of **Caranx**. The fish move in shoals over the sandy bottom, their average size being a little over a foot in length.

When caught this fish is a silvery blue, with several transverse bands of a slightly darker tint above the lateral line, and a pale yellow below; almost immediately the pale yellow becomes much deeper and a yellow tinge is seen above the lateral line. The yellow tint then fades and returns several times before the fish dies; after death the colour is invariably deep yellow, somewhat darker above the lateral line than below it. The smaller the fish, the less the intensity of the yellow. Only occasionally did these fish take a bait.

Caranx bucculentus Alleyne and Macleay. Pellew.

This fish is grey dorsally, fading to white over a smaller ventral area. A very dark mottling can be discerned through the grey. As the fish dies the head and nape become a very dark grey indeed.

Caranx parasitus Garman? Pellew.

This small fish, a beautiful silver with a black post-opercular spot, was obtained among the tentacles of a large rhizostome medusa.

Caranx forsteri Cuvier and Valenciennes. Pellew.

A fish which takes a bait with avidity. The young of this species move in small shoals over the sandy bottoms.

Caranx radiatus Macleay. Pellew.

Our specimens, which were all about eight or nine inches long, showed great variation in prolongation of fin rays, as follows:—

(1) A slight prolongation of the rays of both dorsal and anal fins.

(2) Marked prolongation of the rays of both these fins.

(3) Marked prolongation of dorsal rays and only slight prolongation of anal rays.

Caranx armatus Forskal. Pellew.

A fish of the common bluish-grey colour, in which darker bands can be distinguished.

After death the bands are indistinguishable.

Alectis indica Rüppell. Pellew.

This fish, conspicuous on account of its extreme silverness and elongated fin rays, was caught in small numbers on the sand flats during July but was not met with later in the year.

Ulua mandibularis Macleay. Pellew.

This little-known fish was caught by net on several occasions—a pair being captured each time.

Trachinotus baillonii Lacépède. Pellew.

Caught in small numbers on sandy beaches. This fish can at times be seen darting about in extremely shallow water.

Trachinotus ovatus Linnæus. Pellew.

Caught less frequently than the preceding species. Our largest specimen was twenty-three inches long.

Scomberoides sancti-petri Cuvier and Valenciennes. Pellew.

Young specimens of this species were caught in almost every haul.

It is an extremely voracious fish and was at times noticed to attack fish of a relatively large size. Fish of about three feet long were taken by net on several occasions.

The family Carangidæ is well represented in the Pellew waters, both in number of species and in the number of fish present. Of all the fish caught by us almost half belonged to this family. These fish are all good for eating purposes, their only defect being that the flesh becomes soft and deteriorates in flavour in a comparatively short time after capture. The Carangidæ as a whole were more plentiful in July than in later months.

There is one large species of **Caranx** (our largest specimen was three feet five inches in length), which is met with from time to time and which unfortunately is not represented in the collection.

Family LEIOGNATHIDÆ [20].

- Gazza equuliformis** Rüppell. Pellew.
Leiognathus splendens C. & V. Pellew and Darwin.
Leiognathus mortoniensis Ogilby. Pellew.
Leiognathus sp. Darwin. Austr. Museum Regd. No. *IA. 1540*.
 Too young for specific identification.

The Leiognathidæ or pony fish are small fish resembling the silver bellies (Gerridæ) in form and habit, but they have not the comparatively large deciduous scales which are such a noticeable characteristic of the latter.

Series PERCIFORMES.

Family APOGONIDÆ [21].

- Apogon ruppellii** Günther. Darwin.
Archamia lineolata C. & V. Pellew.

Family AMBASSIDÆ [22].

- Ambassis (Priopis) gymnocephalus** Lacépède. Darwin.
Ambassis (Ambassis) nalua Hamilton-Buchanan. Darwin.

Family LATIDÆ [23].

- Lates calcarifer** Bloch. Pellew and Darwin.
 At both localities this fish was caught by net on mud flats.
Psammoperca waigiensis Cuvier and Valenciennes. Pellew.

Family EPINEPHELIDÆ [24].

- Centrogenys waigiensis** Cuvier and Valenciennes. Darwin.
 Caught in a pool in coral reef.
Plectropomus maculatus Bloch. Pellew.
 A small specimen caught among coral.
Cephalopholis pachycentron Cuvier and Valenciennes. Pellew.
Epinephelus fasciatus Forskal. Pellew.

The majority of specimens of this species are a dusky brown with vertical bands of a slightly darker tint, having a white edge to their fins. One specimen caught well away from the mainland was of a reddish colour with conspicuous brownish-grey vertical bands and with the edges of the fins a much cleaner white than the other specimens.

The species is common among the rocks.

Epinephelus tauvina Forskal. Pellew.

A fairly common species caught by line usually at night.

Epinephelus megachir Richardson. Pellew and Darwin.

Similar in habit to the preceding species.

The various species of rock cod, as their name suggests, frequent the rocky portions of the coast and coral reefs. They are therefore seldom taken by net but they take a bait freely. With the exception of large specimens, which are tough-skinned and coarse, they are excellent eating fish.

Although the number of specimens captured was considerable it was seldom that one exceeded seven inches in length in the waters of Sir Edward Pellew group.

Family PSEUDOCHROMIDÆ [25].

Pseudochromis punctatus Richardson. Pellew and Darwin.

Caught in a pool on a coral reef.

Family LUTIANIDÆ [26].

Lutianus russelli Bleeker. Pellew.

Lutianus fulviflamma Forskal. Pellew.

Lutianus erythropterus Bloch. Pellew.

The changes of colour which occur in this fish as it grows are particularly striking; it is at all stages a beautiful fish. The young fish of 70 cms. in length is a rose-pink with a tinge of blue and brown here and there on the body.

The dorsal, ventral and anal fins are black, and from the spinous dorsal an oblique black line runs forward through the eye to the mouth. Immediately anterior to the tail is a large black spot surrounded by a lighter zone. The pectoral fins and tail are almost colourless.

In a specimen of 100 cms. most of the black has disappeared. The fish is pink except for the oblique line which passed through the eye and for a slight tinge of colour where the pre-caudal spot was. The oblique line has now become a brown colour.

The adult colouring is assumed by the time the fish has reached a length of 250 cms. It is then pink all over, the dorsal scales showing a tinge of yellowish-brown, the ventral scales fading to a very pale pink, whilst between the eyes there is a zone of deep pink (almost scarlet).

There is now no trace of the earlier black markings.

Lutianus sebæ Cuvier and Valenciennes. Pellew.

The "Government Bream" is another gorgeously marked fish which shows considerable alteration with growth and variation among fish of the same size.

Small fish show a considerable amount of white between the bright red oblique lines which form the broad arrow.

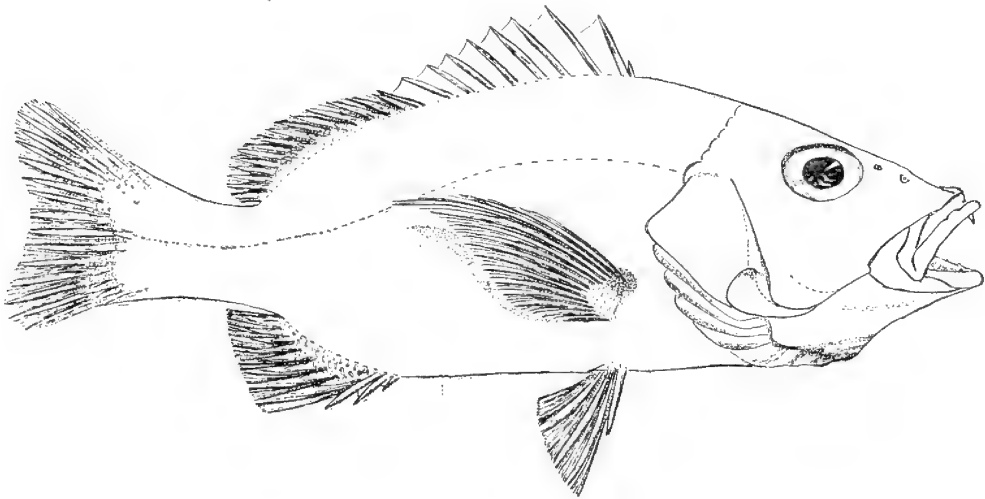
Medium sized fish (400 cms. in length) are red all over except ventrally where they fade to white, and have the lines of the arrow a much darker red.

In really large fish the lines of the arrow are barely distinguishable, the whole of the dorsal half of the fish having become a dark red. Fish of this species from 300 cms. to 500 cms. in length we consider among the best in Australian waters for eating purposes.

Lutianus waigiensis Quoy and Gaimard. Pellew.

This species is conspicuously marked with longitudinal bands of brown and yellow.

It is one of the commoner fish caught by line among rocks close to the shore. (Text-figure 1.)



Text-figure 1.—*Lutianus waigiensis* Quoy & Gaimard.

. E. J. Paradise, del.

The Lutianidæ are a family of brilliantly-coloured fish which live among rocks and coral and take a bait freely. Many of the species rank very high as table fish.

Family POMADASIDÆ [27].

Plectorhynchus pictus Thunberg. Pellew.

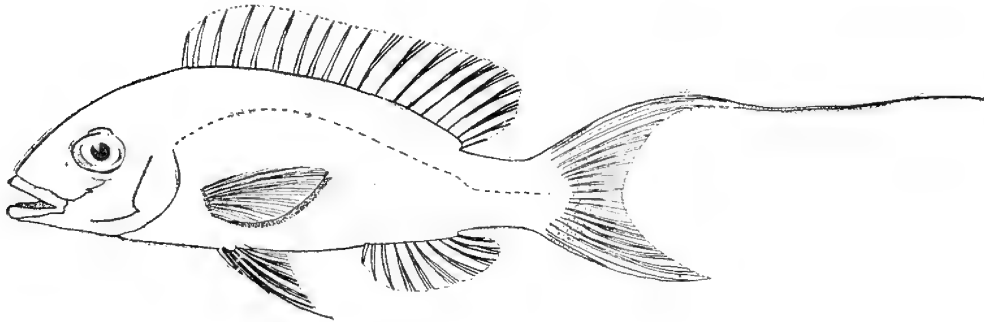
Plectorhynchus reticulatus Günther. Pellew.

Pomadasys nageb Rüppell. Darwin.

A young specimen, constituting a new record for Australia.

Scolopsis temporalis Cuvier & Valenciennes. Pellew.

A rather rare species caught by line in the region of coral reefs. It is a brilliantly marked fish, the predominating colour of the dorsal half being a bluish-green. This fades to white ventrally. The scales are fairly large and each scale stands out prominently on account of colour arrangement. Both our species were rendered conspicuous by a caudal filament greater in length than the longest rays of the upper lobe from which it springs. (Text-figure 2.)



Text-figure 2.—*Scolopsis temporalis* Cuvier and Valenciennes.

W. E. J. Paradise, del. (modified after McCulloch).

Family TERAPONTIDÆ [28].

Helotes sexlineatus Quoy & Gaimard. Pellew.

In our specimens of this species the longitudinal lines are interrupted by six vertical bands of almost white.

Terapon theraps Cuvier & Valenciennes. Pellew.

No adults of this species were obtained, but large numbers of juvenile specimens up to one inch in length were regularly found sheltering in clumps of floating weed during the months of June and July.

Terapon puta Cuvier and Valenciennes. Pellew.

This species was caught in large numbers by fish-trap on a sandy bottom a considerable distance from shore. It makes a peculiar grunting or humming noise when out of water. At times this species was caught by line.

Terapon servus Bloch. Pellew.

Often caught by fish-trap in company with the preceding species, which it resembles in regard to grunting.

It was caught by line much more frequently than the preceding species.

Terapon caudavittatus Richardson. Pellew and Darwin.

A species fairly common on sand flats, comes close to the shore and takes a bait freely.

Terapon unicolor Günther. Howard River.

This freshwater species was captured in the Howard River, 35 miles from Darwin.

The various species of this family have a flesh which is of good eating quality, but most of them are of small size and very bony.

Family LETHRINIDÆ [29].

Lethrinus glyphodon Günther. Pellew.

The common species.

Lethrinus hæmatopterus Temminck and Schlegel. Pellew.**Pentapus setosus** Cuvier & Valenciennes. Pellew.

Fairly common at times on sandy bottom.

Pentapus cyaneotæniatus Richardson. Pellew.

This family contains many ornate species. Those of the genus **Lethrinus** remain mainly in the vicinity of coral reefs or rocks, whilst the various species of **Pentapus** (all small fishes) move in shoals over areas of sandy bottom. Some of the species of **Lethrinus** grow to a large size, and are particularly fine eating fish, known by the names of "Island Snapper," "Grey Snapper," or "Yellow-mouthed Snapper," in various localities. No very large specimens were obtained in Pellew waters.

Family SPARIDÆ [30].

Sparus berda Forskal. Pellew and Darwin.

At Darwin this species is common in the vicinity of the piles of the jetty, where it is caught by line. When taken from the water these fish are a dark silvery grey dorsally, fading to white ventrally. There is a conspicuous black spot which extends from the ventral fins half way to the anal fins. As the fish dies this spot fades, being entirely

absent after death. This spot was not present at any time in specimens captured at Pellew, where the fish is fairly common close to the shore during October. It was not met with earlier in the year. It is an excellent eating fish.

Family GERRIDÆ [31].

Xystæma punctatum Cuvier & Valenciennes. Pellew.

A common species.

Xystæma abbreviatum Bleeker. Pellew.

The commonest species.

Xystæma carinatum Alleyne & Macleay. Pellew.

The various species of **Xystæma** are small silvery fish with scales which come off with the slightest rubbing. They move about in shoals on the sand flats. In spite of their small size they are excellent for eating purposes, being relatively free from bones.

Family MULLIDÆ [32].

Pseudupeneus jeffi Ogilby. Pellew.

This was the only species of red mullet obtained. This fish, like **Xystæma**, is of a small size, but has a flesh of excellent quality and free from small bones. After the fish has been scaled it often becomes a much darker red than it was with the scales on; this is not a sign of deterioration.

Family SILLAGINIDÆ [33].

Sillago maculata Quoy and Gaimard. Pellew.

Sillago sihama Forskal. Darwin.

Sillago ciliata Cuvier and Valenciennes. Pellew.

Although considerable numbers of whiting were met with on the sand flats they were all immature, the largest being about 170 cms.

Suborder CIRRHITOIDEI.

Series EPHIPPIFORMES.

Family MONODACTYLIDÆ [34].

Monodactylus argenteus Linnæus. Pellew.

This fish moves about in small shoals.

Family PLATACIDÆ. [35].

Platax teira Forskal. Pellew.

This species was captured on several occasions on beaches in the proximity of rocky headlands or coral reefs. The dark vertical bands

are conspicuous in the smaller fish but inconspicuous in the larger specimens, which are of a darker brown all over.

Platax novemaculeatus McCulloch. Pellew.

Large schools of this species were caught at times on the sand flats. The average size of these fish is ten inches, and the majority of them are of a silver colour, with a brown tinge over the nape and head, and with oblique bands of darker brown transversing this area. The species however, shows great variation of colouring. In the one school, fish which are silver all over, showing no dark bands, will be seen, and also fish which have a brown tinge all over with almost black oblique lines. These colour variations with all intermediate forms, occur in small fish as well as those of average size; but it was noted that the few extremely large specimens were all of the dark type. This is an excellent fish for eating purposes. It was often caught in company with Carangids and, like them, was more plentiful in July than later in the year.

(Dr. Hudson informs us that in 1925 he did not meet with this fish.)

Family DREPANIDÆ [36].

Drepane punctata Gmelin. Pellew.

This species is identical in habit with **Platax novemaculeatus**, and further has similar qualities as a food fish.

Suborder SQUAMIPENNES.

Series TOXOTIFORMES. Family SCATOPHAGIDÆ [37].

Scatophagus ætate-variens De Vis. Pellew.

This species is universally present in small numbers within a reasonable distance of the shore throughout the waters of the Gulf of Carpentaria.

Family CHÆTODONTIDÆ [38].

Chætodon aureofasciatus Macleay. Pellew.

Parachætodon ocellatus Cuvier & Valenciennes. Pellew.

Caught by net whilst hauling in the vicinity of rocks and coral.

Suborder AMPHACANTHI. Family SIGANIDÆ [39].

Siganus concavocephalus Paradice. Pellew.

A new species, figured herewith (Plate XII., fig. 2).

Siganus lineatus Cuvier & Valenciennes. Wessel and Pellew.

