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TRANSACTIONS AND PROCEEDINGS
AND
REPORT
OF THE
ROYAL SOCIETY of SOUTH AUSTRALIA.

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For 1897-98.

[WITH SEVEN PLATES AND THREE WOODCUTS.]

8 Plates. (1-4, 4-7)

EDITED BY PROFESSOR R. TATE.

ISSUED DECEMBER, 1898.



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OCT 4 1898

A FURTHER CAMBRIAN TRILOBITE FROM YORKE PENINSULA.

By R. ETHERIDGE, JUNR., Hon. Fellow, Curator, Australian Museum, Sydney.

[Read November 2, 1897.]

Plate IV., figs. 1-3.

In 1884 Dr. Henry Woodward described* two Cambrian Trilobites from the Parara limestone of Yorke Peninsula, to which he gave the names of *Dolichometopus Tatei*, and *Cono-*

ERRATA.

- pp. 80-89, and legend on Plate iv. (Mollusca) read Plate iv. *bis*.
p. 145, line 30, read were *never* seen.
p. 162, line 12 from bottom insert *at* after shot.
pp. 173, 175-8, 181, 183, insert *Brockman* before Creek.
p. 217, line 30, read Plate 6 instead of Plate 7.

GEOLOGICAL SURVEY.

It appears that Zenker, in 1833, proposed the name of *Conocephalus* for a blind Trilobite, previously known as *Trilobites Sulzeri*, Schlottheim, and in 1839 Emmrich added a second species termed *Conocephalus striatus*, but possessing eyes. The incongruity of this appears to have struck Corda, who in 1847 pointed out that *Conocephalus* was, at the time of its enunciation, by Zenker, a preoccupied name, and proposed to substitute for the blind *Conocephalus* (*C. Sulzeri*) the name of *Conocoryphe*, and for the species provided with eyes (*Conocephalus striatus*) that of *Ptychoparia*. Subsequently the illustrious paleontologist Barrande, without separating the two forms, endeavoured to

* Geol. Mag., 1884, I. (3), p. 343.

† Trans. R. Soc. S. Austr., 1892, XV., Pl. II., p. 187.

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By R. ETHERIDGE, JUNR., Hon. Fellow, Curator, Australian
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[Read November 2, 1897.]

Plate IV., figs. 1-3.

In 1884 Dr. Henry Woodward described* two Cambrian Trilobites from the Parara limestone of Yorke Peninsula, to which he gave the names of *Dolichometopus Tatei*, and *Conocephalites australis*. Since then Prof. R. Tate has described† two others from the same district—*Olenellus* (?) *Pritchardi* and *Microdiscus subsagittatus*.

Quite recently the Mr. W. Howchin transmitted to me a portion of the cephalic shield of another Trilobite, found by him at Ardrossan, that is in my opinion congeneric with Woodward's *C. australis*, but differing specifically, as I hope to show in the sequel, by a very important character. It will, however, be necessary in the first place to review our position in a generic sense. Dr. Woodward, following my determination of the Caroline Creek Trilobites, in Tasmania, referred his species to the genus *Conocephalites*, Barrande, both of us using this name as it was then commonly accepted. Through later researches amongst Cambrian Faunas, and the literature relating thereto, it has been ascertained that *Conocephalites* as a generic name will not stand, but must give place to that of *Ptychoparia*, Corda. No one has done more to clear up this point than have Messrs. F. B. Meek and C. D. Walcott, the latter the energetic director of the U.S. Geological Survey.

It appears that Zenker, in 1833, proposed the name of *Conocephalus* for a blind Trilobite, previously known as *Trilobites Sulzeri*, Schlottheim, and in 1839 Emmrich added a second species termed *Conocephalus striatus*, but possessing eyes. The incongruity of this appears to have struck Corda, who in 1847 pointed out that *Conocephalus* was, at the time of its enunciation, by Zenker, a preoccupied name, and proposed to substitute for the blind *Conocephalus* (*C. Sulzeri*) the name of *Conocoryphe*, and for the species provided with eyes (*Conocephalus striatus*) that of *Ptychoparia*. Subsequently the illustrious palæontologist Barrande, without separating the two forms, endeavoured to

* Geol. Mag., 1884, I. (3), p. 343.

† Trans. R. Soc. S. Austr., 1892, XV., Pl. II., p. 187.

surmount the difficulty by substituting the name *Conocephalites* for *Conocephalus**. In 1872 the late Mr. F. B. Meek, whose great care and perspicuity it is a pity more of us do not follow, adopted† Corda's names to the exclusion of Barrande's substituted one. Finally in the words of Mr. Walcott:—"This division [i.e., of *Conocephalus*, Zenker] appears to me to be one demanded by the characters of the two types, and I fully endorse the opinion of the late Mr. F. B. Meek (. . . .) that Mr. Corda's names should be adopted, and the subsequent name *Conocephalites*, proposed by Mr. Barrande, in 1852, treated as a synonym.‡" In these terms I now employ the name *Ptychoparia* for *Conocephalites australis*, Woodw., and the fragmentary cephalic shield, lately obtained by Mr. Howchin, for which I propose the name of—

Ptychoparia Howehini, sp. nov. Pl. IV., figs. 1-3.

Sp. Char.—Glabella oblong, with sides almost parallel, narrowing but very slightly towards the front, which is evenly rounded; surface convex, and slightly arched in the middle line, most so posteriorly; furrows in three pairs, the first or posterior pair being the strongest marked, consisting of shallow depressions extending inwards nearly to the arched median line; second or middle pair still shallower and shorter, issuing from the axial grooves halfway between the first pair of furrows and proximal ends of the ocular ridges; third or anterior pair very short and faint, mere nicks in the lateral margins of the glabella, exactly opposite the proximal ends of the ocular ridges; basal lobes the most pronounced, the anterior lobe the largest, gradually sloping downwards to the well developed frontal furrow, which is wide and gently concave; fillet (*bourrelet*) of the limb prominent, thick, and rounded. Facial sutures anterior to the ocular ridges, straight (i.e., parallel to the longer axis of the glabella), giving to the anterior portions of the united glabella and fixed cheeks a square appearance. Fixed cheeks gently convex, but not wholly preserved. Ocular ridges very well marked, broad and rather flat, very oblique to the longer axis of the glabella, bounded posteriorly by faint furrows. Axial furrows broad and not deep. Ornament consisting of granules of two orders, small, and minute respectively, interspersed with one another, and distributed over the whole surface, including the frontal furrow, limb, and ocular ridges.

* Syst. Sil. Bohême, 1852, I. p. 415.

† 6th Ann. Report U.S. Geol. Survey Territories (Hayden's), 1872, p. 487. I regret that I have not this work at hand to refer to.

‡ Bull. U.S. Geol. Survey (Powell's), No. 10, 1884, p. 35.

Obs.—The central portion of the cephalic shield, or cephalon, is all that is preserved of this interesting crustacean. The reason for separating it from *P. australis*, Woodw., sp., are the following:—(1.) Presence of the strong ocular ridges, absent in the latter; (2) direction of the facial sutures, which in *P. australis* are said to be “somewhat oblique,” but here are certainly straight anterior to the ocular ridges, and do not commence near the anterior angle(s) of the glabella; (3) absence of oblique striae in advance of the eyes; and (4) the position the eyes would occupy were they preserved. As regards the last point of difference in *P. australis* the anterior ends of the eyes are decidedly well forward, but I believe the corresponding points in *P. Howchini* will be found to be much more posterior in position. In most *Ptychopariae* possessing ocular ridges, the anterior terminations of the eyes are situated at the distal or posterior ends of the ocular ridges. Now these points in *P. Howchini* are much more posterior than the corresponding positions in *P. australis*. Herein, in my opinion, lies a fundamental difference between the two types.

To *Ptychoparia* are also referable, in all probability, most, if not all the fragmentary cephalic shields, described by me from Caroline Creek, Tasmania.*

[The Type specimen is in the Australian Museum, Sydney, presented by Mr. Howchin.]

EXPLANATION TO PLATE IV.

PTYCHOPARIA HOWCHINI.

Fig.

1. The cephalon or head shield as far as preserved, front view.
2. The same, side view.
3. Granules forming the sculpture, much enlarged.

* Proc. R. Soc. Tas. for 1882 (1883), pp. 153-157.

ON SOME AUSTRALIAN INSECTS OF THE FAMILY
PSYLLIDÆ.*

By W. M. MASKELL, Hon. Correspondent.

[Read December 7, 1897.]

Plates I.—III.

The Australasian Psyllidæ have not, as far as I am aware, been sufficiently studied. T. Dobson, in the Papers and Proceedings of the Royal Society of Van Diemen's Land, in 1850, wrote upon the waxy secretion, or "manna," produced by some Tasmanian insects, and gave some figures both of this manna and of adult insects; but he seems to have known of only three species. I possess some waxy shields corresponding to his figures 3 and 5, but have not their adults; and it is not possible to make out from his figures 4 and 6 exactly what genera or species are represented by them. Since his time I do not know of any systematic attempt to describe Psyllidæ in this part of the world, except my own paper in the Transactions of the New Zealand Institute, 1889, in which I reported four new species, one of which was probably an importation from Australia. Mr. E. Rübsaamen, in the Berlin Entom. Zeitschrift, 1893, has a paper on some galls on Eucalyptus, amongst a number of which he mentions one from Australia which contained a Psyllid pupa; but no adult was found. I gathered from a letter a few years ago from the late Mr. Olliff that he proposed to form a new genus, "*Xylolyma*," for some of the species which have waxy shields; but the specimens which I possess of four of these would belong rather to Signoret's proposed genus "*Spondylaspis*." Probably, however, the adults of these forms, when found, would not be separable from the ordinary Psyllid genera, like *Asphalara tecta* of the present paper; and both *Spondylaspis* and *Xylolyma* would be abandoned. I think that Mr. Olliff never actually published anything on his suggested genus. If any other papers exist on Australasian Psyllidæ, I have not seen them, nor can I find references to any in the "Zoological Record." But there must be many fine species yet to be discovered in these regions.

The principal character for generic separation in this family is the venation of the forewing of the adult. In order to illustrate

* This is a posthumous article, the author having died before receipt of proofs.—[ED.]

this point in the present paper I have inserted in the figures of wings letters denoting the parts referred to in the text. Although I could not, on account of the dark patches, put such letters in fig. 3, but the letters of figs. 10 and 17 will serve also for them. I have also placed letters to the figures of the male genitalia.

GENUS PSYLLA, Geoffr.

Head prolonged anteriorly in two processes. Stalk of the cubital vein in the forewing shorter than the stalk of the sub-costal vein.

Psylla Lidgetti, sp. nov. Pl. i., figs. 1-4.

Insects not forming any gall or shield.

Pupa naked, active (Fig. 1). Colour, dorsally, dark brownish-yellow, with a dark-brown patch on the head on each side of a longitudinal light stripe; thorax with an anterior brown patch and six others in two rows; abdomen transversely banded with brown. Wing-cases dark-brown, almost black. Ventrally, the general colour is dark-red. Antennæ and feet greenish, the terminal joints of each dark-brown. Eyes red. The general form of the insect in this stage is elliptical, the head smoothly rounded in front, the abdomen terminating in a minute projection. Antennæ as long as the whole body, rather thick, with eight joints, six of which are ringed and bear numerous hairs, and on the last are two unequal spines. Feet thick and swollen, rather short; the dimerous tarsus, claws and pad are normal of the genus. The margin of the whole body and head is fringed with numerous short hairs, and a number of these are also scattered over all the dorsum. Length of the pupa about $1\frac{1}{2}$ mm. = $\frac{17}{16}$ inch.

The adult insect (fig. 2) is of a general brown colour with some irregular patches of reddish yellow; the antennæ and feet yellow; eyes red. Head broader than long, somewhat depressed in front and produced beneath in two short roundly-conical processes. Eyes semi-globular, sessile, numerously faceted. Antennæ moderately long and slender, with ten joints, of which eight are ringed. Feet presenting no special characters. In the forewings the sides are nearly parallel, each side very slightly concave in the middle, the ends broadly rounded. The primary stalk of the veins reaches to about one-fourth of the length of the wing; the stalk of the cubitus* is about one-half the length of the stalk of the sub-costa; the sub-costa forks close to the margin

* On account of the dark bands on the wing in fig. 3 the veins cannot be well distinguished by lettering; but the letters in figs. 10 and 17 will answer also for this.

with one short branch and another almost parallel to the margin, but there is no pterostigma in the enclosed space ; the radius is wavy, joining the costal margin about the apex ; the upper main branch of the cubitus is convex, forking at two-thirds of its length and its upper secondary branch reaches the margin a little below the apex ; the lower main branch forks at about three-fourths of its length, the shorter secondary branch turning sharply to the margin, the longer extremely convex ; the claval vein is short and very slightly concave. On the surface of the wing are several brown patches ; a few, small and scattered, near the base of the wing ; one across the middle, much broader near the costal margin and narrow near the dorsal margin ; a third, towards the extremity, very broad at the dorsal margin ; and a fourth, very small, separated from the third by a crescent-shaped hyaline space, just above the apex. The hind wings are hyaline, with only the usual three longitudinal faint veins. The genitalia of the male insect (fig. 4) consists of the usual dorsal processes ; the genital-plate (*a*) is curved slightly backwards, with its basal portion very broadly rounded posteriorly ; the forceps (*b*) consists of two narrow cylindrical processes bent slightly forwards ; between these organs is the penis (not shown in the figure) ; the abdominal extremity (*c*) is blunt and turned upwards. The genitalia of the female have not been observed, but in all probability they do not differ greatly from those of the next species.

Habitat.—In Australia, on *Acacia implexa*. My specimens were sent by Mr. Lidgett, of Myrniong, Victoria, from whom I have ventured to name the insect.

The differences between this and *P. acaciæ* will be readily seen by comparison of the wings and the genitalia, although in colour and in habit the two do not greatly differ. The brown bands on the forewing of *P. Lidgetti* are much more close and conspicuous than the scattered patches on *P. acaciæ*, and the dorsal hairs of the pupa are also distinctive.

GENUS APHALARA, Förster.

Head either swollen or produced in conical processes ; stalk of cubitus in forewing longer than the stalk of the subcosta ; radius curved.

I follow F. Löw in including amongst the generic characters the processes of the head. Scott (Trans. Entom. Soc., London, 1876) says :—" Face not lobate."

Aphalara tecta, sp. nov. Pl. ii., figs. 5-10.

Insects covered in the pupal stage by a waxy scale or shield. The colour of this shield is reddish-yellow ; the form is sub-

elliptical or pear-shaped, tapering anteriorly, somewhat convex, the secretion exhibiting very fine transverse striations, and in some specimens also a few obscure corrugations radiating from the pointed end; the margin is smooth all round; the average length is about 4 mm. = $\frac{1}{3}$ inch, with a width at the broadest part of about 3 mm. The texture of the dorsal part is thin and not very solid; the marginal part is thickened by an accretion which, on turning over the shield, is seen to form a ventral scale not extending over the whole median space.

The enclosed pupa is yellow, both dorsally and ventrally, and the antennæ and feet are likewise yellow; the wing-cases are dark-brown. On the dorsum there is a short transverse black band at about the separation of the thorax and the abdomen; on the head and thorax are two longitudinal rows of black quadrangular spots, and on the abdomen two similar rows of short black bands in pairs; the extremity of the abdomen bears a black patch. On the abdominal margin is a quantity of white cottony secretion, not forming a fringe. Antennæ moderate, with eight joints, of which six are ringed. Feet short and thick.

The adult female is yellow, with the thorax and abdomen marked dorsally with a few black patches; eyes reddish, faceted, semiglobular, sessile. Head broader than long, depressed in front, produced beneath in two rather long sub-cylindrical processes. Antennæ yellow, with brown tips, of the usual ten joints. Feet yellow, normal. Forewings hyaline, without spots or bands; the primary stalk of the veins (*a b*) is very short, only about one-sixth the length of the wing; the stalk of the cubitus (*b c*) is a little longer than the stalk of the sub-costa (*b d*); the sub-costa (*d g*) forks close to the margin; the radius (*d f*) is rather convex, and reaches the margin near the apex, and a little above it; the upper branch of the cubitus (*c e, c h*) forks at some distance from the margin, its branches bending sharply downwards; the lower cubital branch (*c k, c m*) forks at a short distance from its source, and its longer branch is not very convex; the clavus (*a n*) is concave. Hindwings hyaline, with the normal three longitudinal veins. Genitalia of the male (fig. 14) with a sub-conical genital-plate, the sides straight, the end truncate; the forceps is very broadly dilated at its tips, and is bent sharply forward beyond the genital-plate. Genitalia of the female formed of two simple conical valves enclosing the ovipositor.

Habitat.—On *Eucalyptus stuartiana*. My specimens were sent by Mr. French from Victoria, the exact locality not mentioned.

The appearance of the pupal shield in this species might cause it to be easily mistaken for a coccid of the genera *Chionaspis* or

Mytilaspis, but examination of the enclosed pupa shows it to be undoubtedly a Psyllid.

GENUS TRIOZA, *Förster.*

Head produced in two conical processes ; stalk of the cubitus in forewing entirely wanting.

Trioza multitudinea, *Tepper*. Pl. iii., figs. 11-17.

Ascelis (?) multitudinea, *Tepper*, Trans. Roy. Soc. South Australia, 1893. Figs. 15-21.

Insects forming large galls on leaves, in the pupal stage. These galls, in the fresh state, have a greenish colour, but when quite mature or old they become red, or reddish-yellow; the normal form is subglobular ; rarely, specimens are slender and cylindrical ; the outer surface is rough and wrinkled ; the texture is soft and leathery. Each gall usually contains a single cavity—sometimes there are two or three cavities ; the interior walls are always quite smooth. The gall is attached to the leaf by a narrow base, and on the other side of the leaf there is usually a depression, but this is not entirely constant. The galls vary in size from a diameter of 3 mm. = $\frac{1}{8}$ inch, to 12 or more mm. And I have seen a few almost 1 inch.

Within the galls are found the pupæ, which when alive have dorsally a palish-brown colour, banded with faint yellow bars ; dead specimens are dark-brown, and the bands almost obsolete ; ventrally the colour is pale yellow, the feet and antennæ the same. Dorsally the wing-covers are plainly visible, also the eyes, which in fresh specimens are bluish. The margin of the pupa all round bears a fringe of short yellow hairs. The general form is elliptical, with a length of about 2 mm. = $\frac{1}{12}$ inch. There is no special character in the antennæ and feet, which indeed do not vary greatly in the genus *Trioza*.

The larva has not been observed.

The adult female is almost entirely yellow, with a darker tinge on the thorax, dorsally, and at the extremities of the antennæ and feet ; the eyes are red, semi-globular, facetted, placed on a short tubercular base. The head is broader than long, depressed in front and produced beneath in two moderately long sub-conical processes ; the rostrum is cylindro-conical. The antennæ have 10 joints, all elongated, sub-equal and ringed, except the two first, which are short and smooth ; on the last joint are two short sub-equal spines. Feet normal, with dimerous tarsi and double claws. The genitalia of the female (fig. 19) consist of two longish, sharply-pointed processes enclosing the ovipositor ; one of these is rather shorter than the other ; both are numerously ringed, the

outer margins of the rings smooth to the tip ; the inner margins are also smooth for about halfway, but those near the tip are very sharply serratulate. Forewings hyaline, with a very minute sparse punctuation and without marginal hairs ; the dorsal margin (fig. 21, *a m h*) is slightly concave in the middle, the costal margin (*a g e*) is nearly regularly convex ; the primary stalk of the veins (*a b*) extends to nearly one-third of the wing ; the cubitus (*b e, b k*) has no stalk, forking directly with the subcosta (at *b*) ; the upper branch of the cubitus (*b e, b h*) is convex, forking near the apex, the terminal branches reaching the margin at about equal distances from the apex ; the lower branch forks near the dorsal margin with one short branch (to *m*) and one longer and convex (to *k*) ; the radius (*d f*) is very slightly wavy, and leaves the subcosta (*b g*) at about half the length of the latter ; the clavus (*a n*) is nearly straight ; the costal vein (*a g e h n*) runs all round the margin. The hindwings are hyaline, with three faint longitudinal veins, of which the posterior one is forked. The genitalia of the male have the usual dorsal processes ; the genital plate (*a*) is broad at the base, with slightly emarginate tapering sides ending in two divergent sub-conical teeth ; the forceps (*b*) is somewhat similar, but narrower, and is bent forwards almost to the plate.

The length of this insect is about 2 mm = $\frac{1}{12}$ inch, with an expanse of wings about 5 mm.

Habitat.—In Australia, on various species of *Eucalyptus* ; principally, I believe, on what is known as "Stringybark." Mr. Tepper sent me specimens from Marino, South Australia ; Mr. Froggatt, from New South Wales ; Mr. French, from Victoria ; and Mr. H. S. Dove, from Tasmania.

The generic position of this insect is clearly defined by the character of the wings, which are quite normal of the genus *Trioza*. Specifically, it may be distinguished by the genitalia of the female, which seems to be different from any hitherto reported, as well as by the character of the galls which the pupæ inhabit. Psyllidæ, as has been found of late years, are almost as varied as Coccidæ in their ways of covering themselves ; and this seems to be especially the case with the Australasian forms, for I do not find that Low and Scott or Riley draw particular attention to this point respecting Psyllidæ of other regions. In this part of the globe, however, we have some uncovered (e.g. *Rhinocola fuchsiae* in New Zealand), some with cottony secretion (as *Rhinocola eucalypti* in N.Z.), some excavating pits for themselves (as some undetermined Australian forms), some forming elaborate waxy tests of elegant design (as the species described from Tasmania by Dobson in 1850 and others not yet fully worked out), and some again, such as the one now under dis-

cussion, forming large and conspicuous galls. I possess several specimens of very beautiful waxy pupa-cases, of which one is certainly that for which Signoret founded his genus *Spondylaspis* in 1879; but some of these are empty, and in others there are only dead pupæ, so that I cannot well describe them. It would be worth while for an Australian entomologist to take up the study of these forms, and to describe the adults.

In 1893 Mr. J. G. O. Tepper published in the Transactions of this Society a paper on "South Australian Brachyscelid Galls," in which he described one species as of the genus *Ascelis*, namely, *A. multitudinea*. Having previously had galls of this (sent by Mr. French), and having extracted from them only Psyllid pupæ, I was convinced that Mr. Tepper's description of them to the Coccidæ could not be correct, and I asked him to let me have specimens, which he very kindly did at once. From the galls which he sent me I bred four adult insects, which are those described above. Mr. Tepper must have been led into his error on account of a principle which he laid down in his paper. Speaking of some of my Coccid genera—*Frenchia*, *Cylindrococcus*, &c.,—he said:—"On account of a general similarity of habit, I consider that they also should be included in the family [Brachyscelidæ]. They form woody galls similar in structure to those of *Brachyscelis*." Undoubtedly, the galls of *Trioza multitudinea* might easily be taken as very closely allied to those of such species as *Brachyscelis nux* or *Opisthoscelis subrotunda* or others, as long as the enclosed insects are not examined. But the study of these at once shows that the principle embodied in the words just quoted (and which I have italicised) is essentially erroneous. Clearly both Psyllidæ and Coccidæ have a "general similarity of habit;" yet it is quite impossible to unite the two. There is only one point as to which I am in doubt. Mr. Tepper describes not only the gall of his species, but also the enclosed insect. This, he says, is "yellow, rather flat, elliptical, with long hairs . . . antennæ dorsal . . . legs none . . . last segment of abdomen deeply emarginate, the sides forming thick, obtusely acuminate appendages, without bristles or setæ." What was this insect? The description does not seem like that of a Coccid, and the figure given by Mr. Tepper (in his Plate V., fig. 4 d) has no Coccid features. In all the galls of this species opened by me I have found Psyllid pupæ, in which the legs are a very conspicuous character; but in some I found also yellow, elliptical things, with dorsal antennæ, which were pupæ of parasites, and from one of which emerged a long-bodied, long-winged fly of some Hymenopterous genus.

I think, on the whole, that I have rightly attached Mr. Tepper's insect to *Trioza*. The specific name given by him is quite appropriate, and I have not disturbed it.

INDEX TO FIGURES.

NOTE.—In the figures of wings *a b* is the “primary stalk;” *b c* is the “stalk of the cubitus;” *b d* is the “stalk of the subcosta;” *b g, b f*, is the “subcosta;” *a f* is the “radius;” *c e, c h* is the “upper branch of the cubitus;” *c k, c m* is the “lower branch of the cubitus;” *a n* is the clavus.”

In the figures of genitalia, *a* is the “genital-plate;” *b* is the “forceps;” *c* is the “abdominal extremity.”

All the figures are highly magnified, except fig. 16.

Fig.

1. *Psylla Lidgetti*, pupa.
2. “ “ adult insect, dorsal view.
3. “ “ forewing.
4. “ “ genitalia of male, side view.
5. *Aphalara tecta*, shields on leaf.
6. “ “ pupa.
7. “ “ head of adult.
8. “ “ antenna.
9. “ “ genitalia of male.
10. “ “ forewing.
11. *Trioza multitudinea*, galls on leaf.
12. “ “ pupa.
13. “ “ adult insect.
14. “ “ genitalia of female.
15. “ “ “ more highly magnified.
16. “ “ genitalia of male.
17. “ “ forewing.



FURTHER DISCOVERIES OF GLACIAL REMAINS
IN SOUTH AUSTRALIA.

By WALTER HOWCHIN, F.G.S.

[Read May 3, 1898.]

The Inman and Hindmarsh Rivers enter the sea within one-and-a-half miles from each other at Encounter Bay, with the town of Port Victor situated between their outlets. The Inman takes its rise in the Bald Hills and follows a E.S.E. course, whilst the Hindmarsh River rises in a series of springs among the "Tiers," twelve miles north of Port Victor, and has a course almost due north and south.

In a previous paper read before the Society* it has been shown that the Inman valley carries abundant evidences of former glacial conditions, and that the trend of the ice was from south to north. Ice-borne stones have been traced rounding Cape Jervis, and studding the eastern shores of the Gulf. Similar erratics have been carried overland, across the Cape Jervis peninsula, and northward as far as Hallett's Cove, at least fifty miles from their source. All the evidence thus obtained pointed to the fact that the granite ridge of the southern coast had been a centre of dispersion for the ice, and as the Hindmarsh Valley, like the Inman, is included in the radii from this centre, it seemed highly probable that it would supply additional proofs of the extent of this extinct icefield.

To test this point by direct observation, I spent a few days last month in a walking tour through the Hindmarsh Valley and Ranges, across to Myponga and Sellick's Hill. The superficial deposits to some extent mask the geological features of the Valley, yet the results show that the Hindmarsh Valley has been under an equal measure of glaciation as the Inman Valley.

The geological formations of the district are as follows :—

Recent.—1. River wash, consisting mainly of fine silt.

Newer Tertiary.—2. Horizontal beds of variegated marls and sands, with thin lenticular beds of fine gravel.

Older Tertiary.—3. Pink - coloured fossiliferous limestone (limited to the head waters of the Hindmarsh).

* Trans. Roy. Soc., S. Aus., xxi, p. 61.

Geological Horizon Doubtful.—4. Glacial clays and sandstones, with erratics.

Primary.—5. Metamorphic quartzites, sometimes passing into schistose structure.

In no part of its course (south of Nettle's Hill) does the Hindmarsh River flow over the Primary rocks, and consequently no opportunity presented itself of finding such examples of polished ice pavements as occur in the Inman. The Valley flats and minor hills are composed of Newer Tertiary beds, as described above. In the lower reaches of the Valley these beds attain a considerable thickness, and effectually obscure the underlying beds. Good sections may be seen in washaways and steep cliffs up to 50 ft. in height, and it is in these Newer Tertiary beds that the river has cut its way and laid down more or less a secondary deposit of recent alluvial wash.

In some parts of the valley, especially on the higher flats, the surface is a loose white sand, densely occupied by scrub.

On all sides there were presented the strongest proofs that in post glacial times the valley has been subjected to much silting up, the glacial deposits have been wasted, rearranged, or blinded by an excess of cover, and the wonder is that any evidence of their presence has been left to tell its tale.