Siganus nebulosus Quoy & Gaimard. Pellew.

The Siganidæ are fish which tend to remain in the vicinity of rocks; they are capable of inflicting injury by the spines of their fins. Our Pellew specimens were caught by net near rocks, whilst the Cape Wessel specimens were speared from the rocks by an aborigine and given to a party from the "Geranium" as a peace offering.

Order HETEROSOMATA. Family PARALICHTHYIDÆ [40].

Pseudorhombus multimaculatus Günther. Pellew and Darwin.

Flounders are met with on most of the flats of Sir Edward Pellew group, our largest specimens coming from the rather muddy flats at the southern end of the group near the mainland. They are one of the best eating fish in Australian waters.

Family SYNAPTURIDÆ [41].

Synaptura setifer Paradise. Darwin.

Caught by net on shallow mud flats. It is peculiar in having tufts of setæ scattered about its body (Text-figure 3 on p. 102).

Family CYNOGLOSSIDÆ [42].

Rhinoplagusia guttata Macleay. Pellew.

Fairly common on mud flats in company with flounders. **Rhinoplagusia guttata** Macleay was recently described and figured by McCulloch & Whitley (Rec. Austr. Mus. xiv., pt. 4, 1925, p. 350, fig. 3) as **Rhinoplagusia japonica** Schlegel. According to Mr. J. R. Norman of the British Museum (Biol. Res. Endeavour, v. 5, 1926, p. 300), however, Macleay's species differ from the typical **japonica** "chiefly in having a longer head, somewhat smaller mouth, longer nasal papilla on the blind side, in the form of the scales, and in the colouration."

Order CATAPHRACTI.

Series SCORPÆNIFORMES. Family SCORPÆNIDÆ [43].

Scorpæna bynoensis Richardson. Cape Wessel.

Caught in a pool under dead coral.

Series PLATYCEPHALIFORMES. Family PLATYCEPHALIDÆ [44].

Platycephalus arenarius Ramsay and Ogilby. Pellew.

A few specimens were caught by line in clear water at the northern end of the group during October; not met with earlier.

Insidiator nematophthalmus Günther. Pellew.

Occasional specimens met with both on sand and mud flats at all times.

Both the above are good for table purposes.

Order CHROMIDES.

Family POMACENTRIDÆ [45].

Amphiprion tricolor Günther. Darwin.

Four of this species were caught in a coral pool. These are a valuable series and are figured herewith. (Plate XIII.)

Pomacentrus wardi Whitley. Cape Wessel.

A single specimen of this species was obtained in a pool among dead coral. Another specimen was later obtained by Mr. Melbourne Ward at Heron Island, Capricorn Group, Queensland. This latter specimen has been described by the junior author (in press), being designated as the type of the species.

Glyphisodon palmeri Ogilby. Pellew.

Order PHARYNGOGNATHI.

Family LABRIDÆ [46].

Chærodon cyanostolus Richardson. Pellew.**Chærodon olivaceus** De Vis. Pellew.**Chærodon cyanodus** Richardson. Pellew.

These parrot fishes are common among rocks where they are caught by line. They are perfectly safe to eat but the flesh deteriorates rapidly and is comparatively poor in flavour.

Family SCARIDÆ [47].

Scarus pyrrostethus Richardson. Pellew.**Scarus pyrrostethus australianus** Paralice. (Plate XIV.) Cape Wessel.

This family is not as well represented as the Labridæ. The flesh is similar.

Our Cape Wessel specimen was caught under a ledge of submerged rock by the blacks. They work their hands about under the ledges in shallow water until they feel a fish and then approximate their hands from opposite sides of the fish until they have it safely secured.

Order GOBIOIDEI.

Family PERIOPHTHALMIDÆ [48].

Periophthalmus kœlreuteri Pallas var. **argentineatus** Cuvier and Valenciennes. Pellew.

This most interesting little fish is very common on the mud flats and among the mangroves both in Sir Edward Pellew group and at Darwin.

When the tide is high it is frequently seen resting on sloping mangrove roots the anterior half of its body out of the water and the tail portion in the water. At low tide it rests in holes excavated in the mud by crabs, with its tail down the hole, its modified pectoral fins on the edge of the hole and its head projecting, or else it hops about in the mud, using its flattened pectoral fins to help it make its leaps of about eighteen inches or two feet, which carry it quickly across the mud into comparative safety in the maze of mangrove roots. It is noticeable that the positions adopted by this fish are such that the tail, which is an accessory organ of respiration, is either in the water or at least kept shaded and moist in order to carry out this function. It is interesting to note that on various occasions on which one of us has endeavoured to convey these fish back to the ship, they have died in a comparatively short time if carried in a can of water where they have to remain entirely submerged, but have arrived in good condition when transported in a can with sufficient weed in it to allow the fish to rest with the greater part of its body out of the water. The late Mr. H. E. Finckh of Mosman, Sydney, a most skilful and experienced aquarium worker, arranged the transport of these fish to his aquarium and kept them in good health there for a long period in surroundings made to simulate their natural conditions. At Darwin this fish is known as Kangaroo Fish.

Order DISCOCEPHALI.

Family ECHENEIDÆ [49].

Echeneis naucrates Linnæus. Pellew and Darwin.

This fish was captured by line, in fish-traps, and at times drawn on board adhering to tiger sharks.

Order JUGULARES.

Series BLENNIIFORMES.

Family BLENNIIDÆ [50].

Petroscirtes obliquus Garman. Pellew.

Salarias meleagris C. & V. Cape Wessel and Pellew.

These fish are found in shallow pools among rocks or dead coral. They are particularly agile out of water and often do not hesitate to leave a small pool in which they are being pursued, in order to make their way to an adjoining pool by jumping over small broken wet stones.

Series ZOARCIFORMES.

Family CONGROGADIDÆ [51].

Congrogadus subducens Richardson. Darwin.

Caught in a pool among coral.

Suborder HAPLODOCI.

Family BATRACHOIDIDÆ [52].

Coryzichthys diemensis Le Sueur. Darwin.

Caught in a pool among coral.

Family ANTENNARIIDÆ [53].

Antennarius urophthalmus Bleeker. Darwin.

Order PLECTOGNATHI.

Suborder SCLERODERMI.

Family TRIACANTHIDÆ [54].

Triacanthus biaculeatus Bloch. Pellew and Darwin.

A common species caught by net on sandy beaches. In the living fish the dorsal spine is produced as a fine filament almost the length of the fish. This filament is very brittle and specimens seldom reach an institution with it intact.

Family MONACANTHIDÆ [55].

Monacanthus chinensis Bloch. Pellew.

A considerable number of specimens of this fish was collected in 1925 but on previous occasions the species was not met with.

Family PSILOCEPHALIDÆ [56].

Psilocephalus barbatus Gray. Pellew.

A single specimen of this species was caught by net. It was noted that whilst lying on the beach this fish was able to throw itself a foot into the air.

Suborder OSTRACODERMI.

Family OSTRACIIDÆ [57].

Ostracion rhinorhynchus Bleeker. Darwin.

This fish was speared from the ship whilst lying alongside the jetty.

Suborder GYMNODONTES.

Family TETRAODONTIDÆ [58].

Leiodon patoca Hamilton-Buchanan. Darwin.

Spheroides lunaris Bloch and Schneider. Pellew.

Spheroides whitleyi Paradise. Pellew.

A new species figured and described herewith (Plate XV.).

Tetraodon immaculatus Bloch and Schneider var. **manillensis** Procé. Pellew.

Tetraodon nigropunctatus Bloch and Schneider. Pellew.

The fishes of this family are definitely poisonous, having caused the deaths of men and lower animals on various occasions. (Paradice, W. E. J., Med. Journ. Aust. 1924 (2), p. 25.)

GENERAL REMARKS ON FISH OF SIR EDWARD PELLEW GROUP.*

This group of islands extends some twenty-five miles out into the Gulf of Carpentaria from the western part of the southern shore, in the region of the mouth of McArthur River. The beaches of the northern third of the group consist of sand or broken coral, and are washed by clear water in which there is a comparatively prolific growth of coral, e.g., Paradise Bay and Base Beach. The beaches of the southern portion of the group are mud flats running back in many places to mangrove swamps. The water here is muddy, probably from the McArthur River, and in it the only corals found are a few scattered astrean genera.

In the clear water to the north, Hemirhamphidæ (garfish) and Belonidæ (longtoms), are met with in large numbers at all times, whilst Carangidæ (trevally), etc. are seen in great numbers during June and in smaller numbers during later months. As the Carangidæ diminish in numbers in the clear water, they are replaced by small numbers of Sparidæ (bream) and Platycephalidæ (flathead). In the zone between the clean beaches and the definitely muddy beaches the predominating fish are **Platax novemaculeatus** and **Drepane punctata** (e.g., Geranium Bay). On the mud flats the Cynoglossidæ (tongue soles) are present and the Paralichthyidæ (flounders) reach their largest size. Carangidæ in small numbers and various Elasmobranchii (sharks and rays) are present. Among the rocks and coral in clear water the Epinephelidæ (rock cods) and Lutjanidæ (red snapper and hussars) are found (e.g., Pearce, Urquhart, and Observation Islands). None of the species of the two families just mentioned were caught in any way approaching the size to which the same fish grow in Torres Strait or along the Great Barrier Reef. The sandy beaches of this group appear to be the ideal environment for Sillaginidæ (whiting) and we are unable to offer any explanation for failure to obtain large fish of this family. Trolling and fishing with a live bait are not included here, as these methods were not used. No doubt many fishes, such as the larger Carangidæ and Scombridæ (Spanish mackerel), would have been captured by this means, as they are at Thursday Island, a live herring being the usual bait. Fishes could at all times be described as prolific in the waters of the Sir Edward Pellew Group.

* Paradise, W. E. J. —The "Sir Edward Pellew Group of Islands" Report, with special reference to biology and physical features. The Parliament of the Commonwealth of Australia 1923-24, No. 143, F. 15481. This report gives observations on all classes of animals except fish.

ADDITIONS.

As this paper was completed for the press, a further batch of fishes was received from Surg. Lieut. G. Courtney of H.M.A.S. "Geranium," who had collected them during 1926 in the Northern Territory.

All were referable to known species and are listed by McCulloch & Whitley, but some had not previously been obtained by "Geranium" collectors in those waters. The additions are as follows:—

Chiloscyllium trispeculare (Richardson). Knight Reef, Clarence Strait, Northern Territory.

Stegostoma tigrinum (Pennant). Clarence Strait, Northern Territory.

[*Squalus tigrinus* Pennant, Ind. Zool. 1769, p. 24 (*vide* Sherborn).

This is called by the later name *Stegostoma tygrinum* Bonnaterre in McCulloch and Whitley's list.]

Squalomugil nasutus (De Vis). Adam Bay, near Darwin, Northern Territory.

This species is common on the mud flats, where specimens of about 140 mm. in length were noted swimming with a considerable portion of their heads above the surface.

Holacanthus (Chætodontoplus) duboulayi Günther. Darwin, Northern Territory.
Speared alongside the jetty.

Pomacentrus chrysurus Cuvier and Valenciennes. Melville Island, Northern Territory.

Gobius ornatus Rüppell. Adam Bay, Northern Territory.

Scartelaos viridis Hamilton-Buchanan. Adam Bay, Northern Territory.

Caught on the mangrove flats in company with **Periophthalmus**.

An interesting specimen in Dr. Courtney's collection was a large sea-snake, which on being opened was found to contain an exceptionally large specimen of **Coryzichthys diemensis** Le Sueur. Mr. J. R. Kinghorn has kindly identified the sea snake as *Astrotia stokesii* Gray.

Dr. Courtney is able to add another case of poisoning by the Genus **Tetraodon**, the ship's cat having been fatally poisoned by eating a small portion of the flesh of **Tetraodon immaculatus**.

SPECIES FROM PORT DARWIN AND THE SIR EDWARD PELLEW GROUP, NORTHERN TERRITORY, WHICH ARE NOT LISTED FROM QUEENSLAND, BY McCULLOCH AND WHITLEY.

HYPOPRION MACLOTI Müller & Henle. Pellew.

Carcharias (Hypoprion) macloti Müller & Henle, *Plagiost.* 1839, p. 34, pl. x. New Guinea.

HARENGULA BULAN Bleeker. Darwin.

Clupalosa bulan Bleeker, *Verh. Bat. Gen.* xxii., 1849, *Bijdr. Ichth. Mad.*, p. 12. Madura Island, etc., E. Indies.

HARENGULA KANAGURTA Bleeker. Pellew.

Alausa kanagurta Bleeker, *Verh. Bat. Gen.* xxiv., 1852, *Haring*, p. 34. Batavia.

ARIUS (TACHYSURUS) GRÆFFEI Kner & Steindachner. Pellew.

Arius græffei Kner & Steindachner, *Sitzb. Akad. Wiss. Wien* liv. (1866), 1867, p. 383, fig. 12. "Samoa"=East Indies?

GYMNOTHORAX UNDULATUS Lacépède. Pellew.

Muraenophis undulatus Lacépède, *Hist. Nat. Poiss.* v., 1803, pp. 629 & 644. South Seas.

TYLOSURUS CAUDIMACULA Cuvier. Pellew.

Belone caudimacula Cuvier, *Règne Anim.*, ed. 2, ii., 1829, p. 285. Based on Russell's pl. 176 of "Kuddera A" from Vizagapatam.

SPHYRÆNA ALTIPINNIS Ogilby. Pellew.

Sphyræna altipinnis Ogilby, *Proc. Roy. Soc. Qld.* xxiii., 1910, p. 8. Aru Islands.

BREGMACEROS MCCLELLANDI Thompson. Darwin.

Bregmaceros maclellandi Thompson, *Mag. Nat. Hist. (Charlesw.)* iv., 1840, p. 184, text-fig. Ex Cantor MS. Delta of the Ganges.

ULUA MANDIBULARIS Macleay. Pellew.

Caranx mandibularis Macleay, *Proc. Linn. Soc. New South Wales* vii., 1882, p. 356. New Guinea.

APOGON RUPPELLII Günther.

Apogon ruppellii Günther, *Cat. Fish. Brit. Mus.* i., 1859, p. 236. Australian Seas.

- AMBASSIS (PRIOPIS) GYMNOCEPHALUS Lacépède. Darwin.
- Lutjanus gymnocephalus** Lacépède, Hist. Nat. Poiss. iv., 1802, p. 216. Tropical Pacific.
- CEPHALOPHOLIS PACHYCENTRON Cuv. & Val. Pellew.
- Serranus pachycentron** Cuvier & Valenciennes, Hist. Nat. Pois. ii., 1828, p. 295. No locality given.
- PSEUDOCROMIS PUNCTATUS Richardson. Darwin & Pellew.
- Assiculus punctatus** Richardson, in Stokes' Discov. in Austr. i., 1846, Append. p. 494, pl. ii., figs. 1-5. Coast of Australia.
- POMADASYS NAGEB Rüppell. Darwin.
- Pristipoma nageb** Rüppell, Neue Wirbelth. Abyssin., Fische 1838, p. 124, pl. xxx., fig. 2. Djedda, Red Sea.
- PENTAPUS CYANEOTÆNIATUS Richardson. Pellew.
- Mænoides? cyaneo-tæniatus** Richardson, Icon. Pisc. 1843, p. 8, pl. v., fig. 1. Depuch Island, N.W. Australia.
- SIGANUS CONCAVOCEPHALUS Paradise. Pellew.
- SYNAPTURA SETIFER Paradise. Darwin.
- AMPHIPRION TRICOLOR Günther. Darwin.
- Amphiprion tricolor**, Günther, Cat. Fish. Brit. Mus. iv., 1862, p. 8. Port Essington.
- POMACENTRUS WARDI Whitley. Darwin.
- Pomacentrus wardi** Whitley, Rec. Austr. Mus. xv. (in press). Heron Island, Capricorn Group, Queensland.
- SCARUS PYRROSTETHUS AUSTRALIANUS Paradise. Cape Wessel.
- PETROSCIRTES OBLIQUUS Garman. Pellew.
- Petroscirtes obliquus** Garman, Bull. Mus. Comp. Zool. Harv. xxxix. 8, 1903, p. 237, pl. iv., fig. 3. Suva, Fiji.
- ANTENNARIUS UROPTHALMUS Bleeker. Darwin.
- Antennarius urophthalmus** Bleeker, Nat. Tijd. Ned. Ind. ii., 1851, p. 488. Riouw, East Indies.
- OSTRACION RHINORHYNCHUS Bleeker. Darwin.
- Ostracion rhinorhynchus** Bleeker, Verh. Bat. Gen. xxiv., 1852, p. 34 (*fide* Weber & Beaufort 1911).