A very large granite boulder was met with on Mr. Alexander Hutchison's land, distant from the river about three-quarters of a mile, on its western banks, and immediately on the line of fence separating Sections 205 and 218, Hundred of Encounter Bay. The stone was originally so large that it formed an obstacle to the fence, and had to be blasted before the wire could be carried through. Two shots had been inserted, reducing the part exposed above ground to half a dozen pieces, the largest of which measures 4 ft. x 3 ft. x 3 ft. The base is still set firmly in the ground, and the part exposed measures seven feet across. It is a red granite with the characteristic features of the Port Victor and Port Elliot granites.

Two other large granite boulders were pointed out to me by Mr. Hutchison occurring on his land on the eastern side of the river. One of these was situated near the eastern edge of Section 117, Hundred of Goolwa, and the other near the middle of the adjacent Section 143. Both boulders are nearly even with the ground, and have an exposure of five feet and four feet respectively, but it was apparent that if the soil had been removed their dimensions would have been shown to be much greater.

Following the road for about two miles, and rounding the prominent spur of the Peeralilla Hill, as the road passes through Section 136, a low cutting on the right hand side of the road exposes a drift bed containing many erratics, including a

granite boulder which is uncovered to the extent of about 2 ft. It is not unlikely that this bank of drift has slipped down from higher ground.

A few hundred yards further north, at a point nearly opposite the gates of Beaudesert, occupied by Mrs. Hutchinson, two large granite boulders are seen on the right hand side of the road, near the crest of the foot hills. They are at an elevation of about 80 ft. above the road, and as they exhibit flat faces toward each other, it is very likely that they originally formed one block which has split along a line of weakness into two. They are now 3 ft. apart (one having slid a little down the bank), and are about of equal size, measuring, respectively, 7 ft. x 3 ft. above ground.

Miss Hutchinson, of Beaudesert, kindly directed my attention to a very fine erratic which occupies the bed of a dry tributary of the river about a quarter of a mile below the farmstead. It is a solid block of granite, 6 ft. x 5 ft. x 3 ft. 6 ins. high, and has a fragment lying beside it which appears to have at one time formed part of the larger mass. The boulder rests on a whitish sandstone, somewhat flaggy in structure, which is set irregularly with erratics of all sizes. This glacial sandstone is well seen about ten yards further down the creek, where it occupies the whole bed of the stream and has a dip of 18° N.N.E. Between this spot and the Beaudesert farmhouse there is a bed of laminated black clay in the bottom of the Hindmarsh River which has much the appearance of the black shale of the Inman Valley, where it is found to be intercalated with the glacial sandstone.

Half a mile further north the glacial sandstones are said to be again exposed in the bed of the river at the confluence of a tributary, and the retaining wall of the Mount Billy bridge, which crosses the stream in Section 138, Hundred of Goolwa, rests upon the same beds. Large granite boulders, I was told, occur on the top of the foothills to the right of the Mount Billy bridge, but I had not the opportunity of visiting them.

On Mr. Abel Gray's property, at Condolley Farm, Section 59, Hundred of Encounter Bay, there is an exposure of glacial sandstone which forms a cliff 15 feet high. The beds have a dip 12° S., 3° E. The stone is moderately hard, and Mr. Gray when building his house put in two shots to test the quality of the stone for building purposes, but it proved too friable for use. The beds at this place are comparatively free from large stones, but several small granite boulders were seen on the surface which had probably been weathered out from the upper beds, the largest of which measured 18 inches in length.

Mr. Gray informed me that the same sandstone could be seen in the creek on the other side of the Green Hill opposite his house,

and also at a more distant locality at the Square Water Hole, on the road to Willunga, about 20 chains N.N.W. of the Old Square Water Hole House, and five to six chains from the Adelaide road on the left hand side going north. The surface of the stone at the latter place, he states, has been loosened by weathering, and is more or less covered by blown sand.

It seems highly probable that the extensive deposits of Newer Tertiary sand beds, which have to a great extent choked the Hindmarsh Valley, have been derived as rearranged material from the glacial sandstones, which at several points are seen to underlie them.

The Hindmarsh Valley proper comes to an abrupt termination at Nettle's Hill, about nine miles from Port Victor. After passing Mount Billy Bridge, the road makes a steep ascent of several hundred feet, and enters on a hilly plateau known as the "Hindmarsh Tiers." I saw no granite boulders, nor could I hear of any having been noticed in these Ranges. On the hilltops there frequently occur, however, beds of sandy clay, in which pebbles are promiscuously distributed. These pebbles are much worn, and in some examples appear to be faceted. They are, indeed, exactly similar to the rounded and faceted pebbles which occur plentifully in undoubted glacial drift at Yankalilla and Cape Jervis. I am by no means certain that they have any connection with the glacial phenomena of the district, but their occurrence is peculiar and worth recording. Similar beds with pebbles distributed irregularly through them can be seen at Myponga on the southern flanks of Sellick's Hill.

At the head of the Hindmarsh River there occurs a very remarkable fossiliferous limestone of Eocene age. The stone consists almost entirely of organic remains, forming a very pure carbonate of lime often of a delicate pink colour, and is quarried in the neighbourhood and burnt for lime. The outcrop, which is of an inconspicuous character, is confined to the sides of a narrow creek on land farmed by Mr. Geo. Maslin, within Sections 600 and 601, Hundred of Encounter Bay. The rock is in places massive, and is exposed to a height of twenty feet above the level of the stream, but as the stream has not cut its way to the base of the formation its thickness is unknown. The same limestone can also be seen in a small tributary a little further to the west, but I did not visit the place. This limestone has been generally spoken of as the "Mount Jagged limestone," but it is situated more than three miles from Mount Jagged and is nearer Mount Cone, which is a more considerable elevation. The spot where it occurs is marked by several strong springs which form the headwaters of the Hindmarsh River.

The considerable altitude of this limestone invests it with special interest. The numerous Eocene outcrops of the colony are, with this exception, all within a height not exceeding 200 feet above sea level, whilst the Eocene outlier of the Upper Hindmarsh cannot be much less than 1000 feet. The water parting of this elevated plateau occurs about three miles north of the Eocene outcrop, reaching its greatest altitude in Mount Cone and Mount Jagged, the former, according to the Survey Office records, is 1,380 feet above sea level, and the latter 1,230 feet. The Peeralilla Hill, which is three miles further down the valley than the outcrop in question, has a height of 910 feet. The exact height of the Eocene beds is not known, but is probably somewhere between 800 feet and 1000 feet.

I hoped, in visiting this outcrop, some evidences might be found that would throw light on the stratigraphical relationship of the Eocene limestone to the glacial beds of the district, but neither the base nor the upper limits of the Lower Tertiary beds were exposed. A great thickness of rich loamy soil forms the banks of the creek at this place, and the upper posts of limestones have been weathered into large boulders (after the manner of limestones), with soil as cover and filling the intermediate spaces. The occurrence of Eocene beds at an altitude which gives them a unique position for rocks of this age in southern Australia raises some interesting questions in stratigraphical geology, concerning which we have at present no satisfactory solution.*

It is worthy of note that a few months ago I picked up several sea-worn boulders of Eocene limestone of a pinky colour on the beach near Sellick's Hill. In some respects they bore a close resemblance to the limestone of the Upper Hindmarsh, but differed from the latter in containing rounded grains of quartz. There are Eocene beds on the beach near where the pink limestone boulders were found, but they appeared to possess very distinct lithological features from the rolled fragments. The origin of these sea-worn boulders is, therefore, a little uncertain. If derived from the upland outcrop they must have crossed the watershed. It is perhaps more likely that they have a local origin in some calcareous band which, when broken up and exposed to sea water for some time have suffered some alteration in their ferruginous constituents, and, by oxidation, have developed a pink colour. Such a change, so far as I know, is not common in our Eocene limestones, and may be taken into account when an

* Professor Tate says—"Catyclismal disturbance must account for the presence of fossiliferous beds of this age (Eocene) in the Encounter Bay district at elevations above 600 feet." Roy. Soc., N.S. Wales, Vol. xxii, p. 242. (1888).

attempt is made to correlate stratigraphically these upland Eocenes with their low-level equivalents.

The observations detailed in this paper, whilst enlarging our knowledge of the geographical extent of the extinct ice-field of South Australia, unfortunately, do not throw any additional light on the age at which the glaciation took place or the kind of agency by which the ice operated. We may reasonably expect, however, that when the thick and varied deposits of this period have been submitted to careful examination these two questions will be solved.

FURTHER NOTES ON AUSTRALIAN COLEOPTERA
WITH DESCRIPTIONS OF NEW GENERA AND
SPECIES.

By the Rev. T. BLACKBURN, B.A.

[Read May 3, 1898.]

XXIII.

LAMELLICORNES.

MELOLONTHINI (Tribe).

This aggregate of genera appertains, in Lacordaire's arrangement, to the second "Legion" of the family "Lamellicornes" on account of some of the abdominal stigmata being placed on the ventral segments. Lacordaire divides this second "Legion" into "Tribes," of which the *Melolonthini* is one and is distinguished by those of the abdominal stigmata which are placed on the ventral segments not diverging strongly from the line in which the dorsal and ventral segments meet. The "Tribe" *Melolonthini* is divided by Lacordaire into "sub-tribes," of which, so far as I know, only four are represented in Australia,—viz. *Systellopides* (separated since Lacordaire's time from his sub-tribe *Pachypodides*) *Sericides*, *Sericoides*, and *Melolonthides* (true). The *Systellopide*, are distinguished from the rest of the above-named sub-tribes by the atrophy of the maxillary lobe in combination with the position of the labrum on the same plane with the clypeus; while the true *Melolonthides* differ from the remaining two by the front coxae being (not conical and prominent but) transverse. Lacordaire distinguishes the *Sericides* and *Sericoides* by the relation between their clypeus and labrum, the latter being in the *Sericides* intimately connected (*soudé*) with the clypeus so as to be "indistinct" while in the *Sericoides* it is "free." Here it is to be noted (as Lacordaire remarks) that in some genera (e.g. *Diphucephala*) the clypeus is divided by a suture which gives its front part the appearance of a free labrum, and it must be admitted that there are genera in which it is exceedingly difficult to say that the piece in question is not the real labrum. As an instance I would mention *Phylloctonus*. Comparing an example of this genus with some of the *Systellopides* I cannot discover any difference of structure justifying the assertion that the front piece of the head is a part of the clypeus in one and the labrum in the other. It must be remembered doubtless that Lacordaire

does not appear to have actually examined any *Systellopid* species, and that it is Dr. Sharp who states that it is the labrum which in the *Systellopides* is attached to the front of the clypeus and is on the same level with it. I do not venture to assert that either of these accomplished entomologists (both extremely eminent anatomists) is wrong,—which would be highly presumptuous in any but a specialist on anatomy,—but I draw attention to the matter in order to show that Lacordaire's method of distinguishing the *Sericides* from the *Sericoides* is at any rate not easy of application to the ordinary student.

However, there can be no doubt that these sub-tribes of *Melolonthini* form two very natural and distinct aggregates in each of which moreover there is a highly characteristic relation between the clypeus and labrum, and I think this can be expressed in terms (different from those of Lacordaire) which at any rate as a supplementary statement of characters will be found useful inasmuch as it avoids the necessity of determining in difficult cases whether the front piece of the head is or is not a true labrum.

In the *Sericides*, whether we regard the front piece of the head as a labrum or follow Lacordaire in regarding it as an extension of the clypeus and the labrum as invisible, it stands good that the front face of the front piece of the head looked at from in front has very little downward vertical or oblique development, so that the insertion of the palpi is very little below the plane of the clypeus, but in the *Sericoides* it is far otherwise. In them (and also in the true *Melolonthides*), the labrum is attached to the clypeus at a position considerably below the plane of the upper surface of the latter, so that if the latter be looked at from in front it seems to be strongly thickened downward (in some species obliquely downward and hindward) and the labrum is attached to it at a point considerably down this thickened front face. As in the *Sericides* so in *Sericoides* there are genera in which the labrum is not very easy to see as an organ distinct from the clypeus, and moreover the labrum itself is of very variable form in the *Sericoides* (in some genera even becoming an erect lamina the apex of which rises considerably *above* the plane of the clypeus); nevertheless a result of the attachment of the *base* of the labrum being as indicated above is that the palpi are inserted considerably below the plane of the upper surface of the clypeus and all the observations I have made confirm the opinion that their being so inserted is reliable evidence that the relation of the clypeus and the labrum are of the *Sericoid* rather than the *Sericid* type.

The adoption of this view of the distinctive characters of the Australian *Sericides* and *Sericoides* involves some little re-adjust-

ment of the species to be attributed to those sub-tribes respectively, inasmuch as it renders necessary the removal of *Mæchidius* from the former to the latter and of *Pachytricha* and *Phænognatha* from the latter to the former. These transfers, however, appear to me to tend altogether to a more natural classification. All the three genera affected by it are extremely isolated in their characters, and it is probably open to question whether each of them may not eventually be regarded as representing a distinct sub-tribe, but even so it seems to me that in a natural arrangement the sub-tribes containing *Phænognatha* and *Pachytricha* would stand before the *Sericides* in the *Melolonthini*, and that containing *Mæchidius* certainly after the *Sericoides*. If the arrangement I thus suggest be followed it will have the effect of associating together in the *Sericides* species having remarkable sexual characters in the front tarsi (unless *Phænognatha* of which I know only one sex be an exception) and in the *Sericoides* species not exhibiting such sexual characters (or at least only in a slight degree and in occasional members of a genus) and also of making the *Sericides* of Australia consist entirely (unless *Epholcis* *Phænognatha* and *Pachytricha*, which I have not seen alive, be exceptions) of genuinely flower-frequenting day-fliers, and the *Sericoides* (so far as I know, and I have collected nearly all the genera) contain no genus at all with similar habits; for although a few *Heteronyces* and *Liparetri* are sometimes to be met with on flowers (as indeed what insect are not? I once found some flowers thickly studded with a *Hydrophilid*) certainly neither *Liparetrus* nor *Heteronyx* can be reckoned a flower-frequenting genus.

Since the publication of Lacordaire's volume dealing with the *Lamellicornes* numerous Australian genera have been added, and as their diagnoses are scattered over a wide field of literature it seems desirable before passing to the description of some new species that are before me to make some remarks on the aggregates to which those new species are referable. I will begin with the

SERICIDES (sub-tribe).

Excluding *Mæchidius* and including *Pachytricha* and *Phænognatha* (as proposed above), four genera known to Lacordaire would form the Australian contingent of this sub-tribe. To these five genera must now be added (including two new ones described below and one formerly described under a nom. præocc.).

- A. Head (at any rate of the male) armed with a
 horn *Phænognatha*.
- AA. Head unarmed.
 - B. Each claw bidentate beneath *Pachytricha*.
 - BB. Claws not bidentate beneath.

C. Hind coxae elongate.			
D. Hind tarsi with claws elongate slender and simple.			
E. Basal four joints of front tarsi of male together much longer than apical process of tibia.			
F. Intermediate claws similar to hind claws	...	...
FF. Intermediate claws short (in male thickened and with long appendages)	...	...
EE. Basal four joints of front tarsi together shorter than apical process of tibia	...	...
DD. Hind tarsi with short claws.			
E. These claws simple	...	...
EE. These claws appendiculate	...	...
CC. Hind coxae short and parallel.			
D. Eyes free or nearly so	...	...
DD. Front part of eyes divided by a canthus	...	...
			<i>Phyllotocus.</i>
			<i>Phyllotocidium</i> , gen. n.
			<i>Cheirrhampicha</i> , gen. n.
			<i>Neophyllotocus</i> , gen. n.
			<i>Cheiragra.</i>
			<i>Diphucephala.</i>
			<i>Epholcis.</i>

PHYLLOTOCUS.

Many of the species of this genus are incapable of certain identification where comparison of types is not feasible. Unfortunately 30 names are attributed to it. In Trans. Ent. Soc. N.S.W., I., pp. 80 &c., the late Sir W. Macleay published a review of the then existing names and added nine more, but although he complained of the imperfection of Boisduval's descriptions his own descriptions were of the same kind as Boisduval's,—one of them consisting of eight words of Latin and 13 of English in which no definite character is mentioned apart from color, and the rest are not much better. I have had the advantage of examining some of Sir W. Macleay's types and therefore am in a position to attempt a contribution towards the elucidation of the genus. In Trans. Ent. Soc., N.S.W., II., p. 187, Sir W. Macleay described two additional species, and in P.L.S., N.S.W., 1887, p. 225, another.

Although most of Boisduval's descriptions are in my opinion incapable of being definitely attributed to any particular species it seems to me desirable, as Sir W. Macleay has applied them to species in his collection, to accept his identifications and to let the insects in question bear Boisduval's names. These names are *præusta*, *rufipennis*, *australis*, and *mæstus*. The first of them (*præusta*) Sir W. Macleay regards (correctly I think) as a synonym of *Macleayi*, Fischer, which last is a species that can be confidently identified. Boisduval described another species (*Lottini*) which he referred to *Phyllotocus* only with doubt and which Sir W. Macleay believed to be a *Liparetrus*; it certainly may be disregarded.

Erichson described one species (*P. bimaculatus*) ; it is easily recognisable.

Blanchard followed with three species (*erythropterus*, *navicularis* and *ustulatus*) ; all are easy to identify.

Burmeister was the next describer, and he also added two names (*discoidalis* and *pectoralis*) the former of which he gives as Mr. W. S. Macleay's name (no doubt MS.) and states that it is identical with *australis*, Boisd. It seems to me decidedly that it is a variety of the species that Sir W. Macleay has called *australis*, Boisd., and that the insect which Sir W. Macleay subsequently named *iridescens* is the same thing. *Pectoralis* (as Sir W. Macleay points out) is not a *Phyllotocus*.

In 1858 Bohemann described three species (*marginicollis*, *oblongus* and *velutinus*) which Sir W. Macleay says (I think correctly) are all founded on varieties of the species that he calls *mæstus*, Boisd.

Then Sir W. Macleay follows with his 12 names on which I make the following remarks.

Assimilis is excessively close to *Macleayi*, Fisch. Its author states that the only good specific character to separate it by is a slight groove on its forehead. After examining a long series I have failed to find such a groove constantly present or absent in either species, and doubt whether the two are distinct.

Kingi is undoubtedly a good and distinct species. I believe it to be the insect which Boisd. called *rufipennis*, but as Sir W. Macleay has attributed that name to another insect I shall not disturb his nomenclature.

Marginipennis has puzzled me considerably. Its author states that it is abundant in the neighbourhood of Sydney ; yet I have seen nothing among the numerous *Phyllotoci* collected by me (or sent to me from) near Sydney which agrees with the description. Unfortunately I can find no reference to it in the notes I made when examining Sir W. Macleay's types,—so I must pass it by with the remark that unless there is some clerical or printer's error in the description it is probably a good species unknown to me.

Iridescens (as noted above) I have little doubt is identical with *australis*, Boisd.

Palliatus is decidedly a var. (not I think sexual, as Sir W. Macleay conjectures) of *discoidalis*.

Marginatus its author conjectures to be the female of *marginipennis*. Judging by the description I have no doubt it is a form of that species, though I doubt the difference being sexual.

Ruficollis I cannot identify confidently. The colours are differently described in the Latin diagnosis and the English

following it. It is possible that the species I call *ruficollis* in the following tabulation may be wrongly identified.

Scutellaris is a good species.

Apicalis (from Northern Queensland) is a good species.

Sericeus, its author states, resembles *australis*, Boisd.; but no difference from that species is pointed out, and the description applies perfectly to the species named *australis* in the Macleay collection. I have not seen the type of *sericeus*, which is not in the Macleay Museum, but is doubtless in the "Australian" Museum.

Variicollis I think I know; the type specimen is no doubt with that of *sericeus*, and I have not seen it, but I have an example from the neighbourhood where *variicollis* was taken, which agrees well with the description. It seems to be a good species.

Vittatus is an extremely isolated species from tropical Queensland.

The remaining three species (*occidentalis*, *Meyricki*, and *dispar*) are of my own nomenclature.

It will thus be seen that after all necessary weeding out eighteen species remain which may be regarded as at present forming the genus *Phyllotocus*. The following tabulation shows satisfactory structural characters for distinguishing most of the described species. There are however two (*apicalis*, Macl. and *marginipennis*, Macl.) which I am unable to place in the tabulation owing to the vagueness of their descriptions.

- A. Elytra glabrous (or nearly so) except along their lateral margins.
- B. Elytra nitid, not velvety, with interstices similar *inter se* and not (or scarcely) convex.
- C. Maxillary palpi elongate, their apical joint narrow and cylindric or nearly so.
- D. Front tibiae in both sexes externally tridentate (including the apical process).
 - E. Prothorax rectangular at base *Macleayi*, Fisch.
 - EE. Hind angles of prothorax strongly obtuse... *bimaculatus*, Er.
- DD. Front tibiae with only one tooth above the apical projection.
 - E. Head testaceous *occidentalis*, Blackb.
 - EE. Head black *Meyricki*, Blackb.
- CC. Maxillary palpi much shorter, their apical joint somewhat oval *mæstus*, Boisd.
- BB. Elytra more or less opaque, often velvety, with convex unequal interstices.
- C. Hind femora black or nearly so.
- D. Prothorax strongly lobed in the middle of base *scutellaris*, Macl.
- DD. Prothorax not (or scarcely) lobed in middle of base.
 - E. Puncturation of prothorax faint and obscure (as usual in the genus) .. *ustulatus*, Blanch.

EE. Punctuation of prothorax unusually strong and well defined...	...	<i>variicollis</i> , Macl.
CC. Hind femora testaceous	...	<i>vittatus</i> , Macl.
AA. Elytra clothed with erect hairs (at any rate along the base and suture).		
B. The hairs fringing the prothorax black or nearly so.		
C. Prothorax entirely black.		
D. Head very coarsely unevenly and by no means closely punctulate.		
E. Convexity of prothorax (viewed from side) even,—at any rate in the middle.		
F. Elytra entirely set with erect pilosity	...	<i>erythropterus</i> , Blanch.
FF. Disc of elytra glabrous	...	<i>rufipennis</i> , Boisd.
EE. Prothorax strongly declivous hindward all across base	...	
DD. Head closely evenly and somewhat finely punctulate	...	<i>Kingi</i> , Macl.
CC. Prothorax red, or at any rate with its sides broadly red.		
D. Prothorax very strongly lobed hindward at middle of base	...	<i>ruficollis</i> , Macl.
DD. Prothorax not or but little lobed at base		<i>australis</i> , Boisd.
BB. The prothorax fringed laterally with close-set white pilosity	...	<i>dispar</i> , Blackb.

It seems desirable to say a word regarding the sexual characters of *Phyllotocus*, which to some extent vary with the species. In all of them the male has one of the claws of its front tarsi more or less (in some species very much more than in others) dilated. There is also a tendency towards darker coloring in the males than in the females of some species, and in several species the elytra of the female are much more hairy than those of the male. This latter character is very noticeable in *P. australis*, Boisd.; but is extremely developed in *P. Kingi*, Macl., the female of which has its elytra densely set with velvety pile while in the male the elytra are nearly glabrous on the disc. Sir W. Macleay is certainly justified, I think, in regarding Lacordaire as in error when he finds sexual characters in the antennæ of *Phyllotocus*. I do not observe any sexual differences in the armature of the front tibiae.

PHYLLOTOCIDIUM (gen. nov. *Sericidarum*).

Mentum sat elongatum sat angustum; palpi labiales breves, articulo ultimo obconico; palpi maxillares sat breves (fere ut *Cheiragras*), articulo apicali elongato-ovali quam ceteri conjuncti vix breviori; labrum breviter transversum (a *Cheirrhamp hicæ* parum dissimile); oculi modici; antennæ modicæ, 8-articulatae, clava (maris quam feminæ magis elongata) 3-articulata; prothorax æqualis; scutellum modicum; elytra maris haud, feminæ vix manifeste, striata; pedes robusti minus elongati; tibiæ anticæ extus (processu

apicali vix extus directo excepto) haud dentatæ; unguiculi modice elongati (ab articulo 5° tarsorum longitudine haud multo dissimiles), simplices, maris anterioribus incrassatis et appendicibus 2 elongatis membranaceis instructis; coxae posticæ quam metasternum paullo breviores; corpus supra sat glabrum, subtus pilosum.

Type *P. (Cheiragra) Macleayi*, Blackb.

The tarsal character of this species (mentioned by me in describing it, P.L.S., N.S.W., 1891, p. 482) must, I am now convinced, be regarded as inconsistent with a place in the genus *Cheiragra*; its facies moreover is quite *sui generis*, the glabrous nitid upper surface being suggestive of certain *Phyllotoci* while its head is that of a *Cheiragra*; the structure of the legs (and especially the claws) is quite different from that of any other species known to me, while the coppery (or purplish) gloss of the upper surface distinguishes it among its allies.

CHEIRRHAMPHICA (gen. nov. *Sericidarum*).

Mentum sat elongatum sat angustum; palpi labiales breves, articulo ultimo obconico; palpi maxillares modici (quam *Phyllotoci Macleayi*, Fischer, multo breviores), articulo ultimo subcylindrico ad apicem subacuminato; labrum breve transversum a clypeo sutura vix manifesta divisum; oculi modici, fere ut *Phyllotoci*; antennæ modicæ, 8-articulatæ, clava brevi 3-articulata; prothorax æqualis; scutellum modicum; elytra oblonga, parum manifeste striata; pedes elongati fere ut *Phyllotoci*, sed maris tibiis anticis compresso-dilatatis et tarsis anticis brevibus (harum articulis basalibus 4 brevissimis, articulo apicali quam tibia antica vix breviori, unguiculo permagno deformi); coxae posticæ quam abdomen vix breviores; corpus pubescens.

It will be seen from the above diagnosis that this genus must be placed in Lacordaire's "Groupe" *Phyllotocides* and that it differs from *Phyllotocus* notably in the front piece of the clypeus being very short, strongly transverse, and not separated from the preceding piece by a sharply defined suture, also by the very remarkable sexual characters in the front legs of the male, and the very different maxillary palpi. The hind coxae are very elongate, their hind edge being (on the lateral margin) scarcely farther from the apex of the abdomen than from the hind margin of the metasternum.

C. pubescens, sp. nov. Sat ovalis; pube pallida sat elongata adpressa vestita; subnitida; nigra, vix ænea, antennis palpis pedibusque brunneo-testaceis (nonnullorum exemplorum prothorace elytris abdomineque brunneo-testaceis, nonnullorum

femoribus posticis vel 4 posterioribus infuscatis); capite prothoraceque sparsim sat fortiter, elytris minus sparsim minus fortiter, pygidio leviter squamose, punctulatis; prothorace transverso, antice leviter angustato minus emarginato, lateribus sat arcuatis, basi bisinuata, angulis posticis obtusis; scutello modico; elytris haud (vel vix manifeste) striatis; tibiis anticis extus bidentatis. Long., $1\frac{3}{4}$ — $2\frac{1}{2}$ l.; lat. $\frac{4}{5}$ — $1\frac{1}{5}$ l.

In the male the basal four joints of the front tarsi are incrassated and very short,—together scarcely reaching to the apex of the apical process of the tibia. The fifth joint is excessively dilated and as long (without including the claws) as the preceding joints together. One claw is as long as the fifth joint has a very large lamina like appendage at its base and is attached to the apex of the fifth joint in such fashion that it is directed backwards almost parallel with the tarsus. The other claw is normal. The apex of the basal part of the fifth joint is thickly clothed with long hairs.

W. Australia; taken by Mr. Lea at Swan River and Geraldton.

C. interstitialis, sp. nov. Mas.—Ovalis; parum lata; pubes brevi erecta pallide ferruginea vestita; sat opaca; nigra; antennis palpis pedibus anterioribus 4 tarsisque posticis plus minusve rufescensibus; capite crebrius subtilius, prothorace sparsim sat grosse, elytris quam prothorax magis crebre vix minus grosse, pygidio minus perspicue, punctulatis; prothorace vix transverso, antice sat fortiter angustato, lateribus modice arcuatis, basi vix bisinuata, angulis posticis obtusis; scutello modico; elytris costis obsoletis angustis circiter 4 instructis; tibiis anticis extus haud (processu apicali excepto) dentatis; tibiis posticis robustis. Long. $2\frac{1}{3}$ l.; Lat. $1\frac{1}{5}$ l.