TETRAODON IMMACULATUS Bloch & Schneider, var. MANILLENISIS
Procé. Pellew.

Tetrodon manillensis Procé, Bull. Soc. Sci. Philom. 1822, p. 130 (*vide* Günther 1870).

LEIODON PATOCA Hamilton-Buchanan. Darwin.

Tetrodon patoca Hamilton-Buchanan, Fish. Ganges 1822, p. 7 & 363, pl. xviii.,
fig. 2 (*vide* Günther 1870).

SPHEROIDES WHITLEYI Paradise. Pellew.

SUPPLEMENT BY W. E. J. PARADICE, M.B., Ch.M.

Family SIGANIDÆ.

Genus SIGANUS Forskal.

Siganus concavocephalus sp. nov. (Plate XII., Fig. 2).

D.i., xiii./10; A. vii./9; P. 15; V. i./3/i.; C. 16.

Head (33 mm.) 4.2 in length to middle caudal ray (138 mm.). Maximum depth (at a point midway between vent and origin of anal fin) (53 mm.) 2.6 in same. Maximum diameter of eye (10 mm.) 3.3 in length of head. Vertical diameter of eye (9 mm.) approximately equal to the inter-orbital space, 3.7 in same. Least depth of caudal peduncle (6.5 mm.) 1.5 in max. diameter of eye. Form elongate ovate, compressed, with a marked concavity between the snout and procumbent dorsal spine. Profiles convex except antero-superiorly, where there is a concavity as above-mentioned, having its deepest part above the centre of the eye. The postero-inferior portion of the profile is the most markedly convex, whilst the antero-inferior portion approaches nearest to a straight line. Head naked except for the upper portion of the operculum. Eye large with maximum diameter equal to the distance of the eye from the posterior angle of the operculum. Interorbital space very slightly convex. Snout rounded; two nostrils on each side, the anterior being covered by a flap-like nasal tentacle. Opercular edges entire; a very small opercular flap. Gill openings wide, several poorly defined striæ on operculum. A bony crest in front of eye. Maxillary reaching two-thirds way (approx.) to the vertical of anterior border of eye. Teeth forming a comb-like cutting edge.

Body covered with very small cycloid scales which extend on to the nape, breast, and caudal fin. Vent immediately behind posterior membrane of ventrals. Lateral line follows dorsal curvature from its origin at the operculum to the caudal peduncle along which it runs horizontally. Dorsal spines strong,

preceded by a procumbent spine. Rays diminish very slightly in size from before back to the sixth, after which the decrease is more marked. Anal similar to dorsal but with stronger spines. Pectorals pointed, the second ray being longest. Ventrals angular, the first spine equal in length to the third dorsal spine. Caudal forked, the upper lobe being slightly longer and more pointed than the lower.

Colour Markings.—A greyish-brown ground, more brown dorsally and more grey ventrally. Body comparatively evenly covered with white spots which are most discreet and conspicuous immediately posterior to the pectoral fin, where they are white ovals on a grey ground; their long diameter 3 mm. Elsewhere the spots tend to vary a little in shape and are less conspicuous. A few dark-brown and grey spots are irregularly scattered about the body. There is a large roughly triangular spot almost black in colour situated immediately behind the upper end of the operculum. Width of this spot about two-thirds the diameter of the eye. The caudal fin has a yellow tinge and is crossed by several wavy lines of grey. The pectorals hyaline, the remaining fins being irregularly marked with grey. The operculum, preoperculum and a variable area below the pectorals have a silvery-white sheen.

Affinities.—This species appears to be allied to *S. albopunctatus* Temminck and Schlegel.

Described and figured from the type (*IA. 2553* Aust. Mus.), 138 mm. long to the end of the middle caudal rays.

Locality.—Sir Edward Pellew Group, Gulf of Carpentaria, Australia. Coll. W. E. J. Paradise, June-November, 1923.

There are two specimens of this species captured at the same time from which the following notes have been made:—The smaller, length 91 mm., is the darker, having a ground colour of brownish-grey. White spots are present but less conspicuous than in the other specimens, whilst dark spots are more numerous and uniformly distributed over the body. The middle rays of the dorsals and ventrals project beyond the remainder, making these fins more pointed than in the other specimens. In the larger of these specimens, length 115 mm., the ground colour is similar but there are five evenly spaced transverse bands of a slightly darker colour than the intervening space. The white spots are as conspicuous as in the type, whilst the dark spots are more numerous than in the type but less numerous than in the smaller specimen. The shape of the dorsal and anal is intermediate between the other two specimens. The dark shoulder spot is equally conspicuous and of the same relative proportion in all three specimens. The transverse bands described in the middle-sized specimen can just be discerned in the type.

The following table gives some measurements and proportions from each specimen. All three specimens have the same fin formula.

Type	Length to end of middle caudal rays.	Maximum depth.	Length of head.	Maximum diameter of eye.	Interorbital space.	Distance from anterior to posterior points of insertion of dorsal.	Ditto anal.	Max. depth in length.	Diam. of eye in head.	Interorbital space in head.	Anal in dorsal.	Head in length.
IA. 2553 ..	138	53	33	10	8.5	81	51	2.6	3.3	3.9	1.6	4.2
IA. 2554A ..	115	41	26	9	7.5	65.5	41	2.8	2.9	3.5	1.6	4.4
IA. 2554B ..	91	35	20	7	6	52	33.5	2.6	2.9	3.3	1.6	4.5

Family SOLEIDÆ.

Genus SYNAPTURA Cantor.

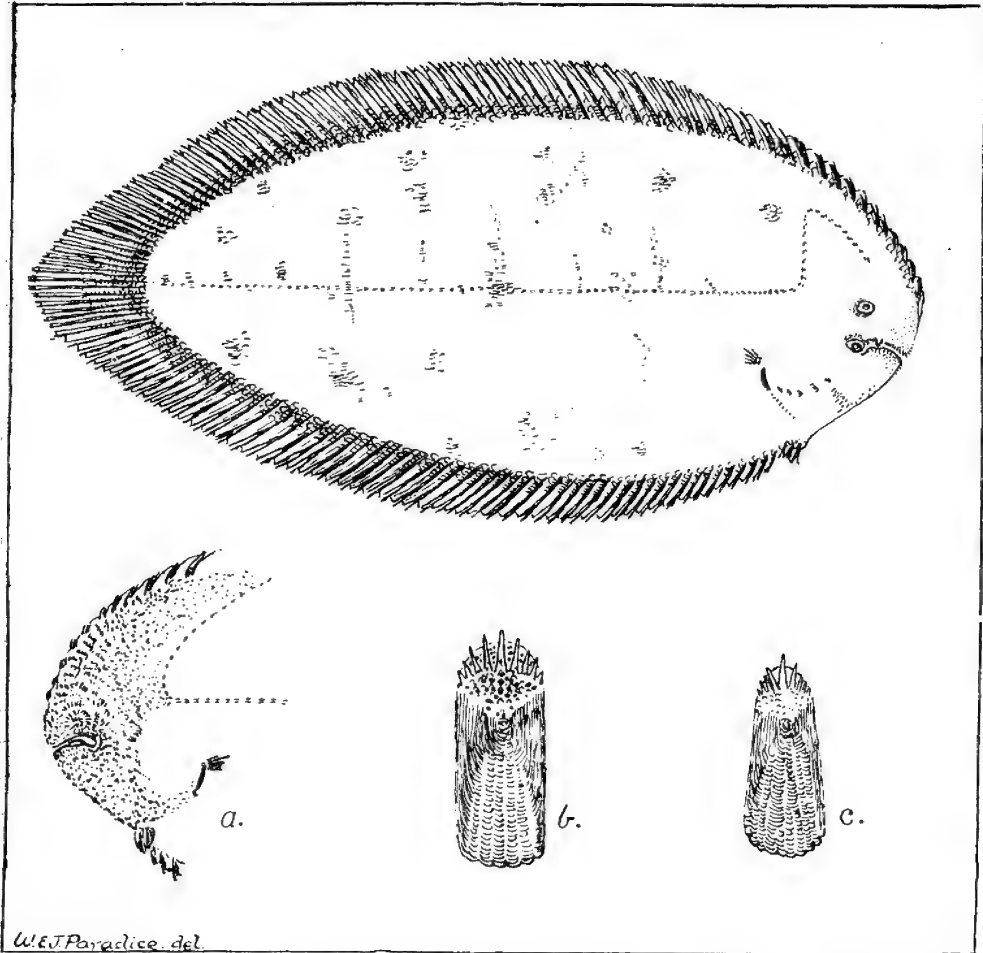
Synaptura setifer sp. nov. (Text-figure 3).

D. 70; A. 57; C. 14; P. 5; V. 3; L. Lat. 82; L. Tr. 36/36 (to the base of fin rays).

Greatest depth (54 mm.) at about two-fifths way from the snout to the hypural joint, 2.3 in the length from snout to hypural (123 mm.). Head (26 mm.) 4.8 in same. Eye (3 mm.) 8.6, interorbital space (4 mm.) 6.5, posterior dorsal and anal rays equal (15.5 mm.) 1.7, and middle caudal rays (20 mm.) 1.3 in length of head. Scales ctenoid above and below extending on to the fin rays, the pigmented scales of the upper surface being more markedly ctenoid than the unpigmented scales of the under surface. Head closely scaled above with tufts of cirri along the preopercular margin, and with small cirri evenly distributed over the area surrounding the mouth. Lower surface closely covered with cirri continuing over a crescent area extending dorsally to the seventeenth dorsal ray and ventrally to the ventral fins and gill slit. Small cirri on the lower profile from mouth two-thirds way down to the ventral fin.

Eyes, on the right side, small, raised above the head and separated by a scaly interorbital space. The upper eye well in advance of the lower, its distance from the snout being one and one-half times the interorbital space. The upper anterior nostril is the only conspicuous one, it being in a simple tube immediately in front of a transverse line through the anterior margin of the upper eye. (The specimen is so hardened by formalin that the interior of the mouth cannot satisfactorily be examined, but it can be determined that no teeth of any size are present.) Mouth opening backwards to

below the centre of the lower eye and completely surrounded by cirri. Gill slit small, somewhat tubular, situated antero-inferiorly to the pectoral fins, the gill slit and pectoral fin of the under surface being larger than the corresponding structures of the upper surface.



Text-figure 3.—*Synaptura setifer*, sp. nov.

Above: Figure of holotype (123 mm. from snout to hypural).

Below: *a.* Anterior portion of under surface showing distribution of cirri.

b. A scale from the middle of upper surface.

c. A scale from middle of under surface.

Dorsal fin commencing at the point of the snout just below a line drawn forward through the anterior eye. The rays increase regularly in length backwards and project a little beyond the membrane. Anal of similar form to dorsal, caudal obtusely pointed. Ventrals opposite each other and free from anal, the right being larger than the left. Lateral line straight from

the back of the head to the middle caudal ray and is situated slightly nearer to the dorsal than the anal. On the upper side the lateral line runs from the anterior end of its long limb, transversely towards the dorsal fin and then follows the dorsal curvature forward to above the anterior eye.

Colour.—Dark-brown above with patches of black cirri or setæ scattered irregularly, those near the lateral line being arranged in transverse lines. Below, greyish-white after preservation in formalin.

Locality.—Port Darwin, Northern Territory, Australia. Coll. Surgeon-Lieut. K. E. F. D. Hudson, 1925.

Family SCARIDÆ.

Genus SCARUS Forskal.

Scarus pyrostethus australianus subsp. nov. (Plate XIV.)

D. ix./10; A. ii./9; P. 14; V. i./5; C. 13; L. Lat. 25; L. Tr. 2/1/6.

Head 3.5 in length to end of middle caudal ray; depth 3.2 in same; eye 5.8 in head; snout 2.8 in same; interorbital 3 in same. Body moderately deep and stout, profile convex both dorsally and ventrally, steeper anteriorly than posteriorly being steepest of all from the origin of the dorsal to the snout. Snout rounded, its tip slightly in advance of the mouth. Jaws unequal, the lower included. Teeth white; posterior canine present in the upper jaw. Upper lip double, the inner flap extending almost to the mid line. Upper lip covers more than half the dental plate; lower lip narrower, barely covering half the dental plate. Cheek with two complete rows of scales and two or three scales in the third row. Preopercle naked over anterior portion of the lower limb; opercle scaly. Six scales on middle line in front of dorsal. Lateral line interrupted, upper portion ending under last dorsal ray; lower portion commencing two rows of scales in advance of this and two rows lower down. The upper portion follows the dorsal curvature, the lower portion running in a straight line to the middle caudal. The tubes of the anterior portion are branched, the posterior tubes being practically simple.

Dorsal spines flexible, with their extremities markedly thickened and bent posteriorly to approximate the thickened portion of the next spine. From each spine thickened bands of membrane resembling rays run posteriorly to the thickened portion of the next spine. Soft dorsal and anal similar in form but not in colour marking. Caudal markedly lunate, the outer rays markedly produced, the upper more so than the lower. Ventrals fairly long, about two in the head, pectorals longer about 1.4 in the head, the posterior edge slightly and evenly curved and the upper rays not produced.

Colours.—Ground colour green fading to dirty white ventrally and brownish-green on the nape and snout. The scales in the region of the middle of the body have a reddish-brown central area, those immediately in front

and behind this having a corresponding central area of yellowish tinge. The scales in the vicinity of the caudal have an underlying pinkish tinge continuous with two conspicuous pink para-lateral lines which traverse the caudal. These bands are sharply differentiated from the remainder of the caudal which is uniformly green. The dorsal is pink with darker rays. A narrow band of blue runs the full length of the dorsal forming the margin of the soft portion but having an extremely narrow edge of white outside it in the spinous portion. (There is no blue band along the base of the dorsal.) The anal has two bright blue bands, one along the edge and the other along the base, the remainder of the fin being pink. The pectoral is blue over its upper third, fading to hyaline below. It has a bright yellow spot at its base. The ventral is white tipped with blue. Eye yellow. A blue supra-orbital band extends from a short distance anterior to the eye half way back to the origin of the lateral line. An infra-orbital line of blue about the same length lies equally before and behind the eye, whilst a median blue line runs from the posterior border of the orbit half way to the opercular angle. The upper lip has a white margin to its central half with a broad blue band above it reaching from one notch of the upper lip to the other. The lower lip has a central blue spot and a blue band on each side from the extreme angle of each side of the mouth to a point a little lateral to the blue spot and forming a chord to the notch in the upper lip. Below this is a slightly waved blue line reaching to slightly behind the angle of the mouth on each side. The area between these lower blue markings is yellow.

This new subspecies is a more brilliantly coloured fish than *S. pyrrosethus* Rich. and is more robustly built, as the following proportions indicate:—

	<i>Scarus pyrrosethus</i> Rich.	<i>Scarus pyrrosethus</i> <i>australianus</i> , subsp. nov.
Depth in length	3.5	3.2
Least depth of caudal peduncle in length	8.9	8.8
Head in depth	1	1.1
Pectoral in length	5.3	4.7

I have examined all the fish of the genus *Scarus* in the Australian Museum and note that different species have different degrees of thickening of the tips of the dorsal spines. Among the small number of fish available this character did not vary within a given species, the most marked thickening occurring in the two specimens of *S. pyrrosethus* Rich., with the exception of the type of this subspecies, in which the thickening is much more marked.

The specimen of *S. pyrrostethus* Rich. obtained at Pellew has been compared with the holotype of the new subspecies and the points of differentiation are set out in the following key:—

A. Caudal emarginate, the upper and lower rays hardly produced; superior and inferior para-marginal pinkish bands inconspicuous. Dorsal with a median row of spots and an upper and lower bluish band. Dorsal spines moderately thickened at their tips, separate one from another. Blue band of lower lip united with the infraorbital band; band of upper lip produced backward to eye. Posterior canines not differentiated.

Scarus pyrrostethus pyrrostethus; IA. 1492. Pellew.

AA. Caudal lobes markedly produced; para-marginal pinkish bands conspicuous. Dorsal with a distal band of bluish, but without spots and without proximal bluish band. Dorsal spines noticeably thickened at their tips, which approximate one another. Blue band of lower lip separate from the infraorbital one; band of upper lip not produced beyond the mouth. Posterior canines well developed. . . *Scarus pyrrostethus australianus*; IA. 1669. C. Wessel.