I see no reason to separate this species generically from the preceding although as will be seen by comparing the descriptions the two are not much like each other superficially. The erect (not adpressed) hairs with which it is clothed, its clypeus more evenly rounded in front, its much less transverse prothorax its elytra with distinct traces of costæ, its very stout hind tibiæ, the much more numerous setæ at the apex of each tarsal joint, &c., contribute to make this species extremely distinct from the preceding. Its facies, indeed, is very much that of a *Cheiragra*, but I do not see how it can justifiably be placed among species with short appendiculate claws while (as is the case) its claws are altogether as characterized in the diagnosis of *Cheirrhampicha*. Perhaps eventually it may be regarded as the type of a new

genus. The male characters of the front tarsi are quite as in *C. pubescens* except in the basal lamina of the large claw being scarcely developed.

N. Queensland ; sent by Mr. French.

NEOPHYLLOTOCUS (gen. nov. *Sericidaram*).

Type *N. (Macrothops) rostrata*, MacL.

I propose this name as a substitute for *Macrothops*, MacL. nec Boisd., which is a nom. praeocc., having been used by Boisduval for a genus already named *Phyllotocus* by Fischer de Waldh. Sir W. Macleay's diagnosis is not very complete as it does not include any reference to the claws, where the most obvious distinctive characters of the *Phyllotocides* are to be found. In the present genus the claws are extremely short (about half the length of the 5th tarsal joint), and are all simple in the female. In the male one of the claws on each of the 4 anterior tarsi is bifid.

Sir W. Macleay described a second species of his genus *Macrothops* under the name *pallidipennis* which he stated was founded on specimens that had lost their "palpi, tarsi &c." It is therefore, impossible to say whether that species is rightly associated with the present insect.

CHEIRAGRA.

Sir W. Macleay formed this genus for a number of species which he described so briefly that it is impossible to identify any of them (as species) with certainty except by comparison, which has not been practicable for me.

I have before me a considerable number of specimens evidently attributable to the genus. Sir W. Macleay in his diagnosis of the genus omitted to mention that the claws are appendiculate and furnished at their base with large membranous processes, which I take to be the most reliable generic character. In the male the front tarsi have one claw similar to those of the female while the other claw is enormously developed and turned back against the surface of the tarsus.

With the exception of two examples (from a far Northern locality, unfortunately both females and therefore undesirable for description) I cannot satisfy myself that the specimens of this genus before me represent more than one species. They are from various localities in Victoria and N.S. Wales and differ to a remarkable extent in coloring, so that it is hard to find two quite alike. This species does not appear to be *Phyllotocus pusillus*, Blanch. (which Sir William seems to regard as the type of *Cheiragra*) as its prothorax is not black in any variety that I have seen and certainly could not be described as "haud punctatus."

I suspect it is *C. ruficollis*, MacL., but unfortunately there is a discrepancy between the 12 words of Latin and the 33 of English of which the description consists, as the Latin makes the elytra testaceous and the English implies that they are black (at least in the male). However, the specimens before me include elytra entirely black, entirely testaceous, and black with various testaceous blotches. There are no differences among Sir W. Macleay's descriptions of *C. ruficollis*, *pallida*, *lurida*, and *atra* except in respect of color and slight distinctions in size. *C. pygmaea* is probably a distinct species which I have not seen, and *aphodioides* may be distinct, as Sir W. Macleay says that the front tibiae of the male are more slender than in its allies.

EPHOLCIS.

This genus bearing much superficial resemblance to *Mæchidius* has entirely the *Sericid* relation between clypeus and labrum. Mr. C. O. Waterhouse in founding it expressed the opinion that it is intermediate between *Diphucephala* and *Mæchidius*. Its coloring and the character of its sculpture as well as the presence of appendages at the base of the claws are certainly suggestive of the latter, though it is to be noted that the claw appendages are not really characteristic of *Mæchidius*, being absent in many species, and an analogous structure being found in an isolated species (*Nosphisthis*) described below. But the structure of the head is totally different from that of *Mæchidius* and if it were to be regarded as allied to that genus rather than *Diphucephala* it would upset the validity of *Sericides* and *Sericoides* as distinct sub-tribes. I have little doubt that it is a flower-frequenting genus. *Mæchidius Albertisi* and *bilobiceps* of Fairemaire are evidently referable to *Epholcis*. I suspect that the former is identical with *E. divergens*, Waterh., in which case its name must sink as a synonym.

I refer provisionally to this genus *Mæchidius gracilis*, Waterh. which its author says is "very unlike all the others in that genus." It appears to me impossible to consider it a *Mæchidius* or even closely allied thereto, inasmuch as its prosternal sutures are not open to receive its antennæ and its mouth structure is of the *Sericid* type, the front of its labium being almost in contact with the apex of the clypeus without the intervention of a visible labrum. Its facies is undoubtedly highly suggestive of *Mæchidius* and very different from that of *Epholcis*, but nevertheless I can find no character to separate it from the latter genus which is not evidently merely specific in other genera, e.g. *Diphucephala* and *Mæchidius*. The following is a new species allied to *E. (Mæchidius) gracilis*.

E. longior, sp. nov. Sat elongata ; sat opaca ; picea, antennis palpis pedibus et corpore subtus rufescentibus ; setulis brevibus gracilibus adpressis, et pilis erectis elongatis sparsis, testaceis vestita ; capite antice truncato elevato-reflexo, lateribus sinuatis ; prothorace sat transverso, antice fortiter angustato crebre rugulose sat grosse punctulato, lateribus fortiter rotundatis, angulis anticis sub-acutis minus prominulis posticis rotundato-obtusis, basi rotundata ; elytris obscure seriatim punctulatis, lineis 3 obscurioribus vix elevatis instructis ; tibiis anticis extus 3-dentatis (dentibus inferioribus 2 approximatis, a 3° sat remotis) ; tarsorum posticorum articulo basali quam 2^{us} multo longiori ; unguiculis singulis ad basin appendiculis singulis armatis. Long. 3½ l. ; Lat. 1¾.

Larger and more elongate than *E. gracilis*, Waterh., with the prothorax much more coarsely punctulate ; the clypeus considerably more reflexed in front (causing the labium to appear less nearly in contact with the edge of the clypeus when the head is looked at from beneath), and with its sides more sinuate.

N. Queensland ; sent by Mr. Cowley.

SERICOIDES (Sub-tribe).

This sub-tribe is by far the most numerously represented among the Australian *Melolonthini*, and moreover presents extraordinary difficulties in classification, owing to the presence of the most remarkable structural differences between insects that apart from those differences are not even very notably distinct from each other as species. These differences are found in the number of joints in the antennæ, the structure of the antennal club, the form of the labrum and the hind coxæ, and even, to some extent, the structure of the claws. To regard such differences as generic (which one would do unhesitatingly in the case of almost any other *Coleoptera*) would require an enormous multiplication of the genera known at present and would split up numerous genera that are among the most natural aggregates in the whole coleopterous series. For example, to regard those differences as generic would involve the formation of at least nine new genera out of *Heteronyx*, than which in a natural arrangement a more homogeneous aggregate could hardly be found, and changes almost as sweeping would be required in nearly all the other large genera.

However at present the sub-tribe is in a state of extreme confusion. Numerous genera have been formed since the publication of Lacordaire's work, but their diagnoses are scattered over a wide field of literature and so far as I know have not been systematically classified. The result of this is that anyone having new species to describe is faced with the greatest difficulty in

ascertaining the genus to which (at least some of them, in all probability) should be referred. I propose therefore, before proceeding to describe various new species before me, to review the *Sericoid* genera and endeavour to set forth their characters in a tabulated form. I shall not, however, attempt the ambitious task of placing the genera in anything like a permanently satisfactory condition, as in my opinion that would be at present impossible, and moreover would require very extensive alterations that should be made by someone who has a wider knowledge than I possess of the *Sericoides* of other parts of the world.

I may say, in passing, that I believe the character which should have the greatest weight in the classification of the *Sericoid* species into genera to be the nature of the sexual distinctions. There are far too many species of which the sexual characters are at least uncertain to allow of this system being carried out to-day, but I am convinced that in it will be found the key to the essential distinctions among the *Sericoid* genera.

What I shall attempt will be simply to determine which of the existing generic names can be retained as founded on characters that are (at any rate among other characters) valid, and show the relation of them to each other,—making as few additions as possible, and not attempting to split them up even in cases where I have little doubt that a fuller knowledge of the sexes will eventually require that they be split up. It is necessary however to add a few new genera.

It will be observed that in the following classification of genera considerable weight is conceded to characters seeming very slight in comparison of others which are treated as of little value though apparently more important; as where the nature of the elytral striation is made generic and the number of antennal joints specific. On this I have to remark that in what I believe will be the really scientific classification characters founded on the nature of the sexual distinctions will take the place of the apparently unimportant characters now employed and also that, however superficial some of these make-shift characters may appear, long and careful observation of a very extensive series of species from many collections has convinced me that they accompany real generic difference and that there is no fear of future observations requiring the genera thus slightly characterized to be suppressed, but that the effect of future observations will be only to show the necessity of further sub-division of the genera now distinguished by apparently slight characters.

The following may be noted in respect of the result of my observations regarding the Australian *Sericoides*. 1. The nature of the armature of the claws where the claws are not simple cannot be relied upon as generic, but the difference between claws

that are either bifid or appendiculate and those that are simple (disregarding membranous basal appendages) is strictly generic. 2. The number of antennal joints and the number of joints forming the antennal club are not generic (although the difference between the number of joints in the club where it is sexual probably *is* generic). 3. Characters founded upon the granulation of the eyes are strictly generic. 4. The difference between simple and geminate striation of the elytra is nearly always combined with reliable generic differences. 5. Marked differences in the form of the clypeus (at least in many cases) are much more generic than differences in the form of the labrum. 6. Differences in the hind tibiae are generic.

From these general observations I now pass to some remarks on the generic names that at present stand attributable to the Australian *Sericoides*. These are, I believe, 34 in number (excluding "*Melolontha*" which seems to have been applied loosely by some of the earlier authors to species of this subtribe). Of these *Cotidia* and *Colobostoma* are mere names given (without mention of characters) by Boisduval to species that cannot be identified. It is not unlikely that *Colobostoma* was founded on the insect since named *Platydesmus sulcipennis* by Sir W. Macleay, but the evidence is not strong enough to upset the later name. I have already discussed this point in Proc. Linn. Soc., N.S.W., 1890, p. 517 (note).

Haplonycha = *Colpochila*. *Silopa* and *Hostilina* = *Heteronyx*. *Philochlaenia* and *Omaloplia* = *Caulobius*. Of the names sunk as synonyms in the above statement I regard it as possible that two (*Haplonycha* and *Philochlaenia*) may have to be restored as representing valid genera when the sexual characters of *Colpochila* and *Caulobius* are known in a long range of species, but I do not find any other generic character that seems sufficient to confirm them.

After the above eliminations there remain 28 genera, to the validity of which I am not able to bring any definite objection, but of them there are four that I have not been able to identify among the large collections of *Melolonthini* that I have examined. On each of these a few remarks seem called for.

1. *Automolus*. This genus was formed by Burmeister for a small Tasmanian species, to which Erichson seems to have attached the MS. name *Liparetrus angustulus*. Burmeister says that its antennæ are nine-jointed. Assuming the correctness of that statement I should say that the genus is a good one and that I have not seen it. If it could be that Burmeister had counted the joints incorrectly and that they are really eight (it is easy to go wrong about the minute antennal joints of a small *Liparetrus*) I should suspect that the species is one of those which Sir W.

Macleay calls "Section II" of *Liparetrus*, and in that case I am not at all sure that it would not be justifiable to retain the name *Automolus* and regard Macleay's "Section II" as forming a distinct genus. But in this uncertainty I must pass the genus by with the remark that it is certainly very closely allied to *Liparetrus*.

2. *Microthopuss*. This is another genus (from W. Australia) which Burmeister characterises as closely allied to *Liparetrus*. If its author is right in saying that it is founded on a male example it is unknown to me. If he was mistaken about its sex I should regard it as possibly identical with my genus *Macleayia* (in which case my name would lapse). Here again I must pass the genus by as uncertain.

3. *Homolotropus*. This genus was founded by Sir W. Macleay (Tr. Ent. Soc., N.S.W., II., p. 193) on an insect that I am unable to identify. Apart from the antennæ I find no character in the diagnosis that seems really generic, and the antennal characters alone do not appear to me conclusive. Nevertheless, from the description of the species, I take it that the genus is likely to be a good one, but there is no character mentioned by the author that enables me to place it in a tabulation. Moreover as Sir W. Macleay asserts that the position of *Homolotropus* is near *Xylonychus* (which Lacordaire places among the true *Melolonthides*, where I think it is certainly more at home than in the *Sericoides*) it is quite possibly not a member of the *sericoid* group.

4. *Odontonyx*. Another of Sir W. Macleay's genera concerning which I cannot speak positively. The diagnosis would fit *Eurychelus* but in the description of the species the author states that there "seems to be" a kind of membranous appendage beneath the last joint of the tarsi, and this remark I am afraid compels me to pass the genus by, with the observation that it is probably near *Eurychelus*.

To the above I have to add nine new genera bringing up the total number to 33.

- A. Prosternal sutures normal.
- B. The claws simple (disregarding membranous appendages).
- C. Winged species.
- D. Femora glabrous and very slender and elongate *Telura*.
- DD. Femora shorter and stouter and more or less pilose.
- E. Elytra very short exposing much of the propygidium (all small species).
- F. Clypeus margined in front.
- G. Antennal club 3-jointed in both sexes *Liparetrus*.
- GG. Antennal club 5-jointed in the male *Macleayia*.
- FF. Clypeus not margined in front *Comophorus*.
- EE. Elytra of normal length (except in a very few large species).