Described and figured from the holotype 265 mm. to the end of the middle caudal ray.

Locality.—Cape Wessel, Northern Territory, Australia. Coll. W. E. J. Paradise, 1923.

Family TETRAODONTIDÆ.

Genus SPHEROIDES, Dumeril.

*Spheroides whitleyi** sp. nov. (Plate XV.)

D. 8; A. 6; P. 13; C. 8.

Head, from upper lip to upper end of gill-opening (26 mm.), 2.8 in the length from upper lip to base of caudal (74 mm.). Eye (6 mm.), 4.3 in the head. Snout, from middle of upper lip to anterior margin of eye (14 mm.), 1.9 in the head, and a little more than the interorbital space. The interorbital space as here measured includes the pigmented skin over the dorsal aspect of the eye and is three times the distance between the bony edges of the orbit (4 mm.).

Longest dorsal ray (13 mm.), longest anal ray (12 mm.), longest pectoral ray (13.5 mm.), 2, 2.1, and 1.9 in the head. Median caudal rays (18 mm.), 1.4 in same. Least depth of caudal peduncle (6.5 mm.), a little greater than the diameter of the eye.

* Named for G. P. Whitley of the Australian Museum, whose work in identifying the fish of the "Geranium" collection has made it possible to publish the paper in its present form.—W.E.J.P.

Chin receding from jaws, its depth equal to the diameter of the eye. Nostrils opening on either side of a papilla which is placed in a depression. Eye nearer the gill-openings than the end of the snout, its upper margin raised above the cephalic profile, lower lid free, upper adnate to the ocular membrane. Margins of gill-openings entire, the inner flap concealed.

Skin of the back from between the eyes to the dorsal fin and laterally down to a line joining the dorsal fin to the upper end of the gill-openings, covered with coarse spinules—snout and cheeks bearing fewer and smaller spinules. A few spinules occur behind the pectoral fins. Abdomen spiny from behind the chin to just before the vent, the skin of this area being longitudinally plicated, the skin elsewhere smooth. A definite fold extends from the chin to the base of the caudal passing immediately below the insertion of the pectorals. Dorsal and anal pointed, the origin of the former in advance of the latter. The four medial caudal rays equal in length and a little longer than the lateral rays; caudal truncate; upper pectoral rays longest, the margin rounded.

Colours.—Back marbled in light and dark brown, a line of about seven large almost circular spots of dark-brown extending along the sides from the upper end of the gill-opening to the caudal. The diameter of the largest spots approx. half the diameter of the eye. Lower surface white. A yellow zone extends along the lateral fold immediately above from the chin to below the origin of the dorsal. Fins hyaline with a tinge of yellow.

Affinities.—Allied to *S. alboplumbeus* Rich. and *S. hypselogeneion* Blkr.

Locality.—Port Denison, Queensland.

A smaller specimen appears in the "Geranium" collection from Sir Edward Pellew Group but is not as well preserved as the Queensland specimen figured and described. The smaller specimen has slightly more spinules behind the pectoral fins, and differs in colour from the larger, having black marbling and spots instead of brown. Its measurements taken in the same manner as those given for the type specimen are as follows:—

Length from upper lip to base of caudal 61 mm., head 22 mm., eye 5 mm., interorbital space 9 mm., least distance between bony margins of orbits 3.5 mm., snout 11 mm., longest dorsal, anal, and pectoral rays 11.9 and 11 mm. respectively. Middle caudal rays 15 mm., least depth of caudal peduncle 5 mm.

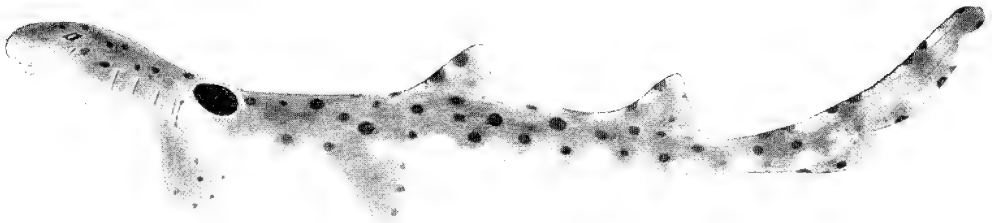


Fig. 1.—*Chiloscyllium ocellatum* Bonnaterre.

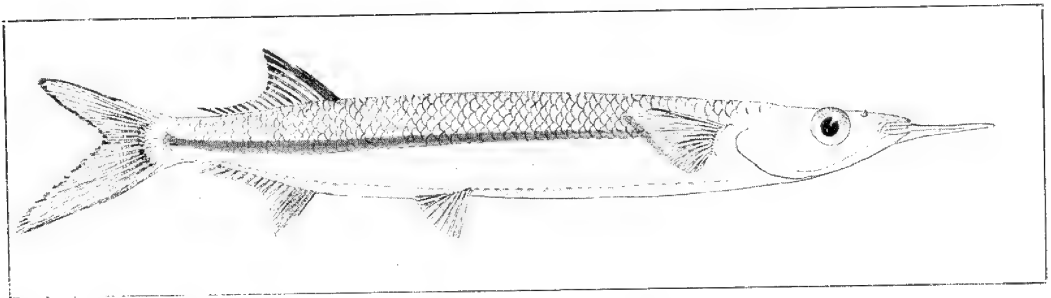


Fig. 2.—*Hemirhamphus quoyi* C. & V.

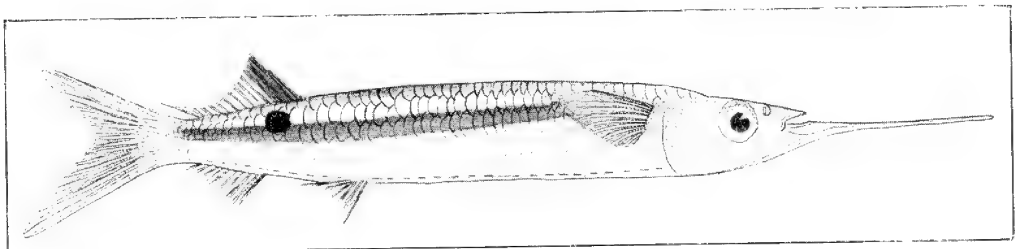


Fig. 3.—*Hemirhamphus welsbyi* Ogilby.

W. E. J. Paradise, del.

Face page 106.



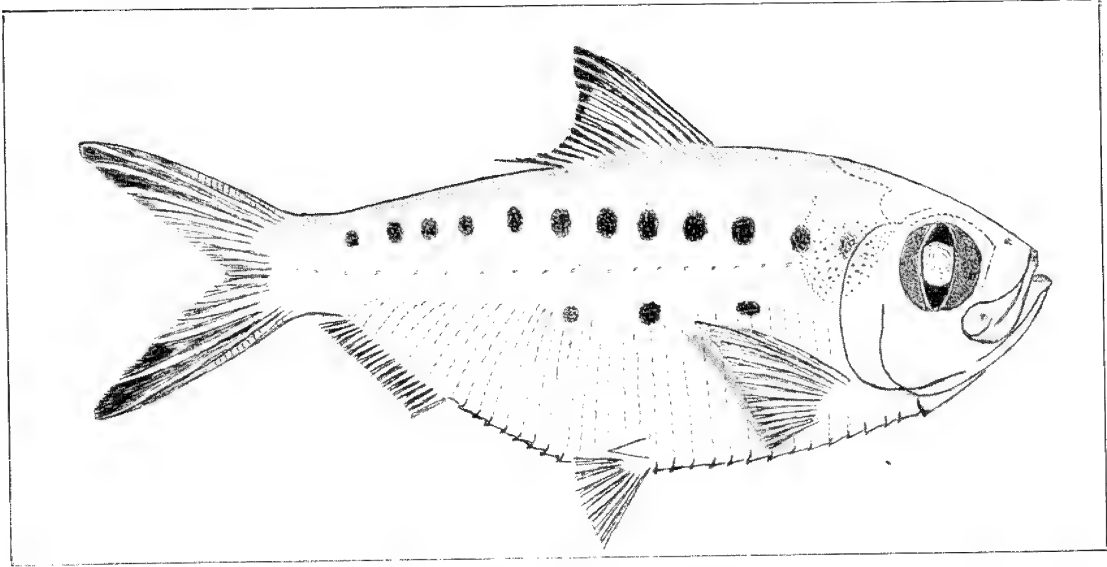


Fig. 1.—*Harengula kanagurta* Bleeker.

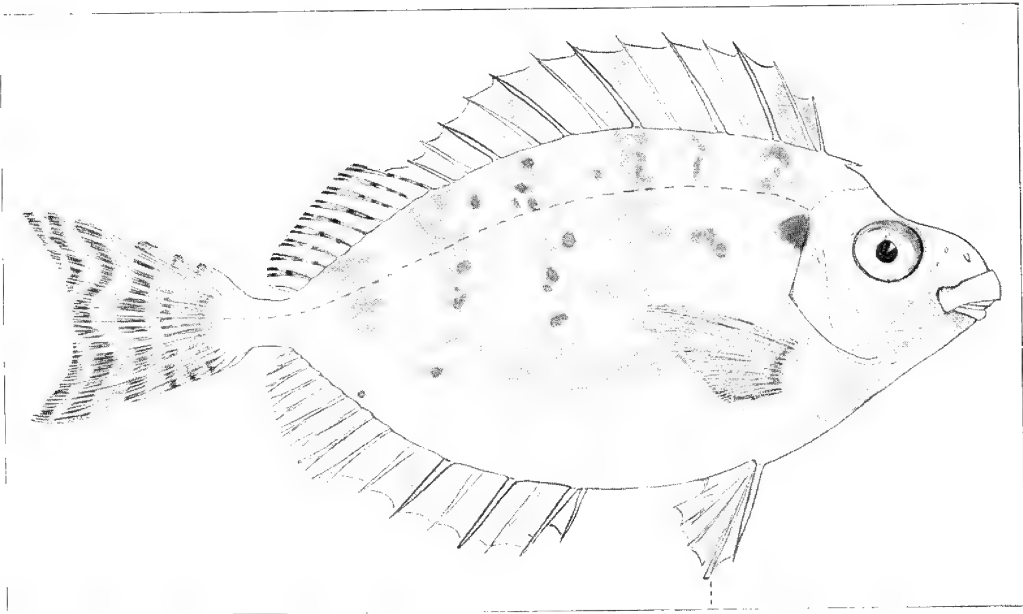
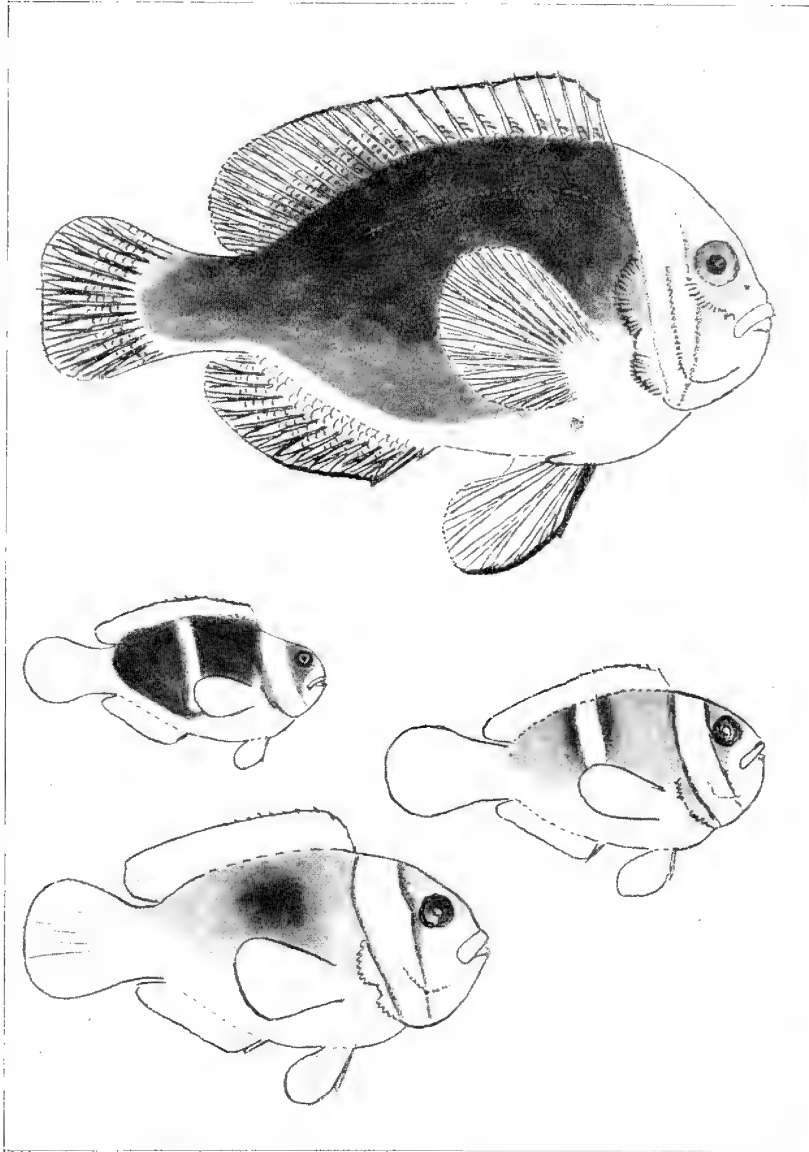


Fig. 2.—*Siganus concavocephalus*, sp. nov.

W. E. J. Partridge, del.

Face page 106.



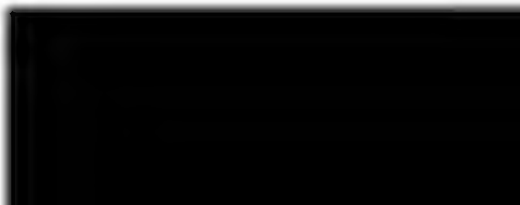


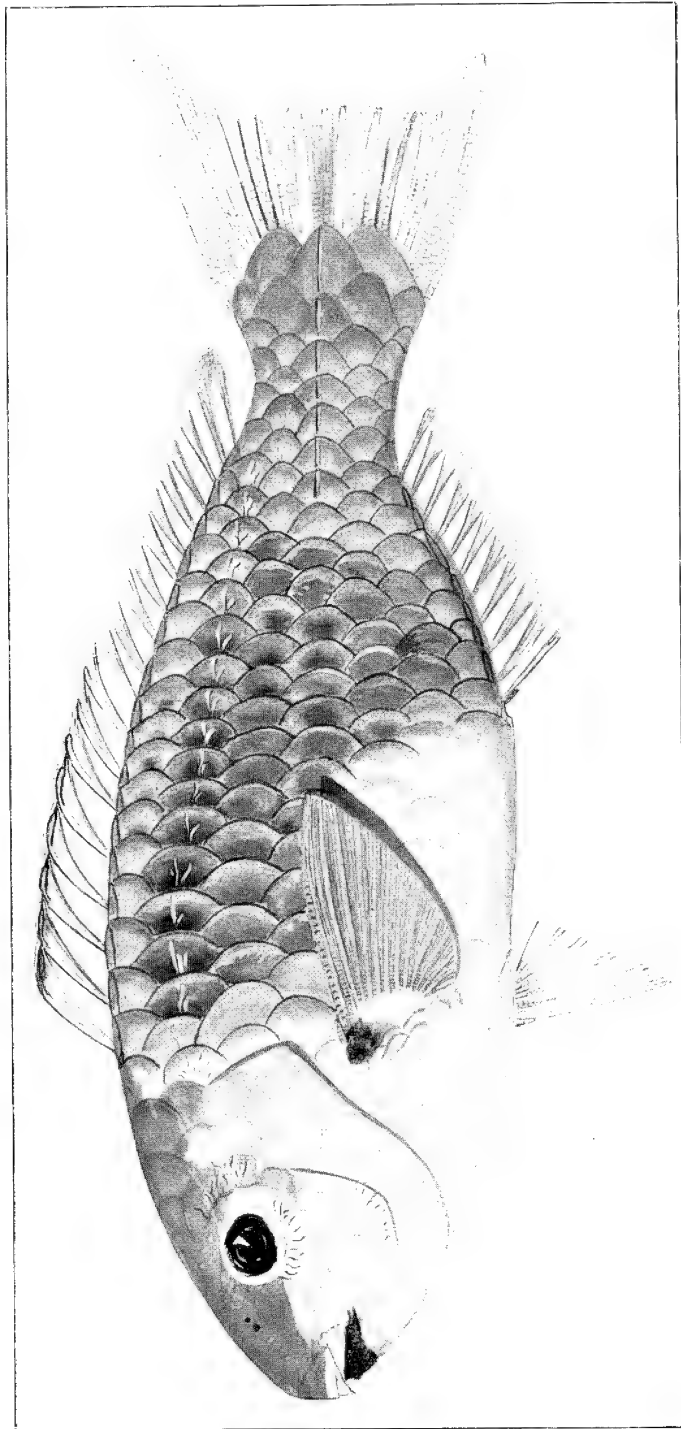
Amphiprion tricolor, Gunther. (Natural size.)

Above.—Figure of a specimen 98 mm. from end of snout to end of middle caudal ray.

Below.—Three sketches of specimens 41, 52, and 63 mm. in length, showing variation of colour markings with growth.

Face page 106.

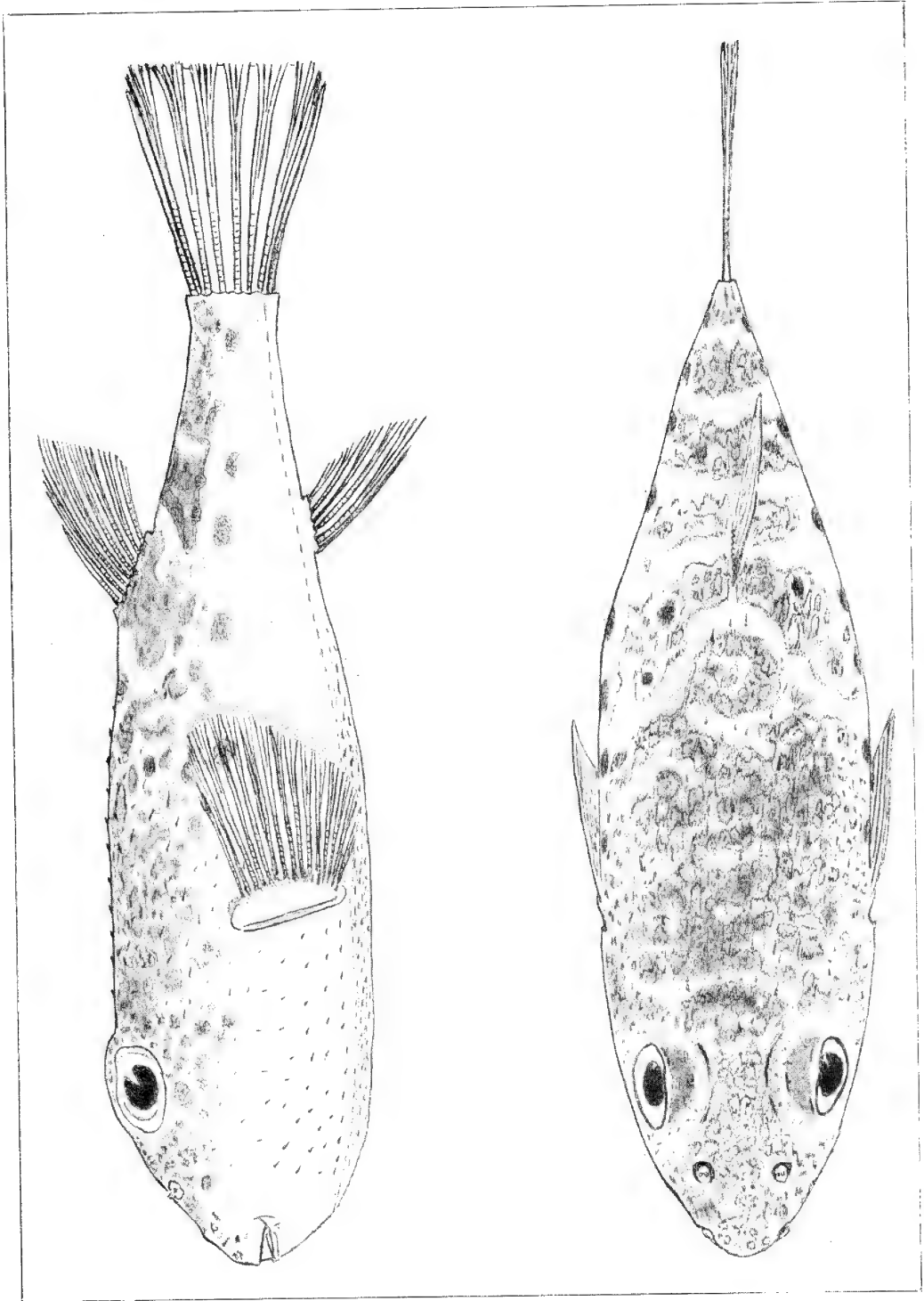




Scarus pyrrostethus australianus subsp. nov.

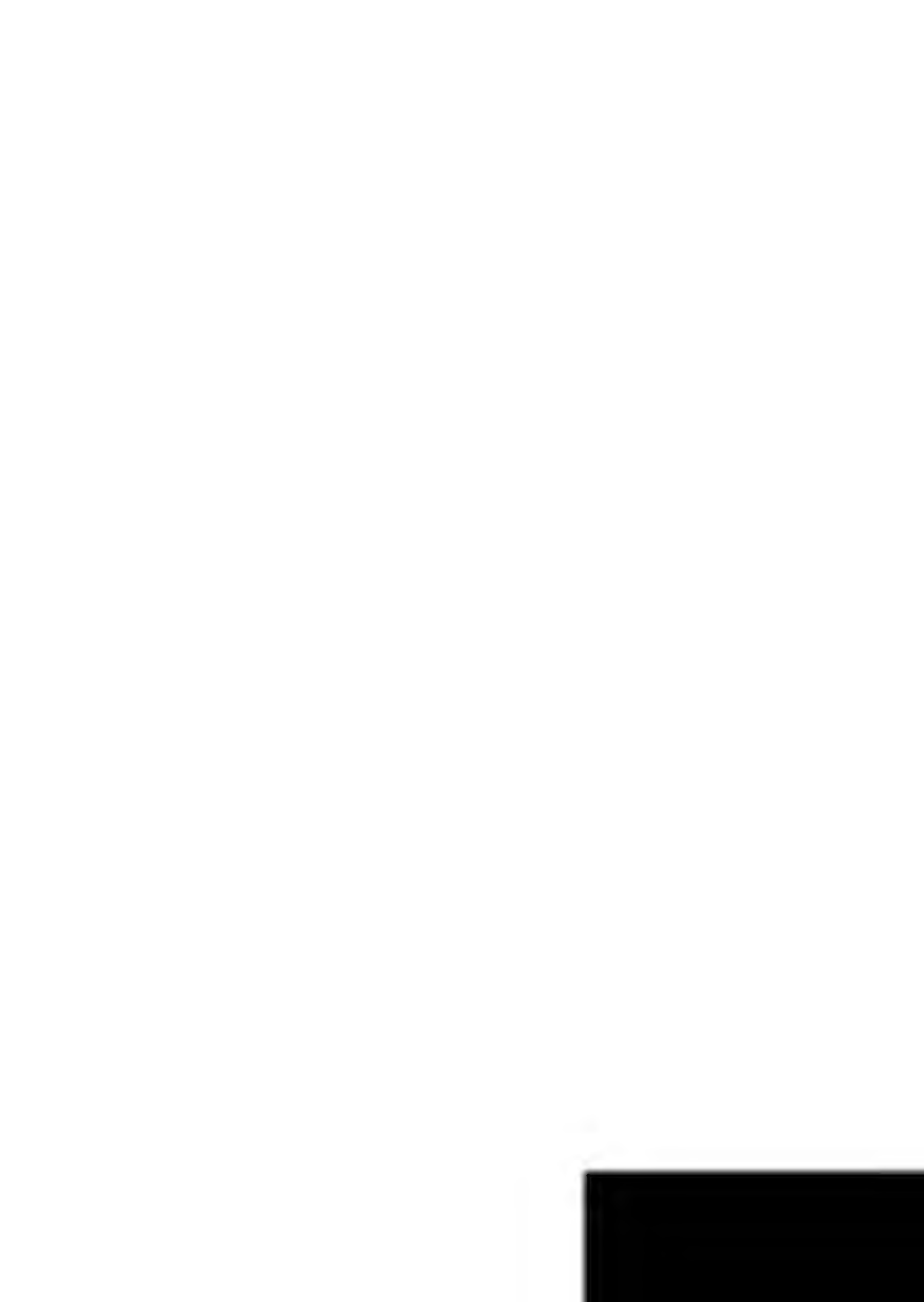
W. E. J. Partridge, del.





Spheroites whitleyi, sp. nov.

W. E. J. Partridge, del.



ICHTHYOLOGICAL NOTES No. 2.*

BY T. C. MARSHALL.

Family MURÆNIDÆ.

Evenchelys macrurus (Bleeker).

Muræna macrurus Blkr. Nat. Tijdschr. Ned. Indie, VII., 1854, p. 324.

Evenchelys macrurus Jordan & Evermann, Proc. U.S. Nat. Mus., XXV., 1902, p. 327.

Rhabdura macrura Ogilby, Proc. Roy. Soc. Qld., XX., 1906, p. 13.

Evenchelys macrurus Fowler, Proc. Acad. Nat. Sci. Phil., LXIV., 1912, p. 20.

Thyrsoidea macrurus Weber & de Beaufort. The Fishes of the Indo-Australian Archipelago, Leiden, III., 1916, p. 354.

Evenchelys macrura McCulloch & Whitley, Mem. Qld. Mus., VIII., 1925, p. 135.

ON 18th February, 1927, a giant specimen of the Long-tailed Eel, *Evenchelys macrurus*, was sent to the Queensland Museum from Maroochy-dore, S.E. Queensland, by Mr. W. J. Butt. (Qld. Mus. No. I. 4333.) This proved to be 12 feet 11 inches (3,938 mm.) in total length, and this apparently establishes a new record in length for the species. Mr. Butt obtained this eel in tidal waters of the Maroochy River at the "Big Cod Hole," a spot well known to fishermen. It was caught on a No. 10 gut line, with a "snapper" hook, a piece of mullet being the bait. Notwithstanding this record length, this eel only weighed 24 lb. A cast of this record specimen has been made for public exhibition.

The late Saville Kent, in "The Great Barrier Reef," p. 303, reports that bêche-de-mer fishermen had told him of a ferocious eel, said to reach twenty feet, which was probably this species.

Following McCulloch and Whitley and H. W. Fowler, the genus *Evenchelys* Jordan and Evermann has been used for this eel in preference to *Thyrsoidea*, under which name Weber and Beaufort give many references, stating that the length is "more than 3,000 mm." In 1906 the late Douglas Ogilby established the genus *Rhabdura* for this species, being unaware of Jordan & Evermann's *Evenchelys*.

* No. 1 Mem. Qld., Mus. Vol. VIII., 1926, pp. 123-4.

Family ATHERINIDÆ.

Rhadinocentrus ornatus Regan.

Rhadinocentrus ornatus Regan. Trans. Zool. Soc. Lond., 1914, XX., pt. 6, p. 280, pl. XXXI., fig. I.

This handsome Atherine, thought at one time to be confined to Moreton Island and later collected at Boambie Creek, New South Wales,¹ has since been obtained on Stradbroke Island by Mr. A. Rudel and Mr. W. Darbyshire, who found them very numerous in fresh water at a spot called the "One Mile." (Qld. Museum Reg. No. I. 4315.)

Family DIPLOPRIONIDÆ.

Diploprion bifasciatus Kuhl & Van Hasselt.

Diploprion bifasciatum, Kuhl & Van Hasselt in Cuvier & Valenciennes, Hist. Nat. Poiss., II., 1828, p. 137, pl. XXI., Java.

Diploprion bifasciatus, Jordan, Tanaka & Snyder. Cat. Fish. Japan, Journ. Coll. Sci., 1913, XXXIII., i., p. 148, fig. 106.

A fine example of this species was forwarded to the Museum in September, 1926, from Bundaberg, by Mr. H. Wessels. (Qld. Mus. Reg. No. I. 4318.) It measured 237 mm. in total length. Previous to receiving this specimen our collection contained two only of this rare Queensland species, both of which were taken on the coast of Southern Queensland (exact locality unknown).

Family LABRIDÆ.

Lepidaplois vulpina Richardson.

Cossyphus vulpinus Richardson, Proc. Zool. Soc. Lond., 1850, p. 71.

Cossyphus aurifer De Vis, 1884. Proc. Roy. Soc. Qld., Vol. 1, p. 146.

Lepidaplois vulpinus McCulloch, Fishes of New South Wales, 1922, p. 73.

A specimen of this handsomely coloured and rare labrid, measuring 448 mm., was caught 30 miles northward of Cape Moreton and presented to the Museum by Mr. G. Hissted. (Qld. Museum Reg. No. I. 4328.)

Family GOBIIDÆ.

Trypauchen wakæ Jordan & Snyder.

Trypauchen wakæ Jordan & Snyder, Proc. U.S. Nat. Mus., 1902, Vol. 24, p. 127, fig. 32.

A specimen collected at Bowen, North Queensland, by Mr. E. H. Rainford, and measuring 140 mm. in length, is the first of the genus to be recorded from Australian waters. (Qld. Museum Reg. No. I. 4125.)

¹ Rec. Aust. Mus., 1926, Vol. XV., No. 1, p. 29.

ADDITIONS TO THE CRETACEOUS AMMONITE FAUNA OF EASTERN AUSTRALIA.

PART 1. (SIMBIRSKITIDÆ, ACONECERATIDÆ AND PARAHOPLITIDÆ).

BY F. W. WHITEHOUSE, PH.D., M.Sc., F.G.S.

(Lecturer in Geology, University of Queensland ; Palæontologist to the Geological
Survey of Queensland ; Hon. Palæontologist to the Queensland Museum.)

(Plates XVI-XVII and Text-figures.)

INTRODUCTION.

THE writer has recently published in these Memoirs (22) a revision of the ammonoid faunas of the "Rolling Downs Formation" and the Maryborough Beds of Eastern Australia. That work was carried out in Cambridge while holding a research scholarship. Since that time he has returned to Australia and now has access to very much more material than when the previous paper was written. It has been thought advisable, therefore, to publish a series of smaller papers, of which this is the first, supplementing the previous work by dealing with new species, new material of imperfectly known forms, new locality records, and such other matters which it may be necessary to place on record.

Family SIMBIRSKITIDÆ Spath.

The genus *Simbirskites* is, at present, a rather unwieldy grouping of species. THYSANOTOCERAS gen. nov.¹ and STOICOCERAS² gen. nov., specialised offshoots from the main lineage, may well be separated, restricting *Simbirskites* to the normal forms with trifurcating costæ.

Simbirskites is derived from *Speetonoceras* and gives rise to the contemporary *Thysanotoceras* via such forms as *Simbirskites umbonatus* (Lahusen), Pavlow (13, pl. 11, fig. 8). As in this case most triplicate "perisphinctids" are derived from an originally biplicate type. An interesting exception, however, is ARRHAPHOCERAS gen. nov.,³ from the *dispar* zone of the Upper Albian,

¹ *Thysanotoceras*, gen. nov. (θύσανωτός, coined). Genotype: *Ammonites (Olcostephanus) picteti*, Weerth (21, p. 12, pl. 2, fig. 5). This includes the group with prominent bundling of costæ in groups of four at the tubercle.

² *Stoicoceras*, gen. nov. (στοϊκός, of a colonnade). Genotype: *Ammonites (Hoplites) teutoburgiensis*, Weerth (21, p. 20, pl. 5, fig. 1).

³ *Arrhaphoceras* gen. nov. (ἄρραφος, without a seam). Genotype: *Ammonites woodwardii*, Seeley (16, p. 12, pl. 11, fig. 3). The genus includes the forms derived from *Pleurohoplites* by the costæ continuing across the venter.

which is derived from the normal hoplitid *Pleurohoplites* and may lead to the Cenomanian *Calycoceras*.

Simbirskites, *Speetoniceras* and *Thysanotoceras* all contain unusually evolute forms in addition to the species of normal volution (e.g. *Simbirskites kayseri*, Neum. & Uhlig sp.; *Speetoniceras losseni*, Neum. & Uhlig sp.; *Thysanotoceras neumayri*, Weerth sp.).

A common feature among the Simbirskitidæ is the decline in virgation of ribbing with age. This, perhaps, reaches its maximum in *Thysanotoceras nodocinctum* (Weerth) which, from the stage with normal quadrifurcating ribs, suddenly decreases at a diameter of about 30 mm. to unbranched ribs, the holotype showing, as intermediate stages, only one trifurcating and two bifurcating ribs. A somewhat analogous case is the rapid decrease in the number of ribs per whorl in some other and earlier "perisphinctids" such as *Paravirgatites*.