- F. Eyes large (projecting laterally at least as far as clypeus), nitid, and scarcely (or very finely) granulate.
- G. Front tibiæ not as in GG.
- H. Antennal club not setose on the faces of the joints in either sex.
- I. Tarsal joints not bearing tufts of long soft hairs.
- J. Labrum distinct (at least by a suture) from vertical front face of clypeus.
- K. Free outline of clypeus an even curve (or nearly so)
- L. Base of prothorax margined.
- M. Elytra geminate-striate.
- N. Hind tibiæ short, their inner outline not nearly straight.
- O. Apical joint of labial palpi conic, not much longer than penultimate ...
- OO. Apical joint of labial palpi longer and more cylindric.
- P. Labrum (viewed from above) truncate or emarginate in front.
- Q. Canthus cutting into front of eye well defined...
- QQ. Front of eye entire (or all but entire)
- PP. Labrum strongly projecting, reflexed and angular at apex ...
- NN. Hind tibiae more elongate, their inner margin straight.
- O. Antennal club differing sexually (always longer than apical joint of maxillary palpi)
- OO. Antennal club in both sexes not or scarcely longer than apical joint of maxillary palpi
- MM. Elytra not geminate-striate.
- N. A membranous appendage at the base of each claw "
- NN. No membranous appendage at base of claws.
- O. Eyes widely separated.
- P. Spurs of hind tibiæ normal.
- Q. Apical joint of labial palpi elongate and cylindric...
- QQ. Apical joint of labial palpi short and more or less conic ...
- PP. Hind tibia without spurs distinct from the fringing cilia ...
- OO. Eyes very large, subapproximate above and beneath the head ...
- LL. Base of prothorax not margined.
- M. Transverse carina of hind tibiæ wanting (as in *Scitala*).
- N. Sterna clothed with long pilosity ...
- NN. Sterna almost glabrous ...
- MM. Transverse carina of hind tibiæ well defined (as in *Colpochila*) ...
- Aneucomides.*
- Colpochila.*
- Petinopus.*
- Glossocheilifer.*
- Scitala.*
- Anodontonyx.*
- Nosphisthis.*
- Frenchella.*
- Platydesmus.*
- Anacanthopuss.*
- Engyops.*
- Colpochilodes.*
- Sericesthis.*
- Neso.*

K.K. Front of clypeus with sharp lateral angles, its sides straight...	...	<i>Sciton</i>
K.K.K. Front of clypeus emarginate ...	...	<i>Byrrhomorpha.</i>
J.J. Labrum entirely confused with vertical front face of clypeus ...	...	<i>Dysphanocheila.</i>
I.I. Tarsal joints each with an isolated tuft of long soft hairs beneath ...	...	<i>Ocnodus</i>
H.H. The faces of the joints of the antennal club clothed with erect setæ ...	...	<i>Diphyllocera.</i>
G G. Front tibiæ excessively dilated and sinuous (not dentate) externally ...	...	<i>Pachygastera.</i>
F.F. Eyes smaller, and more distinctly granulate; surpassed by clypeus.		
G. Front tibiæ not having a tooth close to the base externally ...	...	<i>Haploopsis.</i>
G.G. Front tibiæ with a minute tooth close to the base externally ...	...	<i>Caulobius.</i>
C.C. Apterous species ...	...	<i>Callabonica.</i>
B.B. Claws bifid or appendiculate.		
C. Apterous species ...	...	<i>Pseudoheteronyx.</i>
C.C. Winged species.		
D. Antennæ with more than 7 joints.		
E. Tarsi of male normal.		
F. Form strongly depressed ...	...	<i>Eurychelus.</i>
F.F. Form notably more convex ...	...	<i>Heteronyx.</i>
E.E. Anterior four tarsi of male strongly dilated...		<i>Neoheteronyx.</i>
D.D. Antennæ with only 7 joints ...	..	<i>Nepytis.</i>
A.A. Prosternal sutures open to receive the antennæ ...		<i>Mæchidius.</i>

ANEUCOMIDES (gen. nov. *Sericoidarum*).

Mentum antice emarginatum; palpi labiales breves, articulo ultimo breviter conico quam præcedens parum longiori; palpi maxillares sat elongati, articulo ultimo quam præcedens sat longiori; labrum modice extans, antice late rotundatum (superne visum); oculi sat magni nitidi vix manifeste granulati, antice a cantho profunde incisi; antennæ (speciei typicæ) 9-articulatae, clava 4-articulata (hac maris quam articuli præcedentes conjuncti parum breviori, feminæ haud observatæ); prothorax transversus; elytra geminato-striata; tibiæ anticae extus 3-dentatae, posticis perbrevibus ad apicem valde dilatatis; unguiculi simplices; sterna femoraque pilosa.

The species for which I propose this new generic name is an extremely puzzling one. Its facies is strongly suggestive of a small *Dynastid* of the *Oryctomorphid* group, but its abdominal stigmata are decidedly those of a *Melolonthid*, its antennal structure moreover being quite inconsistent with the idea of a *Dynastid*. It is a short robust insect with hind femora and tibiæ very short and incrassate, and bears no resemblance in facies to any other *Melolonthid* known to me. Nevertheless, I have failed to discover any structural character that I can rely upon to dis-

tinguish it from *Colpochila* except the conic form and unusual brevity of the apical joint of the labial palpi and the somewhat peculiar labrum (slightly approaching that of *Glossocheilifer*), which viewed from above appears as a lamina projecting to a moderate degree from the lower part of the vertical front face of the clypeus, and having its free outline broadly rounded. In the unique male before me the abdomen is remarkably short but this may possibly be the result of distortion merely, and I also observe that the bristles forming the apical fringe of the hind tibiae are unusually short and thick.

A. coloratus, sp. nov. Brevis, sat latus; sat nitidus; supra sat glaber sed prothorace pilis fimbriato, subtus in sternis femoribusque pilosus; rufus, elytris nigro-piceis; clypeo subtilius crebrius, capite postice magis fortiter, prothorace ut clypeus sed minus crebre, elytris crebrius fortiter, pygidio subtiliter sparsim, punctulatis; clypeo antice rotundato sat fortiter reflexo; prothorace postice marginato, fortiter transverso, antice fortiter angustato, angulis anticis acutis minus prominulis posticis (superne visis) fere rectis, basi utrinque vix sinuata; elytris parum distincte striatis (striis geminatis), interstitiis planis; tarsorum posticorum articulo basali quam 2^{as} vix breviori. Long., 5 l.; lat., 2 $\frac{4}{5}$ l.

This small species is notable for its coloring, the whole insect being of a somewhat full red color except the elytra which are black (or nearly so), with a little tendency to rufescence about the shoulders.

S.W. Australia; Eyre's Sand Patch.

COLPOCHILA.

C. Roei, Burm., is certainly, I think, identical with *C. crassiventris*, Blanch. The latter is the older name.

PETINOPUS (gen. nov. *Sericoidarum*).

Mentum antice profunde triangulariter emarginatum; palpi labiales modici, articulo ultimo gracili cylindrico; palpi maxillares sat elongati, articulo ultimo quam præcedens multo longiori; labrum a clypei parte antica verticali bene discretum sed vix prominulum (fere ut *Scitalæ*); oculi magni nitidi vix manifeste granulati, antice fere integri; antennæ (speciei typicæ) 9-articulatæ, clava 3-articulata quam palporum maxillarium articulus ultimus parum longiori (maris quam feminæ haud longiori); prothorax transversus; elytra geminato-striata; tibiæ anticæ extus 3-dentatæ, posticis modicis latis intus sat fortiter arcuatis; unguiculi simplices; sterna parce pilosa; tarsi posteriores 4 maris subtus longe dense pilosi.

The species for which I propose this new generic name has the appearance of a *Colpochila*,—though very much smaller than any *Colpochila* known to me,—but is at once distinguishable from the species of allied genera by the sides of its clypeus not cutting into the eye. I find however a faintly marked smooth but scarcely elevated line on the eye occupying the position that in allied genera is occupied by the canthus-like prolongation of the clypeus. Another notable character consists in the long closely placed pilosity on the underside of the hind and intermediate tarsi in the male which gives those organs an appearance from a certain point of view suggestive of a feather. In the female the hind tarsi are glabrous except at the apex of each joint. The mentum, moreover, is remarkable on account of the very deep triangular excision (reaching nearly half-way to the base) of its apical margin.

P. aegrotus, sp. nov. Sat brevis; sat latus; sat nitidus; supra fere glaber; brunneo-testaceus; clypeo minus crebre, capite postice crebre subaspere, prothorace vix crebre minus fortiter, scutello fere ut prothorax, elytris fortius subcrebre, pygidio fere ut prothorax, punctulatis; clypeo antice rotundato reflexo; prothorace quam longiori duplo latiori, antice minus angustato, angulis anticis sat acutis parum productis posticis rotundato-obtusis; scutello magno triangulare; elytris leviter geminato-striatis, interstitiis nonnullis angustis subconvexis; tarsorum posticorum articulis 1—4 inter se longitudine subæqualibus. Long., $4\frac{1}{4}$ l.; lat., $2\frac{1}{5}$ l.

N. Territory of S. Australia; in my collection, also in S.A. Museum.

GLOSSOCHEILIFER (gen. nov. *Sericoidarum*).

Mentum antice latum fortiter emarginatum; palpi fere ut *Diphylloceræ* (labialibus modicis articulo ultimo sat elongato apicem versus angustato, maxillaribus sat elongatis articulo ultimo quam præcedens sat longiori); labrum fortiter productum, ad apicem angustatum et reflexum; oculi sat magni, sat nitidi, fere læves, antice a cantho profunde incisi; antennæ (speciei typicæ) 9-articulatæ, clava 3-articulata hac maris articulis antennarum 2-6 conjunctis æquilonga, feminæ sat breviori; prothorax transversus; elytra geminato-striata; tibiae antice extus 3-dentatae, posticis minus elongatis (parte apicali sat fortiter dilatata); unguiculi simplices; sterna pilis elongatis dense vestita; tarsis maris quam feminæ multo longioribus robustioribus.

This genus differs from all its allies in the remarkable form of its labrum, which is very large and projects forward from the lower extremity of the front (subvertical) face of the clypeus,

bending obliquely upward, and viewed from above looks like a protruding tongue.

G. labialis, sp. nov. Elongato-ovatus; nitidus; supra fere glaber, subtus in sternis femoribusque pilosus; piceo-niger, antennis palpisque rufis, pedibus (præsertim coxis anticis) plus minusve rufescentibus; clypeo minus crebre, capite postice confertim (hoc exemplorum visorum in medio fovea leviter impresso), prothorace sparsim (ad latera magis crebre), elytris sat sparsim, parum fortiter punctulatis; pygidio in medio sublaevi, ad latera sparsius subtiliter punctulato; clypeo antice rotundato sat reflexo; prothorace postice marginato, sat transverso, lateribus sat fortiter arcuatis, angulis anticis acutis minus productis posticis rotundato-obtusis, basi utrinque sinuata; elytris in disco distinete striatis (sed striis minus perspicue geminatis), latera versus minus distinete striatis (sed striis perspicue geminatis); tarsorum posticorum articulo basali quam 2^{as} sat breviori. Long. 6½—7l.; lat. 3½l.

W. Australia; taken by Mr. Lea at Mt. Barker.

SCITALA.

In Proc. Linn. Soc., N.S.W., 1890, pp. 539-545, I wrote at some length on the claims of this name to retention,—it having been substituted by Burmeister and Lacordaire for *Sericesthis*. I need not now repeat the arguments I then employed, but merely observe that I contended for the claims of *Sericesthis* to be retained in preference to *Scitala*. In doing so I followed the distinguished authors quoted above in the assumption that the type of *Sericesthis* is congeneric with the type of *Scitala*. Lately however I have seen reason to consider that assumption unwarranted. I take it that the type of *Sericesthis* is the species for which Boisduval first used the name,—viz. *S. geminata*,—and that is undoubtedly a later name for *Melolontha pruinosa*, Dalm. Now the type of Erichson's genus *Scitala* is *S. sericans*, Er., a species which I am not sure that I know, but I have before me numerous species undoubtedly congeneric with it (judging by the generic diagnosis), and there appear to me sufficient reasons for the conclusion that they are not congeneric with *Sericesthis geminata*, Boisd. Erichson states that in *Scitala* the apical joint of the labial palpi is obconic and incrassate (as it is in the numerous species referred to above) and he so figures it. But in *S. geminata*, Boisd., it is elongate, cylindric, and very slender. The shape of that joint is a very important character which that eminent specialist Dr. Sharp relies upon as a leading distinction of his genus *Anodontonyx*. I find, moreover, that all the species known to me congeneric with *S. sericans* have the base of the

prothorax margined while in *Sericesthis geminata*, Boisd., the prothorax has no basal margin. On these grounds I have concluded that *Scitala* and *Sericesthis* are both valid genera, and I know of no other species than *geminata*, Boisd. (= *pruinosa*, Dalm.) that can be attributed to the latter.

Dr. Sharp's genus *Anodontonyx* has the labial palpi of *Scitala* as figured and described by Erickson [a fact which Dr. Sharp seems to have overlooked,—probably taking *S. pruinosa* on Lacordaire's authority as the species of (so-called) *Scitala* with which he compared his *Anodontonyx*,—though he probably has seen also some true *Scitala* for he says that the apical joint of the labial palpi in *Scitala* is "generally" slender]. *Anodontonyx* however is perfectly distinct from both *Sericesthis* and *Scitala* by another character (mentioned by Dr. Sharp) viz. that the antennal club is short. This is more fully expressed by saying that in *Anodontonyx* the antennal club is alike in the sexes while in *Scitala* it is much longer in the male than in the female and in both sexes is considerably longer than that of *Anodontonyx*.

Boisduval and Erichson appear to have included species of other genera in their *Sericesthis* and *Scitala* respectively (a matter with which I hope to deal in the next part of this series of papers) but that does not appear to touch the validity of the genera inasmuch as their characters should rest in the one case on the characters of the species to which the name was first applied (without a diagnosis) and in the other case on the diagnosis.

The seven species described by me in my paper referred to above under the name *Sericesthis* (on the assumption that *Sericesthis* and *Scitala* are identical) I must now transfer to *Scitala* (regarding that genus as distinct from *Sericesthis*).

NOSPHISTHIS (gen. nov. *Sericoidarum*).

Mentum antice vix perspicue emarginatum; palpi labiales sat breves, articulo ultimo subconico; palpi maxillares parum elongati, articulo ultimo quam praecedens vix longiori; labrum sat prominulum, antice (superne visum) emarginato-truncatum; oculi sat magni nitidi vix manifeste granulati, antice a cantho profunde incisi; antennae (speciei typicæ) 9-articulatæ, clava 3-articulata, quam palporum maxillarium articulus ultimus haud longiori; prothorax transversus; elytra striata (haud geminatim); tibiae antice extus 3-dentatae, posticis sat brevibus ad apicem dilatatis intus arcuatis; unguiculi parvi simplices, sed ad basin lamella membranacea instructi; sterna pilis longis minus dense vestita.