The importance of rapid changes in the type of venter in ammonite lineages is, in spite of much recent work, still too little appreciated. As Spath has pointed out, the keeled *Schlœnbachia* is without doubt derived from *Pleurohoplites*. *Arrhaphoceras* represents another sudden change in the same stock. This change is very interesting; for it is an example of ribbing continuing across the venter of a stock which normally has an interrupted venter. That such changes may be frequent is suggested by the not infrequent occurrence of such "sports" as the "*Hoplites tuberculatus*" figured by Crick (1, p. 1). Indeed such "species" as *Ammonites acanthonotus* and *Ammonites glossonotus*, Seeley, (16, p. 10, pl. 10, figs. 4, 5), are nothing else than deformed specimens of hoplitids (*Pleurohoplites*). Similar "sports" are present in keeled stocks; and freak specimens of *Spathiceras*⁴ with closed or nodate venters are not uncommon. It is this tendency to close the venter that has produced *Stoliczkaia* from the normal Lyelliceratidæ.

The production of forms with interrupted venters from stocks with plainly arched venters is also very common, the origin of *Dufrenoyia* from *Parahoplitoïdes* being a case in point. In Simbirskitidæ this is well shown on the holotype of *Stoicoceras teutoburgiense* (Weerth) where later whorls develop an interrupted venter. It is also suggested, e.g., in Perisphinctidæ (s. str.) and in Otoitidæ (the Western Australian *Otoites depressus*, Whitehouse, has a suggestion of rib-break on the venter).

Such known rapid changes cast doubt upon the genetic relationships of, e.g., the forms placed in *Berriasellidæ*, and might suggest a possible, though, perhaps, not very probable, relation between Simbirskitidæ and Neocomitidæ.

⁴The genus *Spathiceras* is proposed elsewhere by the writer (in a paper to appear in the Report of the Aust. Assoc. for the Advan. of Sci., Vol. XVIII), with *Hystrihoceras antipodeum*, Etheridge fil. (3, p. 47, pl. 7, figs. 6, 7) as genotype.

Genus SIMBIRSKITES Pavlow (emend.).

(Plate XVI, figure 1; Text-figure 5.)

SIMBIRSKITES MORVENÆ sp. nov.

1909 *Perisphinctes kayseri*, Etheridge Jr. non Neumayr and Uhlig (4, p. 239, pl. 68).1926 *Simbirskites* spp., Whitehouse (22), p. 200.

Description.—Coiling serpental; sublatumbilicate. Venter arched. Prorsiradiate; about 25 primary costæ to the last whorl on holotype; bullate at the umbilicate shoulder and trifurcating. Whorl-section slightly compressed.

Dimensions.—Holotype: 64, 39, 31, 39.

Remarks.—This species belongs to the group of *S. spectonensis*, Pavlow (12, pl. 4, fig. 1), non Young and Bird, and *S. fasciato-falcatus* (Lahusen), for which possibly a new generic name is required. The group includes the forms with the costæ crowded and prorsiradiate, and the umbilical tubercle bullate. In these features, as in the slightly compressed whorl-section, the group resembles *Craspedodiscus*, but has not the prominently discoidal form. The group apparently represents another orthogenetic trend, from normal *Simbirskites* of the *decheni* group, parallel to that leading to *Craspedodiscus*.

The larger specimen figured by Etheridge (4, p. 239, pl. 68) may belong to the same species; but this cannot be determined until the earlier whorls of such large forms are known. For the present that larger specimen may be regarded as belonging also to *S. morvenæ*.

The specimens (which were figured by Etheridge) consist of a large form with the holotype and three specimens of *Leptomaria* (?) sp. nestling in its umbilicus. These specimens are not naturally arranged, but the smaller ones have been fixed to the larger with cement. All, however, have the same matrix, in which are embedded fragments of *Ostrea* and *Trigonia*. These specimens, according to the information of Mr. H. Tryon, were presented to the Queensland Museum by Mr. Hurst over 30 years ago. In the Museum catalogue they are listed as coming from Victoria Downs, Morven.

Lower beds, below the Roma Series proper, occur in other places in Queensland—North of Roma, at Natal Downs, and in the Cape York Peninsula—but I know of no matrix elsewhere in the area similar to that of *S. morvenæ*.

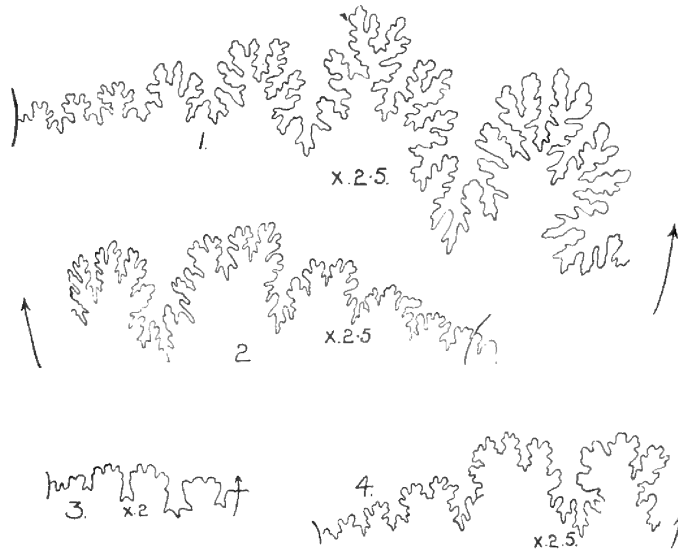
Family ACONECERATIDÆ Spath.

To the three genera recently included by the writer in this family is now added a fourth—*Gyaloceras*. *Theganeceras* is the only such genus not yet found in the Australian Aptian.

The distribution in Australia of the members of the family is interesting. *Aconeceras* and *Sanmartinoceras* are best represented in collections made from the Walsh River (North Queensland) from which area came also the only specimen of *Gyaloceras*. *Aconeceras* is, as yet, known from no other Australian

locality; but *Sanmartinoceras* is known also from Primrose Springs (South Australia), Palmer River (North Queensland), and "South Central Queensland." The beds of Primrose Springs are apparently very high in the Roma Series—higher, I believe, than any of the beds from which fossils have been collected in the Roma district.⁵ The apparent absence of the genus in the latter and well-known district is thus not surprising.

The specimen from "South Central Queensland" is part of the Blomfield collection in the Australian Museum. The generalised locality given for this collection, as stated by Etheridge (4), is "the Sources of the Barcoo, Ward, and Nive Rivers." In this area the topmost portion of the Roma Series⁶ is known at a locality eight miles east of Tambo, from which recently I identified a specimen of *Ammonitoceras* (23). Possibly the *Sanmartinoceras* came from or near this same locality.



TEXT FIGURES 1-4. SEPTAL SUTURES OF ACONECERATIDÆ.

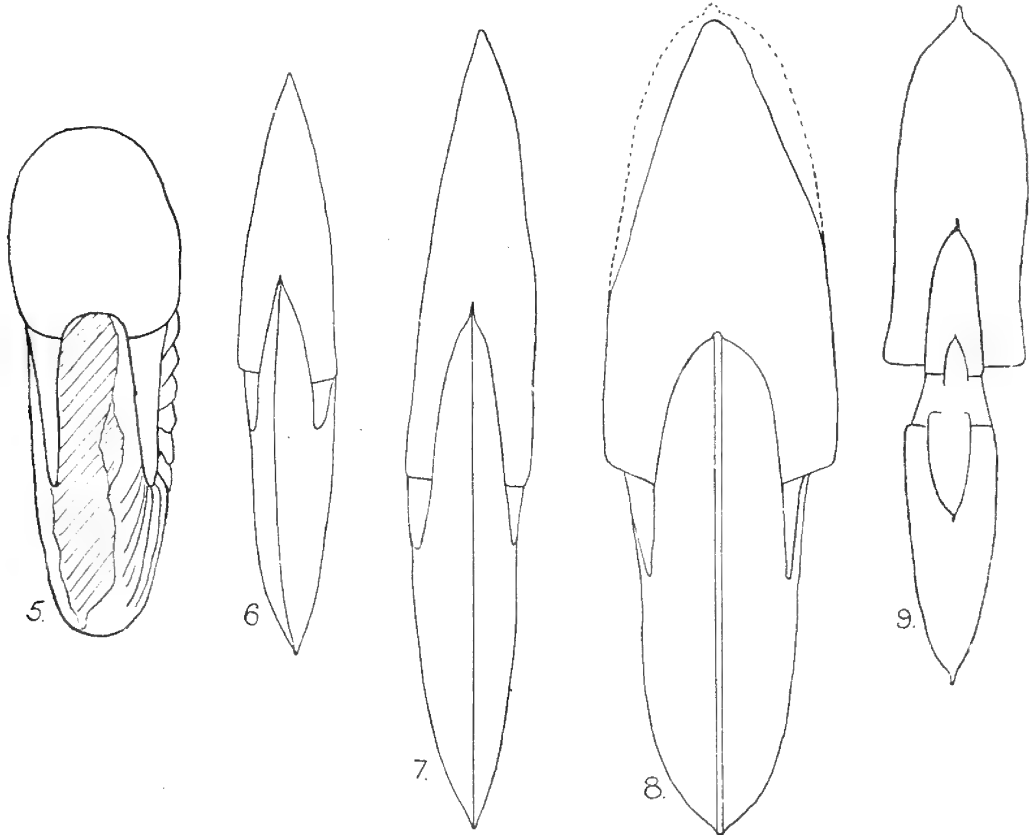
1. *Aconeceras walshense* (Eth. fil.), topotype (pl. xvi., fig. 3); 2. *Sanmartinoceras olene* (Tension-Woods), neotype (pl. xvii., fig. 6); 3. *Sanmartinoceras fontinale* (Hudleston), holotype (pl. xvii., fig. 2); 4. *Sanmartinoceras fontinale* (Hudleston), specimen figured previously (22, pl. 41, fig. 3).

Evidence points to the fact the highest portion of the Roma Series is not well exposed in the vast area of the Artesian Basin where overlaps of the Tambo Series or the Winton Series often conceal it. This would explain the few localities from which *Sanmartinoceras* is known.

⁵I have recently examined the large fossil collections made by Mr. L. C. Ball in the Roma district. The highest fossiliferous horizon was represented by the beds of Roma Downs which appeared to be at the top of the Tropæuman stage. It is probable that the higher beds in this area are covered by an overlap of the Post-Albian Winton (fresh-water) Series; for no fossils of the Tambo Series are recorded between Roma and Surat. The beds at Roma Downs appear to be on the same horizon as those of Peake Downs (S. Aust.). Primrose Springs lying eastwards of the latter locality is, without doubt, on a slightly higher horizon.

⁶Higher, of course, than the beds of Roma Downs with *Tropæum*.

It is fairly certain that *Aconeceras walshense* is a Tropæuman species. The Tropæuman stage being well known in many parts of the Artesian Basin it is at first sight puzzling to find that this species is known only from the one locality. This may be due to faulty collecting, particularly since most of the known specimens were collected on the one occasion (by the Hahn expedition). The species may, therefore, be expected at Roma, near Peake Downs and other places on that horizon. It is possible that the species has a very limited time-range and that the bed containing it may be missing from most of the known fossiliferous areas of the Tropæuman stage.



TEXT-FIGURES 5-9. SECTIONAL VIEWS OF AMMONITES.

5. *Simbirskites morvenae*, sp. nov., holotype (pl. xvi., fig. 1); 6. *Aconeceras walshense* (Eth. fil.), holotype (pl. xvi., fig. 2); 7. *Aconeceras walshense* (Eth. fil.), topotype (pl. xvi., fig. 3); 8. *Gyaloceras smithi*, sp. nov., holotype (pl. xvii., fig. 1); 9. *Sanmartinoceras fontinale*, Hudleston sp. (pl. xvii., fig. 5). All figures natural size.

Further collecting will, almost certainly, give new locality records for the members of this family; and, further, we may expect such collecting to bring to light new species from beds of the Roma Series from which, at present, no aconeceratid forms are known.

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.

Genus ACONECERAS Hyatt.

ACONECERAS WALSHENSE (Tenison-Woods).

(Plates XVI, figures 2 and 3; Text-figures 1, 6, and 7.)

Four specimens of this species, all contained in the Queensland Museum collection, are known. The dimensions of these specimens given according to the usual conventions, are—

Holotype		75.	54.	18.	14.	
<i>F. 1594</i>	(Q.M. Coll.)	80	{ (68).	54.	18.	13.
			{ (49).	56.	19.	14.
<i>F. 1871</i>	(Q.M. Coll.)	92	(72).	57.	—.	12.
<i>F. 1704</i>	(Q.M. Coll.)	105	{ (105).	56.	15 (+).	8
			{ (72).	57.	18.	11.

The faint concentric striae, which are intensified in the five pronounced striae which lie on the axis of the outer flexure of the radial line, are seen only on the holotype, the original shell of the other specimens not being well preserved. The intensifying of the radial line at the point of the inner flexure of the radial line is also interesting, giving a slight "costate" appearance to this narrow zone in the median region of the sides.

Specimen *F. 1704* (figured on pl. XVI, fig. 3) might be separated as a separate variety more involute than the type section. But specimen *F. 1871* is intermediate between the two and for the present all four specimens are recorded under the one name.

Locality.—Walsh River (Q.M. Coll.).

Genus GYALOCERAS nov.⁷

Genotype: *Gyaloceras smithi*, sp. nov.

Remarks.—The new species described below differs so markedly from the normal forms of *Aconeceras* that it is deemed advisable to separate it as the type of a new genus, *Gyaloceras*, distinguished from *Aconeceras* by its greater inflation and by the more obtuse angle of the venter. In degree of involution, smoothness of shell, type of radial line and septal sutures it agrees closely with *Aconeceras* from which it is apparently derived.

The precise hemeral limits of the genus within the Aptian remain to be determined; but it probably belongs to the Tropæuman stage (Lower Gargasian).

⁷ γάλον, a breastplate.

GYALOCERAS SMITHI sp. nov.

(Plate XVII, figure 1; Text-figure 8.)

Description.—Coiling oligogyral, angustumbilicate; fastigate, subearinate; sides convergent; anguliradiate; test smooth, but with the radial striæ intensified in a narrow zone at the middle of the sides; septal suture as in *Aconeceras*.

Dimensions.—

$$109 \begin{cases} (109). & 56. & 25 (+). & 12. \\ (72). & 56. & 28. & 14. \end{cases}$$

Remarks.—There is no other member of the genus with which to compare the species. It has the same intensification of the radial striæ at the median zone of the sides as in *Aconeceras walshense* but there are no concentric striæ. The keel is more pronounced than in *Aconeceras*.

On the side illustrated the shell has suffered a slight injury during life. This, as is usual with the ammonites, is expressed by the reflection of the growth lines for a time. The tiny angular kink in the growth line in the figure is due to this. The radial line, it will be noted, is not so sharply anguliradiate as in *Aconeceras*.

The species is named in honour of the donor, Mr. E. W. Smith

Locality.—Walsh River (Q.M. Coll.).

Genus SANMARTINOCERAS Bonarelli.

Eight specimens of *Sanmartinoceras* have been collected from the Roma Series. Of these the holotype of *S. olene* (Tenison-Woods) can no longer be found. A study of the remaining eight specimens has caused a slight revision of the grouping into species.

These specific relations are not a little puzzling. The specimens fall naturally into two specific groups. One group (the group of *S. olene*) includes the holotype of *S. olene* (i.e. to judge solely from the type figure, since the specimen is lost) and the specimen figured by Etheridge in 1901 (2, pl. 2, fig. 4) which is now refigured (pl. XVII, fig. 5). The remaining specimens belong to the group of *S. fontinale*. The two groups differ in that—

- (i.) The median flexure of the falcate radial line is more pronounced in *S. fontinale*; and
- (ii.) The costæ of the group of *S. olene* are, in the early stage, numerous, regular, and faintly impressed, whereas in *S. fontinale* the costate stage begins more abruptly.

If one judges from Tenison-Woods' figure of the holotype the two specimens in the group of *S. olene* do not agree in all specific features. The costæ of the holotype are less flexed than those of the other specimen, while

the slope towards the venter is greater. I am inclined to think, however, that the original figure was a little incorrectly drawn. Certainly the apertural view, as shown in that figure, suggests that it is a little inaccurate. Since the specimens agree in the main features that distinguish the group from the group of *S. fontinale* I have regarded them as representing but a single species; and, since the holotype is definitely lost, the other specimen, now refigured, is selected as neotype.

The group of *S. fontinale* is regarded as containing only the one species which undergoes a mutational change in which it is not possible, at least at present, to separate varietal stages.

SANMARTINOCERAS FONTINALE (Hudleston).

(Plate XVII, figures 2-5; Text-figure 2.)

- 1890 *Ammonites fontinalis*, Hudleston (5), p. 241, pl. 9, fig. 1.
 1902 *Amaltheus* sp., Etheridge Jr. (3), p. 45, pl. 7, fig. 8.
 1924 *Sanmartinoceras fontinale*, Spath. (19), p. 74.
 1926 *Sanmartinoceras olene*, Whitehouse (pars) non Tenison-Woods, (22), pl. 41, fig. 3.

All the known specimens of *S. fontinale* have now been figured. These six specimens show a wide variation in the development of costæ. On the holotype and the other South Australian specimen (figured by Etheridge) costation begins very early. On the three Walsh River specimens costæ are not developed until a later stage; on one of these (pl. XVII, fig. 2) the costæ begin, however, moderately early, but on the largest specimen (pl. XVII, fig. 5) they do not appear until very late. All, however, have the same type of radial line and the same concentration of costæ and, consequently, they are here regarded as belonging to the same species lineage. Such a lineage, beginning in the smooth *Aconeceras* stage, would naturally proceed through early forms, with the costæ present only on the body-chamber, to more or less completely costate forms like the holotype. Such forms as that of plate XVII, figure 4 would be earlier than the holotype; and the degree of costation may, in the future, serve as a valuable index of the horizon.

If, as is most likely, the change in costation in the lineage proceeds uniformly any varietal division of the group would be very artificial. However subdivision of the group may be possible when many more specimens are available. At present the specific name must be applied to forms widely different in the stage at which the costæ appear, but agreeing in all other features.

The main diagnostic features of *S. fontinale*, as here redefined, are—

- (i.) The very falcate radial line. The median flexure is acute and very marked and the dorsal portion is strongly arcuate.

(ii.) The costæ begin very abruptly as in the normal species of *Sanmartinoceras* from other countries. A short striate stage leads from the smooth to the costate stages on the shell.

(iii.) The dimensions of the species are as follows:—

Holotype	25.	50.	26.	19.	
Q.M. Coll. (<i>F. 1869</i>)	43.	55.	—.	13.	
A.M. Coll. (<i>F. 7304</i>)	45.	53.	20.	13.	
Q.M. Coll. (<i>F. 1722</i>)	}	37.	56.	23.	13.
		56.	56.	20 (+).	11
Q.M. Coll. (<i>F. 1870</i>)	78.	52.	21.	14.	

The septal suture is of the normal type.

Localities.—Primrose Springs. (B.M. Coll., holotype), Lake Eyre Basin (Univ. of Adelaide Coll.), Walsh River Q.M. Coll.), South Central Queensland (A.M. Coll.).

SANMARTINOCERAS OLENE (Tenison-Woods).

(Plate XVII, figure 6; Text-figures 3, 4, and 9.)

- 1883 *Ammonites olene* Tenison-Woods (20), p. 150, pl. 7, fig. 8; pl. 8, fig. 1.
 1892 *Ammonites (Amaltheus) olene* Etheridge Jr. (6), p. 492, pl. 30, fig. 4.
 1901 *Amaltheus olene* Etheridge Jr. (2), p. 32, pl. 2, fig. 4.
 1926 *Sanmartinoceras olene* (pars), Whitehouse (22), p. 205 (non pl. 41, fig. 3).

As redefined above *S. olene* is characterised by—

(i.) The median flexure of the radial line is more obtuse and not so prominent as in *S. fontinale*, while the dorsal portion is not so curved.

(ii.) The costæ do not begin abruptly but increase gradually in intensity.

In regard to this latter feature it should be noted that Tenison-Woods' figure of the holotype shows definite costæ on all parts of the shell visible. On the neotype the costæ on the initial half of the last whorl are so faint that they are extremely difficult to reproduce in a photograph. (The photographer has, however, succeeded in showing them slightly in the photograph here reproduced.) In the drawing of the neotype originally given by Etheridge they were slightly over-emphasised and were not represented as crowded as they appear on the specimen. Another mistake in that figure was that the costæ were shown in part rectiradiate whereas they are, of course, always falcate. On the last whorl of the neotype there are about 33 costæ the first 16 of which are "subcostæ."

In the presence of this "subcostate" stage leading from the smooth to the normally costate portion this species is decidedly different from the other known forms of *Sanmartinoceras*, though probably most closely allied to *S. fontinale*.

The septal suture is of the normal *Sanmartinoceras* type.

The dimensions of the neotype are—73 (54). 50.—16.

Localities.—Palmer River (M.M. Coll., holotype (this specimen is now lost, and appears to have disappeared from the museum), Walsh River (G.S.Q. Coll., neotype).

Family PARAHOPLITIDÆ Spath.

Previously (22, p. 206), in some hesitation, the writer had referred to the genus *Parahoplitoides* a fragment which he had not seen but which had been figured by Etheridge (3, pl. 7, fig. 1). An examination since then has shown that the specimen is, apparently, one of the *Desmoceratidæ* and, therefore, will be treated in a later paper in this series.

Parahoplitoides is, however, present in the Roma Series.

The relations of the early *Parahoplitoides* to the later *Parahoplites* is not clear. The more inflated species of *Parahoplitoides*, such as that now described, may suggest that the change was accomplished by a lineage specialising in inflated forms. It seems to the writer, however, that *Parahoplites* possibly may be derived from *Cheloniceratidæ*; in which case a new family name would be required for *Parahoplitoides* and its offshoots *Stenhoplites*, *Dufrenoyia*, and *CLOIOCERAS* (gen. nov.).⁸

Genus PARAHOPLITOIDES Spath.

PARAHOPLITOIDES PLENUS sp. nov.

(Plate XVI, figure. 4.)

This species is founded upon a fragment distorted in the region of the venter. The dimensions, therefore, cannot be given.

The ribbing is of the type normal for the genus. The costæ, which are flexiradiate, originate and bifurcate at the umbilical margin. They are about as prominent as those of *P. bodei* (v. Kœnen) and *P. fissicostatus* (Phillips) (14, pl. 2, fig. 49), and less so than those of *P. deshayesi* (Leymerie) (9, pl. 17, fig. 17). Unlike *P. bodei*, which it resembles in many respects, the ribs are all continuous from the umbilical margin.

The septal suture, a portion of which is visible, resembles that of *P. læviusculus* (v. Kœnen) (8, p. 224, pl. 8, fig. 4).

The species is rather more inflated than the European and African members of the genus.

⁸ *Cloioceras*, gen. nov. (κλοιός, a collar). Genotype: *Hoplites ruspolii*, Mayer-Eymar (10, p. 258, pl. 2, figs. 10, 11). This genus is an unusual offshoot of *Parahoplitoides* with two ventro-lateral rows of tubercles on each side and simple ribbing.

P. plenus has little in common with *P. weissii* (Neum. & Uhlig) (11, pl. 46, fig. 1) and the similar forms from the *weissii* zone figured by Kilian (7). Its relations are entirely with the lower forms of the *bodei* zone of the Bedoulian, i.e. the lowest portion of the Australiceratan Stage.

At first sight this specimen might be mistaken for one of the species of *Sanmartinoceras*; but it is easily distinguished by the absence of a keel and by the non-falcate costæ.

Locality.—The specimen is in two parts which fit together perfectly. One portion was registered in 1904 as having been found at Mt. Brown (N.S.W.) and presented by Mr. Klein. The other portion was registered in the Museum books in 1907 with the locality "Queensland." Mr. Klein was a noted collector in and around the opal fields of New South Wales, and there can be little doubt that the former locality, Mt. Brown, is correct. The holotype is in the Mining and Geological Museum, Sydney.

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EXPLANATION OF PLATES XVI-XVII.

(All figures are natural size.)

Plate XVI.Fig. 1.—*Simbirskites morvenæ* sp. nov.

Holotype (Q. M. Coll.). Locality: Victoria Downs, Morven (Qld.).

Figs. 2, 3.—*Aconeceras walshense* (Eth. fil.).

Fig. 2 (a), (b). Holotype, lateral and apertural views. Locality: Walsh River (Q. M. Coll.).

Fig. 3.—Specimen F. 1704 (Q. M. Coll.), a form rather more involute than the holotype. Locality: Walsh River (North Qld.).

Figs. 4 (a), (b).—*Parahoplitooides plenus* sp. nov.

Lateral and sectional views of holotype (M. G. M. Coll.). The outline of the venter (which, on the specimen, is crushed) is restored. Locality: Mt. Brown (N.S.W.).

Plate XVII.Fig. 1.—*Gyaloceras smithi* sp. nov.

Holotype (Q. M. Coll.). Locality: Walsh River (North Qld.). The slight flexure at X is due to an injury.

Figs. 2-5.—*Sanmartinoceras fontinale* (Hudleston).

Fig. 2 (a), (b). Copy of protograph of holotype from Primrose Springs, South Australia (B. M. Coll.). Costate stage begins at a diameter of 18 mm.

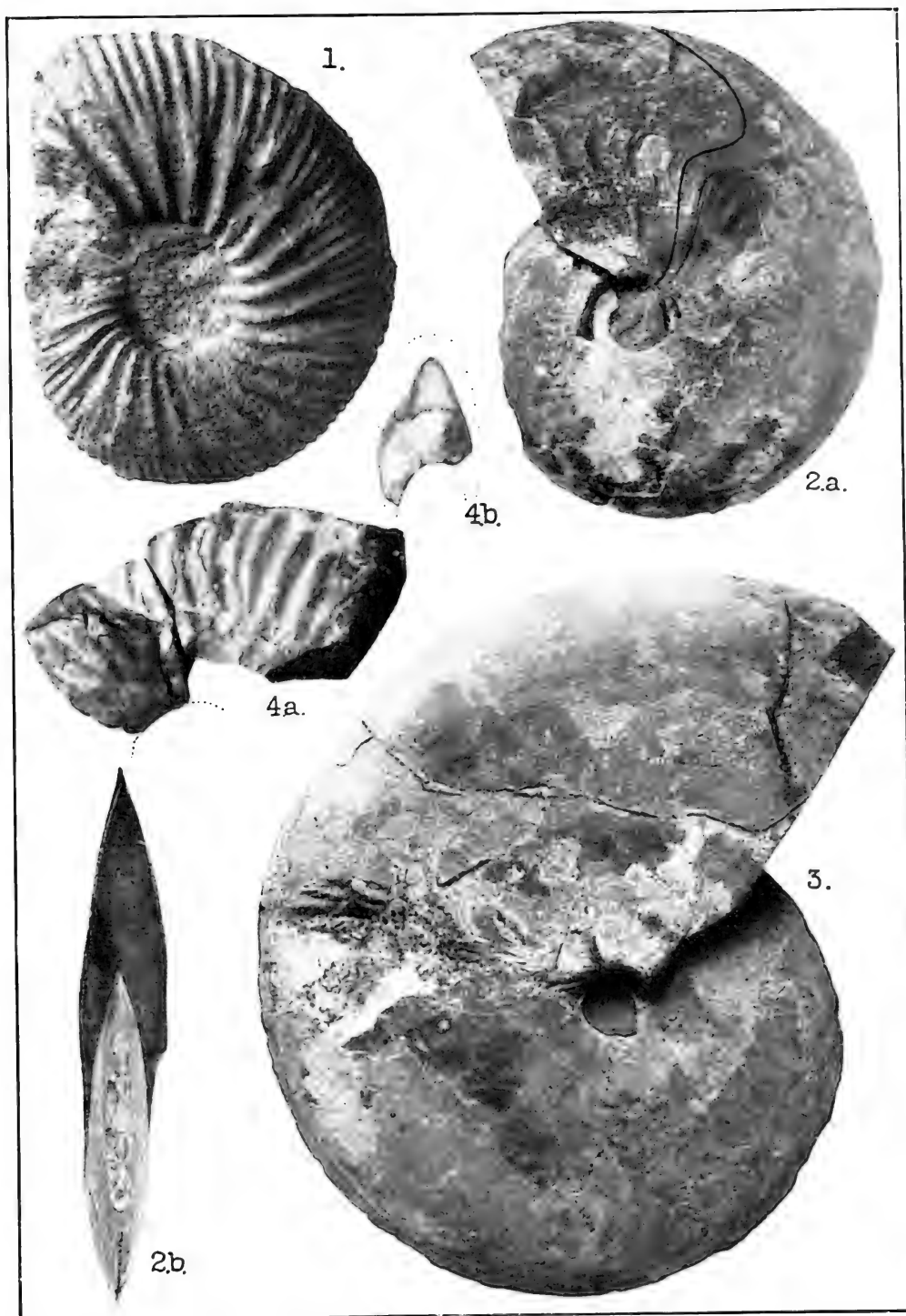
Figs. 3 (a), (b). Specimen from South-Central Queensland (A. M. Coll.). Costate stage is already fully developed at a diameter of 29 mm.

Fig. 4.—Specimen from Walsh River (Q.M. Coll.). Costate stage begins at a diameter of 30 mm.

Fig. 5.—From Walsh River (Q. M. Coll.). The largest known specimen. Costate stage is developed, but only very weakly, at a diameter of 53 mm.

Fig. 6.—*Sanmartinoceras olene* (Tenison-Woods).

Neotype, from Walsh River (G. S. Q. Coll.).





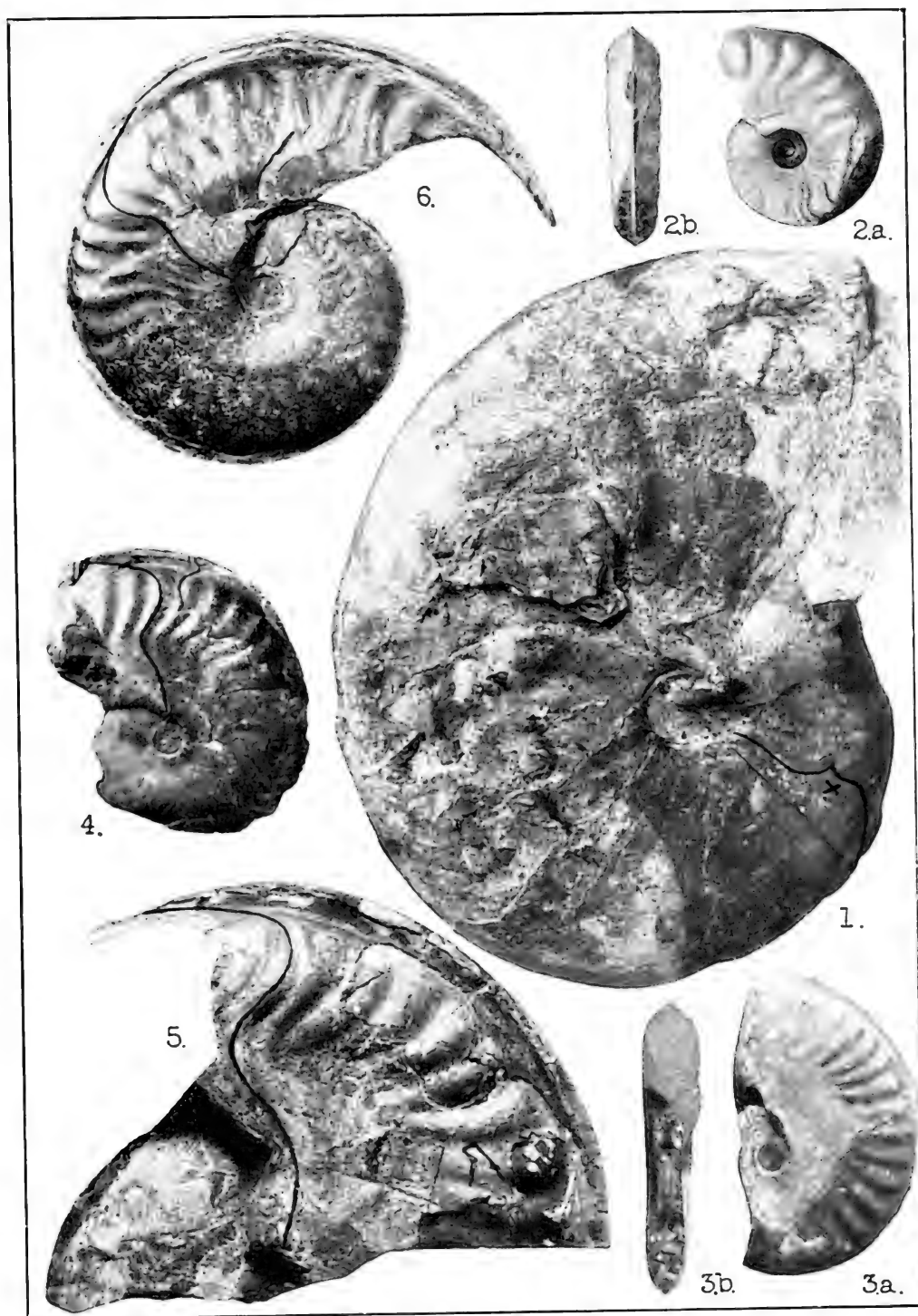


Photo., H. W. Mobsby and A. N. Falk.