This genus has the facies of *Frenchella*, from which it is readily distinguished by the membranous lamella at the base of each claw, as well as by the form of the apical joint of the labial palpi and of the antennal club. I suspect the type is a female, but I have no doubt the male scarcely differs in external structure ; I do not recollect an instance of an Australian *Melolonthid* having an extremely abbreviated antennal club in the female and a longer one in the male. I judge the type to be a female only because its tarsi are short and slender. The sexual distinctions in the genera to which this is related are very slight, usually almost confined to the length of the tarsi where the antennal club is not in both sexes notably longer than it is in the insect before me.

N. parvicornis, sp. nov. Fem.? Sat nitida ; rufo-ferruginea ; pilis elongatis fimbriata ; corpore subtus pygidioque pilosa ; capite confertim rugulose punctulato, clypeo late truncato-rotundato, antice fortiter reflexo ; antennis 9-articulatis, clava perbrevi quadrata 3-articulata ; prothorace fortiter transverso, antice fortiter angustato, sparsius (quam caput multo minus crebre) punctulato, lateribus sat æqualiter arcuatis, angulis anticis vix acutis posticis obtusis, basi minus fortiter bisinuata ; scutello punctulato ; elytris sat fortiter sat æqualiter striatis, interstitiis fortius vix crebre punctulatis ; pygidio subopaco, creberrime subtilissime ruguloso-punctulato ; tarsis brevibus ; articulo apicali inter unguiculorum baseos lamina instructo ; unguiculis brevibus fortiter curvatis. Long., $6\frac{1}{2}$ l.; lat. $3\frac{1}{5}$ l.

N.S. Wales ; taken by Mr. Lea at Forest Reefs.

FRENCHELLA.

In addition to the species of Blanchard and Burmeister already mentioned by me (Pr. Linn Soc, N.S.W., 1892, p. 104) as probably needing to be transferred from *Haplonycha* to *Frenchella*, I find that *H. iridescent*, Blanch., is almost certainly a *Frenchella* ; I have examples before me which seem to be clearly that species. The following are new ones.

F. hispida, sp. nov. Sat nitida ; ferruginea, prothorace prope marginem lateralem medium macula obscura notato ; supra pilis elongatis fimbriata et in capite elytris pygidioque pilis longis erectis sparsim vestita ; subtus sat pilosa ; capite crebre fortiter rugulose punctulato, clypeo antice rotundato modice (minus quam *F. lubrici*, Black.) reflexo ; antennis 8-articulatis, clava sat elongata 3-articulata ; prothorace sat fortiter transverso, antice fortiter angustato, quam caput multo minus crebre punctulato, lateribus superne visis a

basi ad medium fere parallelis hinc antrorum subsinuatim convergentibus (a latere visis, paullo pone medium rotundato dilatatis), angulis anticis acutis posticis acutis nonnihil dentiformibus, basi bisinuata; scutello punctulato; elytris sat æqualiter striatis, interstitiis subconvexis sat fortiter punctulatis; pygidio fere ut elytra punctulata et pilosa.

Maris antennarum clava quam articuli ceteri conjuncti haud breviori; feminæ paullo breviori. Long. 6— $6\frac{1}{2}$ l., ; lat. 3 — $3\frac{4}{5}$ l.

For remarks on this species see the following (*F. approximans*). Victoria and N.S. Wales.

F. approximans, sp. nov. Sat nitida; fusca, antennis palpisque dilutioribus, nonnullorum exemplorum elytris et corpore subtus plus minusve rufescens; ut *F. hispida* pilosa; capite antennisque ut *F. hispidae*; prothorace sat fortiter transverso, antice fortiter angustato (nonnullorum exemplorum obsolete canaliculato), quam caput vix minus crebre punctulato, lateribus superne visis fere ut *F. hispidae* sed a latere visis multo minus fortiter (et vix pone medium) rotundato-dilatatis; cetera ut *F. hispidae*. Long. 6—7 l.; lat. $2\frac{4}{5}$ —4 l.

This species is readily distinguishable from nearly all the other described Australian Sericoid *Lamellicornes* with simple claws by the long slender erect hairs that are thinly placed in longitudinal rows on its elytra. It is, however, extremely close to *F. hispida* from which it differs by its darker color, the considerably closer punctuation of its prothorax and the different lateral outline of its prothorax. If this be looked at from the side it is seen in *F. hispida* to form a strong curve the extreme convexity (that is, the point where the prothorax is at its greatest width) of which is markedly behind the middle, whereas in the present species it is only very feebly curved outward, and the extreme convexity of the curve is scarcely behind the middle of the length of the lateral margin. Owing to the declivity of the sides of the prothorax this difference is scarcely noticeable when the prothorax is looked at from above.

N.S.W.; Sydney and northern districts.

F. hirticollis, sp. nov. Sat nitida; fusca, plus minusve rufescens; fere ut *F. hispida* pilosa sed pilis erectis in prothorace ut in elytris vestita; capite ut *F. hispidae*; antennis 9-articulatis, clava sat elongata 3-articulata; prothorace sat fortiter transverso, antice angustato, dupliciter punctulato (puncturis majoribus solis setiferis), lateribus superne visis modice arcuatis (latitudine majori pone medium posita) basin versus sinuatis (a latere visis fere ut *F. hispida* sed etiam magis fortiter rotundato-dilatatis); cetera ut *F. hispidae*.

Maris antennarum clava quam articuli ceteri conjuncti haud breviori; feminæ paullo breviori. Long., 7— $7\frac{1}{2}$ l.; lat., $3\frac{1}{2}$ — $3\frac{4}{5}$ l.

Allied to the preceding two, but easily distinguishable by the following characters:—The antennæ nine-jointed, the prothorax (as well as the elytra) clothed with long erect pilosity, the prothoracic puncturation consisting of two kinds of punctures intermingled (one kind manifestly smaller than the punctures on the prothorax of *hispida* and non-setiferous, the other kind much larger and setiferous), the sides of the prothorax very manifestly sinuate behind the middle (viewed from above) and evidently more abruptly—indeed almost sub-angularly—dilated behind the middle, and more abruptly declivous (viewed from the side).

N.S.W.; all the specimens I have seen are, I believe, from the Sydney district.

F. aspericollis, sp. nov. Mas. Sat nitida; fusco-rufescens; pilis elongatis fimbriata, capite pygidioque pilis erectis vestitis, corpore subtus piloso; capite antennisque ut *F. hispidae*; prothorace fere ut *F. hispidae* sed creberrime aspere punctulato; elytris magis subtiliter punctulato; pygidio (exempli typici) longitudinaliter fortiter carinato; cetera ut *F. hispidae*.

Fem. latet. Long., $5\frac{1}{2}$ l.; lat., 3 l.

Near *F. hispida* but with elytra devoid of erect setæ (I do not think this is due to abrasion). Very distinct also by the extremely close asperate puncturation of the prothorax and the very evidently finer puncturation of the elytral interstices, as well as by the strongly carinate pygidium,—though I do not find the carination of the pygidium a reliably constant character in all the Australian *Lamellicornes*.

N.S. Wales; Armidale; given to me, I believe, by the late Mr. Olliff.

F. sparsiceps, sp. nov. Mas. Sat nitida; rufescens; pilis elongatis fimbriata, corpore subtus piloso; capite postice minus fortiter minus crebre haud rugulose (parte media fere lœvi), clypeo (hoc minus brevi antice rotundato) magis crebre magis æqualiter, punctulatis; antennis 9-articulatis, clava quam articuli ceteri conjuncti sat longiori; prothorace sat fortiter transverso, antice fortiter angustato, sparsius (quam *F. hispidae* sat minus crebre) punctulato, cetera ut *F. hispidae*; scutello sat lœvi; elytris fere ut *F. hispidae* sed interstitiis multo minus grosse punctulatis.

Fem. latet. Long., 6 l.; lat. $3\frac{1}{2}$ l.

I have seen two males of this species—both in inferior condition and both taken by Mr. Lea near Sydney. The species is at

once distinguishable from all the preceding by its much more sparsely and smoothly punctured head. In both the examples before me there are two large faintly marked impressions between the eyes, but this is probably not a constant character. *F. sparsiceps* is also distinguishable from all the preceding except *hirticollis* by its nine-jointed antennæ, and from that species by its considerably longer antennal club and the absence of erect pilosity on the upper surface.

N.S. Wales.

ANACANTHOPUS (gen. nov. *Sericoidarum*).

Mentum subangustum ; palpi labiales sat breves, articulo ultimo minus elongato subovali ; palpi maxillares elongati, articulo ultimo quam præcedens duplo longiori ; labrum parvum sed distinctum, parum extans, antice (superne visum) emarginatum ; oculi modici sat nitidi, subtiliter granulati, antice a cantho incisi ; antennæ (speciei typicæ) 9-articulatae, clava 3-articulata [hac maris (?) quam articuli 2-6 conjuncti vix longiori] ; prothorax transversus ; elytra striata (haud geminatim) ; coxae posticæ quam metasternum parum breviores ; tibiae antice extus bidentatae, posticis brevibus ad apicem valde dilatatis spinoso-ciliatis (sed haud calcaribus a ciliis distinctis armatis) certo adspectu bilobis ; unguiculi simplices ; sterna breviter sparsim pilosa.

A very remarkable genus which I refer with much hesitation to the *Sericoides*. The species described below has the facies of a *Dynastid*, and I have not a specimen which I can afford to damage to the extent that would be necessary to examine its abdominal stigmata, but its nine-jointed antennæ justify me I think in excluding it from the *Dynastides*. Assuming it to be a *Melolonthid* there is nowhere to place it but in the *Sericoides* from which I can find no structural character to separate it. But wherever it be placed the remarkable structure of its hind tibiæ should make it easy to recognise. These are extremely dilated at the apex where they bear a continuous fringe of strong stout spines but nothing that can be distinguished from the rest of these spines as being "apical spurs." It is to be noted that its eyes are smaller and more distinctly granulated than in most of the genera allied to *Colpochila* and *Sericesthis*, and thus approximate to the *Caulobius* type, but as they project laterally as far as the clypeus I think the genus should be grouped with the former two rather than the last-named. The evident resemblance on facies to the next genus (*Engyops*) which is certainly a *Sericoid* tends to confirm this in the place I have given it. I am uncertain of the sex of the specimen before me but I do not think that important since (from the analogy of allied genera) it is

unlikely that if it be a female the male differs materially except in probably having a longer antennal club. I have not been able to make a proper examination of the front margin of the mentum (which is rugulose and clothed with extremely long setæ, and therefore difficult to study without dissection).

A. inermis, sp. nov. Sat late ovalis; minus convexus; sat nitidus; supra sat glaber; supra piceo-niger, corpore subtus antennis palpis pedibusque rufescens; capite cum clypeo crebre grosse, prothorace sparsim minus fortiter, pygidio sat grosse, punctulatis; prothorace leviter transverso, antice fortiter angustato, lateribus fortiter rotundatis, basi utrinque subsinuata, angulis anticis acutis vix prominulis posticis rotundato-obtusis; elytris substriatis, striis sat fortiter punctulatis, interstitiis subtilius seriatim punctulatis sat planis; tarsorum posticorum gracilium articulo basali quam 2^{ns} sublongiori. Long., 3½ l.; lat., 1¼ l.

Tropical Queensland.

ENGYOPS (gen. nov. *Sericoidarum*).

Mentum sat angustum; palpi labiales sat breves, articulo ultimo minus elongato, subdilatato, ad apicem acuminato; palpi maxillares elongati, articulo ultimo quam præcedens duplo longiori; labrum modicum, bene extans, antice (superne visum) emarginato-truncatum; oculi permagni inter se sub-approximati, sat nitidi, subtiliter granulati, antice a cantho incisi; antennæ (speciei typicæ) 9-articulatae, clava 3-articulata (hac maris quam articuli 2-6 conjuncti paullo longiori); prothorax transversus; elytra striata (haud geminatum); coxae posticæ minus elongatae; tibiae anticæ extus 3-dentatae, posticis sat brevibus ad apicem modice dilatatis; unguiculi simplices; sterna sparsim pilosa.

The species for which I propose the above generic name must certainly I think stand near the preceding one (*Anacanthopus inermis*) on account of the close resemblance between them in respect of the oral organs (the narrow rough mentum clothed with very long sparse setæ, the very long apical joint of the maxillary palpi, &c.), and a decided agreement in facies. The present insect however has a less marked resemblance to a *Dynastid* and differs from the preceding in several important structural characters. It is distinguished from all the other Australian *Sericoides* so far as my observation goes by its very large eyes, the interval between which is so narrow that the middle part of the head (limited in front by the clypeal suture, on the sides by the eyes, and behind by a line joining the hind extremities of the eyes) is scarcely if at all wider than long.

E. spectans, sp. nov. Sat late ovalis ; minus convexa ; subnitida ; supra sat glabra ; ferruginea ; capite crebre fortius, prothorace sparsim minus fortiter, pygidio fortiter minus crebre, punctulatis ; prothorace sat transverso, antice fortiter angustato, lateribus leviter arcuatis, basi utrinque vix sinuata, angulis anticis acutis vix prominuluis posticis rotundato-obtusis ; elytris sat fortiter punctulato-striatis, interstitiis sat fortiter nec seriatim punctulatis subconvexis ; tarsorum posticorum articulo basali quam 2^{as} sublongiori. Long., 3 $\frac{1}{5}$ l. ; lat. 1 $\frac{4}{5}$ l.

Southern Queensland,

COLPOCHILODES (gen. nov. *Sericoidarum*).

Mentum antice sat fortiter emarginatum ; palpi fere ut *Frenchellæ* (labialibus modicis articulo ultimo sat elongato sat cylindrico, maxillaribus sat elongatis articulo ultimo quam præcedens sat longiori) ; labrum totum plus minusve extans, antice (superne viso) truncato vel late emarginato ; oculi sat magni nitidi vix manifeste granulati, antice a cantho profunde incisi ; antennæ (speciei typicæ) 9-articulatæ, clava 3-articulata (hac maris angusta elongata quam articuli præcedentes conjuncti vix breviori, feminae multo breviori) ; prothorax transversus ; elytra geminato-striata ; tibiae anticæ extus tridentatae, posticis fere ut *Sericesthis* (elongatis, gracilibus, intus fere rectis) ; unguiculi simplices ; sterna pilis elongatis dense vestita.