SHORT REVIEW OF THE PRESENT KNOWLEDGE OF THE SAUROPODA.

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THE Sauropoda are the hugest continental animals the earth has ever seen. They lived from the middle Jurassic to the Danian period of the uppermost Cretaceous. Much has been written about them, but nevertheless their natural classification and development do not yet appear in a desirable clearness. In this respect the immense size of the Sauropoda has been an obstacle.

The satisfactory excavation of such gigantic skeletons is difficult, and the preparation, which is still more important, needs trained, skilful men working for years. The scientific value of a skeleton is determined in advance by the degree of care by which, during the excavation, the original articulation or the original positions of the bones to each other in the rock is dealt with by sketch-plans in scale as to make sure specially the sequence of the vertebræ. Because of the failure of this in many cases, we still know so astonishingly little about the natural classification of the Sauropoda as a whole.

Most has been written and spoken on the North American Sauropoda. Too little has been done with the earlier Sauropoda. The knowledge of the Upper Cretaceous Sauropoda until now is quite insufficient. The large amount of Tendaguru Sauropoda at Berlin and the recent excavations of the Carnegie Museum at Pittsburgh have not yet been described; they will probably complete and alter our ideas of the development and classification of the Sauropoda.

The external appearance of the Sauropoda during Jurassic and Cretaceous times does not change much in general; that means, in their adaption and biology they are very similar to each other. Therefore it is necessary to judge from minor differences in the more conservative parts of the skeleton such as the neural parts of the skull and especially the vertebral column. These are the essential parts to deal with.

(1.) The *Family of the Cetiosauridæ* has been considered as the most primitive division of the Sauropoda. But they have to be divided into two families :—

(a) Subfamily **Cardiodontidæ** (Owen).

Teeth with sharp anterior and posterior edges and flat lingual face. Neural part of skull similar to *Plateosaurus*. Vertebral formula (in *Haplocanthosaurus*) 13 (?) cervicals, 12 dorsals, 5 sacrals consisting of 1 dorsosacral,

3 original sacrals and 1 caudosaurial). Neural spines of presacrals undivided. Slight cavernosity of presacrals. Cervicals prolonged and opisthocœlous; dorsals short and opisthocœlous; caudals amphi- or platy-cœlous. Distal extremity of tail consisting of rod-like elements. Two sternal plates. Ilium without much of a posterior spine. Pubis broad plate in whole length. Ischium even distally fairly broad. Fore leg much shorter than hind leg. Leg bones solid. Fibula without prominent muscular attachment above middle of shaft. Long metacarpals and short metatarsals.

Middle and Upper Jurassic. The main genera are:—

Cetiosaurus (Owen). Middle Dogger, England.

Cetiosauriscus (Huene). Oxford Clay in England, Kimmeridge zone in Switzerland.

Haplocanthosaurus (Hatcher). Lowest part of Morrison beds, North America.

Dystrophæus (Cope). Lowest part of Morrison beds, North America.

Remarks.

Cetiosaurus has been described in many places. Compare mainly R. Owen: Reptiles of the Mesozoic Formations, Pt. II. in Paleont. Soc., 1875. See also J. Phillips: Geology of Oxford and the Valley of the Thames, 1871.

Cetiosauriscus for *Cetiosaurus leedsi*, A. S. Woodward: Proc. Zool. Soc. London, 1906, 232-243. Dorsal and caudal vertebræ much shorter than in *Cetiosaurus*, broad neural spines. Fore leg much shorter relatively than in *Cetiosaurus*. Low ilium and slender femur as in *Haplocanthosaurus*. "*Ornithopsis*" (?) *Greppini* (Huene) also belongs to this genus; see *Eclogæ geologicæ Helvetiæ*, XVII., 1, 1922, 80-94.

Haplocanthosaurus, see Hatcher: Mem. Carnegie. Mus., II., 1, 1903. Several vertebræ are missing and the present writer gives a different interpretation of the vertebral formula from Hatcher.

Dystrophæus, see Huene in: Neues Jahrbuch f. Min. etc. Beil. Bd. 19, 1904, 319-333.

(b) Subfamily **Brachiosauridæ** (Riggs).

Teeth similar to those in *Cardiodontidæ*. Skull relatively primitive (not yet described, from Tendaguru). Vertebræ more cavernous than in *Cardiodontidæ*. Neural spines of præsaclral vertebræ undivided. 5 sacrals as in preceding group. Front leg nearly as long (*Bothriospondylus*) or longer (*Brachiosaurus*) than hind leg. Girdles similar to those in preceding group.

Middle Jurassic to Lower Cretaceous. The main genera are—

Bothriospondylus (Owen). Middle Dogger in England and Madagascar, Malm in England and France.

Pelorosaurus (Mantell). Kimmeridge in England and France, Wealden in England.

Brachiosaurus (Riggs). Upper part of Morrison beds in North America, Jura-Cretaceous-limit at Tendaguru.

? *Pleurocælus* (Marsh). Potomac, eastern North America.

Remarks.

Bothriospondylus. See specially A. Thevenin: Dinosauriens de Madagascar. Annales de Paléontologie, II., 1907.

Pelorosaurus, introduced 1850. The genus is identical with *Ornithopsis* (Seeley 1870) and *Dinodocus* (Owen). See the literature in A. S. Woodward and D. Sherborn: Brit. Foss. Vertebr., 1890.

Brachiosaurus, see mainly E. S. Riggs: Publ. 94 of the Field Columbian Museum, Geol. Ser. II., Chicago, 1904, p. 229 ff. W. Janensch: Uebersicht über die Wirbeltierfauna der Tendaguruschichten. Archiv. f. Biontologie, III., 1, 1914, p. 86.

Pleurocælus, see O. C. Marsh: Dinosaurs of North America, Papers Ann. Rep. Director U.S. Geol. Surv., 1895, p. 183-185, Pl. 40-41.

(2) Family **Morosauridæ** (Marsh).

Teeth similar to those of Cetiosauridæ. Skull relatively primitive, snout not flattened in front as it is in *Diplodocus*. Large nasal openings above the snout. Upper and lower jaw with strong teeth. Quadrate normally built. Deep infundibulum. Formula of præsaclal vertebræ not certain. 5 sacral. Præsaclals very cavernously built, far more so than in the Brachiosauridæ. Neural spines divided from 7th cervical to about 6th dorsal. Caudal centra relatively longer than in Brachiosauridæ, amphicæalous; præsaclals opisthocæalous. Sternal plates similar to those in Cetiosauridæ. Pubis little narrower than in Cetiosauridæ. Fore legs much shorter than hind legs. Humerus broad and with very prominent Processus lateralis, comparable with Plateosauridæ. Fibula with slight prominent muscular attachment above middle of shaft.

Upper Jurassic. The main genera are:—

Camarasaurus (Cope). Upper Morrison Beds, North America.

Amphicælias (Cope). Same beds, North America.

Barosaurus (Marsh). Same beds, North America.

? *Gigantosaurus* (E. Fraas). Jura-Cretaceous-limit at the Tendaguru in former German East Africa.

Remarks.

Camarasaurus (= *Morosaurus*, Marsh, = *Brontosaurus*, Marsh) is here taken in the sense of Osborn and Mook: Mem. Amer. Mus. Nat. Hist., New Series III., Pt. 3, 1921; the species there described must be something quite different

from what Gilmore describes under the name *Camarasaurus lentus* (Marsh) with a skull like *Camarasaurus* and with the præ-sacral formula: 12 cervicals, 12 dorsals, and 5 sacrals; see C. W. Gilmore:—"A nearly complete skeleton of *Camarasaurus*, a Sauropod Dinosaur from the Dinosaur National Monument, Utah." Mem. Carnegie Mus., X., 3, 1925, 347-384. This vertebral formula is certain as the skeleton was articulated; the number of cervical vertebræ is lower than in *Camarasaurus excelsus* described by Osborn and Mook, though the actual number of cervicals in that form is not known; this latter species also had probably less dorsals than the skeleton described by Gilmore. This demonstrates much uncertainty in the edifice of the natural classification of the Sauropoda. If "*Morosaurus*" *brevis* (Owen) belongs to that genus, it would also occur in the English Wealden.

Amphicoelias, see in the mentioned Memoir of Osborn and Mook.

Barosaurus, see R. S. Lull: The sauropod Dinosaur *Barosaurus* Marsh, redescription of the type specimens in the Peabody Museum, Yale University. Mem. Connecticut Acad. Arts and Sci., VI., 1919, 1-42.

Gigantosaurus (E. Fraas, non Seeley), see W. Janensch, Uebersicht über die Wirbeltierfauna der Tendaguruschichten Archiv. f. Biontologie, III., 1, 1914.

(3) Family **Dicræosauridæ.**

Skull similar to *Camarasaurus*. Neural spines of præ-sacral vertebræ higher and more deeply divided than in *Morosauridæ*. Vertebræ differently and less cavernous than in *Morosauridæ*; centra without pleurocœls. Short neck. Præ-sacral formula not published yet.

Jura-Cretaceous limit. Only genus:—*Dicræosaurus* (Janensch). Jura-Cretaceous-limit at the Tendaguru in former German East Africa.

Remarks.

Dicræosaurus, see Janensch l.c. 1914. Posterior part of skull in: Pompeckj, Sitz. ber. Gesellsch. naturforsch. Freunde, Berlin, 1920, 3, p. 120, fig. 4.

Should perhaps the skeleton described by Gilmore as *Camarasaurus lentus* (see above) belong to this family? This is but a faint suggestion; the writer does not know.

(4) **Diplodocidæ.**

Numerous tack-like teeth. Skull much modified as compared with *Camarasaurus*. Nasal openings pushed up to the front. Situation of orbita very high. Snout low. Both pairs of temporal openings much pushed together. Quadrate ham-like in form. Longitudinal axis of skull broken. Very deep infundibulum. Neural part of skull high. Vertebral formula: 15 cervicals, 10 dorsals, 5 sacrals, amongst which 1 dorsosacral, as in all of the former families. Præ-sacrals very cavernous. Neural spines deeply divided from the 7th cervical to the 5th dorsal (the 6th is less divided). Also anterior caudals still

cavernous. Caudals amphicœlous. Extremity of tail consisting of rod-like elements. Distal hæmapophyses forming double lashes. Abdominal ribs existing. 2 sternal plates. Pubis narrower at distal end than in Morosauridæ. Fore legs much shorter than hind legs. Humerus broad with strong Processus lateralis.

Upper Jurassic. Only genus:—

Diplodocus (Marsh). Morrison beds of North America.

Remarks.

The most important descriptions of *Diplodocus* are by Hatcher: Mem. Carnegie Mus. I., 1, 1901. Holland: Ibidem, II., 6, 1905. Holland: Ibidem, IX., 3, 1924.

(5) Family **Apatosauridæ** (Riggs).

Essential characters same as in Diplodocidæ, skeleton more bulky. 15 cervicals, 10 dorsals, 5 sacrals. Following indications given by Holland this family will possibly become united with Diplodocidæ.

Upper Jurassic. The genera are:—

Apatosaurus (Marsh). Morrison beds of North America.

? *Uintasaurus* (Holland). Same beds of North America.

Remarks.

Apatosaurus, see mainly E. S. Riggs in Publ. 82 of Field Columbian Mus. Geol. Ser., II., 4, 1903, p. 165–196.

Uintasaurus, see J. W. Holland in Ann. Carnegie Mus., XV., 1924, p. 119–138.

(6) Family **Titanosauridæ**.

Numerous weak tack-like teeth as in *Diplodocus*. Also external form of skull similar to that genus. Longitudinal axis of skull broken. Upper orbital rim higher than middle of skull-roof. Both temporal openings shortly pushed together. Neural part of skull very high, snout low and broad. Basipterygoid processes shorter than in *Diplodocus*. Supraoccipital of specially primitive form as in Morosauridæ. Formula of the opisthocœlous præsacral vertebræ not known, but with a minimum of 12 and a maximum of 14 cervicals; in the same sense, 10–12 dorsals. 6 sacrals amongst which 2 dorsosacrals and 1 caudosacral, all firmly ankylosed. First caudal biconvex, the following caudals procœlous. Neural arch in middle and posterior caudals fixed only in anterior part of centrum. Extremity of tail consisting of rod-like elements. Two long narrow sternal plates. Coracoid rectangular. Pubis broad plate in whole length with small foramen. Fore leg shorter than hind leg. Processus lateralis in humerus only little prominent. Fibula with rather thick proximal extremity and very prominent muscular attachment above middle of shaft.

From Lower to uppermost Cretaceous. The genera are :—

Titanosaurus (Lydekker). Wealden to Danian, England, France, Transylvania, India, Madagascar, Patagonia, Brazil.

Laplatasaurus (Huene). Turonian to Senonian, Madagascar, India, Patagonia.

Argyrosaurus (Lydekker). Senonian, Patagonia.

Antarctosaurus (Huene). Senonian, Patagonia.

Macrurosaurus (Seeley). Cenomanian in England, Senonian in Patagonia.

Aepisaurus (Gervais). Aptian, Southern France.

Hypselosaurus (Mathéron). Danian, Southern France.

? *Alamosaurus* (Gilmore). Danian, New Mexico.

Remarks.

Titanosaurus, see R. Lydekker in Palæontologia Indica (Mem. Geol. Surv. Ind.) (4), I., 3, 1879, p. 20 ff. Lydekker: The Dinosaurs of Patagonia. An. Mus. La Plata, II., 1893. Also: Quart. Journ. Geol. Soc. London, 43, 1887, 156–160. Quart. Journ. Geol. Soc. London, 44, 1888, p. 58. Ch. Depéret in Bull. Soc. géol. France, (3), 24, 1896, 178 ff. Thevenin in Ann. Pal. II., 1897, p. 13–14. Depéret in Bull. Soc. géol. France, (3), 28, 1900, 107–108. Nopcsa in Quart. Journ. Geol. Soc. London, 79, I., 1923, 100–116. Nopcsa in Mitteil. a. d. Jahrb. Ungar. Reichsanstalt, 23, 1, 1915, p. 14–15.

Laplatasaurus and *Antarctosaurus* are new genera; they will soon be published in the Anales del Museo de La Plata.

Argyrosaurus, see Lydekker in Mus. La Plata, II., 1893.

Macrurosaurus, see mainly H. G. Seeley in Quart. Journ. Geol. Soc. London, 32, 1876, 440–444.

Aepisaurus, see P. Gervais: Zool. et Pal. Françaises, 1852, Vol. I., p. 263; Vol. II., Explanation of Plates, p. 8; Vol. III., Pl. 63, fig. 3–4.

Hypselosaurus, see Mathéron in Mém. Acad. Imp. Sci. Marseille, 1869, 1–39; and in Bull. Soc. géol. France, (2), 26, 1869. Nopcsa in Quart. Journ. Geol. Soc. London, 79, 1, 1923, 108.

Alamosaurus, see Ch. W. Gilmore: A new Sauropod Dinosaur from the Ojo Alamo formation of New Mexico. Smithsonian Miscell. Coll., 72, 14, 1922 (Jan.), 9, p. 1–9.

This short review demonstrates quite plainly, that in the families Morosauridæ, Dicræosauridæ, and Apatosauridæ our present knowledge of the Sauropoda still is quite insufficient. But there are hopes that this lack will soon be filled up.

Quite recently also Australia has begun to contribute to the history of the Sauropoda (H. A. Longman: A giant Dinosaur from Durham Downs, Queensland. Mem. Queensland Mus. VIII., 3, 1926, 183–194; ibidem, IX., 1927, pp. 1–18).



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