The species for which I propose the above new generic name cannot be satisfactorily placed in any previously characterised genus. With the general characters in other respects of a *Colpochila* it combines the hind tibiae of a *Sericesthis*,—slender, elongate, and having their inner edge straight, which gives it a facies quite unlike that of either of the above named genera. Besides the species described I have seen two others from W. Australia, but as each of them is represented by a unique female it would not be wise to describe them at present.

C. raucipennis, sp. nov. Elongato-ovatus ; sat nitidus ; supra fere glaber, sternis femoribusque pilosis ; ferrugineus vel piceo-ferrugineus ; clypeo crebre subfortiter, capite postice acervatim minus fortiter, prothorace sparsius (ad latera sat crebre) sat fortiter, elytris sat grosse rugulose, pygidio minus crebre subfortiter, punctulato ; prothorace postice haud marginato, sat transverso, lateribus (superne visis) pone medium fere rectis, angulis anticis subacutis minus prominuluis posticis rotundato-obtusis, basi utrinque sinuata ; scutello laevi ; elytris geminato-striatis, interstitiis nonnullis angustis convexus sed sculptura nonnihil propter rugositatem obscura ;

tarsorum posticorum articulo basali quam 2^{ns} parum breviori.
Long., 7—8½ l.; lat., 3½—4 l.

W. Australia; Perth, Albany, &c.

NESO (gen. nov. *Sericoidarum*).

Mentum antice leviter emarginatum; palpi labiales modici, articulo ultimo subcylindrico haud vel vix dilatato, sat elongato; palpi maxillares modici, articulo ultimo quam præcedens sat longiori; labrum in medio vix prominulum, antice (superne visum) emarginato-truncatum; oculi magni nitidi subtilissime granulati, antice a cantho profunde incisi; antennæ (specierum cognitarum) 9-articulatae, clava 3-articulata (hac maris quam articuli 1-6 conjuncti haud breviori, feminæ sat breviori); prothorax transversus, basi haud marginata; elytra varie striata; coxae posticæ minus elongatae; tibiae anticæ extus 3-dentatae, posticis sat brevibus ad apicem dilatatis intus arcuatis; unguiculi simplices; sterna sparsim pilosa.

This genus (which seems peculiar to tropical Australia) differs from *Colpochila* in facies more widely than in structural characters. It is however distinct by several good characters,—especially its prothorax not margined at the base its short hind coxae and the sparseness of the pilosity on its sterna. The canthus cutting into the front part of the eye moreover is much less divergent from the clypeal outline than in *Colpochila*, being evidently a mere prolongation of the clypeus, while in *Colpochila* it has the appearance of a carina distinct from the clypeal outline. It should be noted that this genus presents the very rare (among the Australian *Sericoides*) character of including among species with simply striate, one at least with geminate-striate, elytra. In the latter however the striation is very different from that of *Colpochila*, *Scitala*, &c., the width of the interstices between stria and stria of the pairs being very little less than of the alternate interstices and all the interstices being equally flat, whereas in *Colpochila*, &c., the wider interstices are twice as wide (or more) as the narrower ones and the latter are distinctly more convex than the former.

N. usta, sp. nov. Ovata; sat convexa; nitida; supra glabra; rufo-brunnea, capite prothorace pedibusque obscuris; capite cum clypeo sat crebre sat grosse, prothorace sparsius subfortiter, punctulatis; prothorace sat fortiter transverso, antice fortiter angustato, lateribus sat rotundatis, basi retrorsum declivi utrinque vix sinuata, angulis anticis acutis subprominulis posticis rotundato-obtusis; elytris subtilius punctulato-striatis, interstitiis subtilius confuse punctulatis, planis; tarsorum posticorum articulo basali quam 2^{ns} subbreviori.

Maris antennarum clava quam articuli 1-6 conjuncti vix longiori, pygidio nitido sparsim distinete punctulato.

Feminæ antennarum clava sat breviori, pygidio minus nitido subobsolete punctulato. Long., $4\frac{1}{2}$ - $5\frac{1}{2}$ l.; lat., $2\frac{1}{4}$ -3 l.

Tropical Queensland.

N. yorkensis, sp. nov. Ovata; modice convexa; nitida; supra glabra; rufa, elytris antennisque testaceis; capite cum clypeo crebre fortiter, prothorace sparsim subfortiter, pygidio sparsim subtilius, punctulatis; prothorace sat fortiter transverso, antice fortiter angustato, lateribus sat rotundatis, basi retrorsum declivi utrinque manifeste sinuata, angulis anticis acutis sub prominulis posticis obtusis (vix rotundatim); elytris minus regulariter striatis, striis fortius punctulatis, interstitiis sat planis sparsim fortius punctulatis; tarsorum posticorum articulo basali quam 2^{us} distinete breviori.

Maris antennarum clava quam articuli 1-6 conjuncti fere sesqui longiori.

Feminæ antennarum clava quam articuli 1-6 conjuncti sat breviori. Long., $5\frac{1}{2}$ l.; lat., $2\frac{4}{5}$ l.

Differs from the preceding in color, also in the much longer antennal club of the male, the prothorax notably less strongly declivous hindward across the base, the considerably stronger puncturation of the elytra, the absence of sexual difference in the sculpture of the pygidium, &c.

Tropical Queensland.

N. planicollis, sp. nov. Ovata; modice convexa; nitida; supra glabra; rufa vel rufo-testacea, capite infuscato, prothorace magis obscure rufo, elytris antennisque pallidis; capite quam clypeus manifeste minus crebre, prothorace sparsim subfortiter, punctulatis; prothorace fortiter transverso, antice sat fortiter angustato, lateribus sat rotundatis, basi haud retrorsum declivi utrinque parum sinuata, angulis anticis acutis parum prominulis posticis obtusis (vix rotundatim); elytris geminato-striatis, striis sat fortiter punctulatis, interstitiis (ex his, alternis quam cetera paullo angustioribus minus punctulatis vix convexioribus) sat fortiter confuse punctulatis; tarsorum posticorum articulo basali quam 2^{us} sat breviori.

Maris antennarum clava quam articuli 1-6 conjuncti plus quam sesquiatiori, pygidio sparsim subfortiter punctulato.

Femina latet. Long., $5\frac{4}{5}$ l.; lat., 3 l.

Resembles the preceding (*N. yorkensis*) in color but differs from it in the considerably longer antennal club of the male (which to a casual glance looks about twice as long as all the

preceding joints together), in the basal part of the prothorax not being declivous hindward, in the elytral stria distinctly running in pairs, &c.

Tropical Queensland.

SCITON.

For the original diagnosis (P. L. S., N.S.W., 1892, p. 101) it will be well to substitute the following fuller one.

Clypeus antice truncatus, lateribus sinuatis; mentum antice emarginatum, lateribus pone apicem profunde excisis; palpi labiales modici, articulo ultimo dilatato; palpi maxillares parum elongati, articulis robustis (apicali 2° longitudine æquali quam 3^{us} sat longiori); labrum vix exsertum, antice (superne viso) truncatum vel late vix emarginatum; oculi magni nitidi vix manifeste granulati, antice a cantho profunde incisi; antennæ (specierum cognitarum) 9-articulatae, clava 3-articulata (hac maris* cogniti quam articuli præcedentes 5 conjuncti paullo longiori, feminæ paullo breviori); prothorax transversus; elytra geminato-striata; tibiæ anticae extus tridentatae, posticis fere ut Sericesthis (elongatis, gracilibus, intus fere rectis); unguiculi simplices; sterna pilis erectis sat brevibus minus perspicuis vestita, pedibus sparsim pilosis.

A very distinct genus on account of the form of the clypeus (recalling that of *Mæchidius*), the peculiar excision of the sides of the mentum disclosing the extreme base of the labial palpi, and the scarcely exserted labrum resembling that of the genus I take to be *Ocnodus*.

S. paullus, sp. nov. Ovatus, minus elongatus; subopacus, non-nihil pruinosis; supra glaber; rufo-ferrugineus, antennis palpisque testaceis; clypeo nitido in medio subgibbo crebre squamose, capite postice prothoraceque vix manifeste, elytris parum distincte, pygidio nitido subtiliter sat crebre, punctulatis; prothorace sat transverso, antice minus angustato, lateribus leviter arcuatiss, basi utrinque leviter sinuata, angulis anticis acutis minus prominulis posticis superne visis sat (nec acute) rectis; elytris geminato-striatis, interstitiis alternis angustioribus subconvexis; tarsorum posticorum articulo basali quam 2^{us} paullo longiori. Long., 5— $5\frac{3}{4}$ l.; lat. $2\frac{4}{5}$ —3 l.

Very much like *S. ruber*, Blackb., but much smaller, and easily distinguished *inter alia* by its clypeus being quite gibbose in the middle longitudinally (so that from a certain point of view it appears foveate on either side) and by the notably longer basal

* i.e. *S. paulli*, sp. nov.

joint of its hind tarsi. I have before me a third species of this genus (also from W.A.) which is not however in fit state for description.

W. Australia.

DYSPHANOCHILA (gen. nov. *Sericoidarum*).

Mentum antice leviter emarginatum ; palpi labiales modici, articulo ultimo subconico sat dilatato ; palpi maxillares elongati, articulo ultimo quam praecedens multo longiori ; labrum a clypei parte antica verticali nullo modo discretum ; oculi magni nitidi vix manifeste granulati, antice a cantho profunde incisi ; antennae (speciei typicæ) 9-articulatae, clava 3-articulata (hac maris quam articuli praecedentes conjuncti multo longiori, feminæ haud observatae) ; prothorax transversus ; elytra haud manifeste striata ; tibiæ anticæ extus 2-dentatae, posticis elongatis minus robustis intus fere rectis ; unguiculi simplices ; sterna femoraque pilosa.

This genus is easily distinguished by the total absence of any distinction between the labrum and the deep downward-vertical front face of the clypeus (which is even more complete than in the genus that I take to be *Ocnodus*), in combination with hind tibiae of the *Sericesthis* type. Its facies is something like that of *Anodontonyx*.

D. pilosipennis, sp. nov. Sat brevis, sat lata ; modice nitida ; supra pilis subtilibus elongatis erectis sparsius vestita, subtus in sternis femoribusque pilosa ; brunneo-testacea ; clypeo crebrius fortiter, capite postice sparsim sat grosse, prothorace fere ut clypeus sed paullo minus crebre, elytris crebrius sat fortiter, pygidio fortius minus crebre, punctulatis ; clypeo antice rotundato-reflexo ; prothorace postice in medio haud marginato, transverso, antice angustato, angulis anticis minus acutis minus prominulis posticis acutis leviter retrorsum prominulis, basi utrinque sinuata ; elytris haud distincte striatis ; tarsorum posticorum articulo basali quam 2^{ns} paullo breviori. Long., 4 $\frac{1}{2}$ l. ; lat., 2 $\frac{2}{5}$ l.

An easily recognisable species on account of the long erect hairs clothing the upper surface. In one example I can detect no indication of elytral striae, in the other there are very faint traces of striae arranged in pairs ; they are however scarcely distinguishable, but sufficient to show that the striation, such as it is, is of the geminate type.

W. Australia ; Swan R. Taken by Mr. E. F. W. Blackburn and Mr. Lea.

HAPLOPSIS.

M. Lacordaire regards this genus as identical with *Heteronyx*. His remarks seem to imply that he had seen at least one of its

species, but it is difficult to believe he can really have done so, as he says that it has "entirely the general appearance" of *Heteronyx*,—which is far indeed from being the case. Together with a very different facies, it has simple claws and the club of the antennæ remarkably elongated. Structurally it is near *Caulobius* (which Lacordaire also merges in *Heteronyx*, quite erroneously I am convinced). Superficially it is easily separated from *Caulobius* by the presence (at any rate in all the described species) of conspicuous pubescent vittæ on the elytra; but it is difficult to specify satisfactory *structural* distinctions because *Caulobius* must I think for the present be allowed to embrace species that will probably have to be treated eventually as types of distinct genera. The insect which Burmeister has described as *Caulobius* (*Sericesthis cervina*, Boisd.) is I think pretty certainly not congeneric with *C. pubescens*, Le Guillou; but as I have not to my knowledge seen the former I am unable to deal with the matter confidently, and must treat *Caulobius* sufficiently loosely to include in it both those which Burmeister attributes to it. Regarded thus, the only one of Burmeister's characters that seems reliable is a very slight (but as far as my observation goes a very constant) one, viz. the presence in *Caulobius* but not in *Haplopsis* of a minute tooth on the external margin of the front tibiæ close to the base of those organs. In his tabulation Burmeister distinguishes the two genera by the form of the labrum, which in *Caulobius* is said to be,—and in *Haplopsis* not to be,—prominent and separated by a distinct suture from the vertical front face of the clypeus. This holds good in respect of *Haplopsis* and *Caulobius pubescens* but not in respect of some other species before me which, I feel confident, are congeneric with *C. cervina*. So again Burmeister says there are eight joints in the antennæ of *Caulobius* and nine in those of *Haplopsis*,—but the variability of the Australian *Heteronyxides* in very closely allied species of numerous genera is so great as to render this character worthless. The other notable distinctive character mentioned by Burmeister, —viz. the presence of sexual variation in the clypeus of *Haplopsis* and not of *Caulobius*,—is an important one if constant,—but I have not before me (and still less had Burmeister before him) a sufficiently long series of species and specimens to say confidently whether it is constant. That *Haplopsis* and *Caulobius* are two thoroughly good genera I should say there is not the shadow of a doubt,—nor have I much doubt that all Burmeister's distinctive characters (except that founded on the number of antennal joints) will stand, but I suspect that Burmeister's diagnosis of *Caulobius* was drawn up on *C. pubescens* only and that *C. cervinus* if examined would be found not to correspond with the diagnosis of *C. pubescens* in respect of the labrum and to differ in other

respects of generic importance. Owing to this suspicion I have included among the new species under *Caulobius* (below) some species which I place in the genus only provisionally (as probably congeneric with *C. cervinus*, Burm., ? Boisd.), but for which I think a new generic name will be required eventually.

H. debilis, sp. nov. *Piceo-nigra*; *subænescens*; *subnitida*; capite prothoraceque pilis elongatis erectis pallide brunneis, elytris pilis decumbentibus griseis vittatim positis, corpore subtus pedibusque pilis albidi sat crebre, vestitis; capite prothoraceque sat crebre nec fortiter punctulatis; hoc fortiter transverso, antice angustato, lateribus leviter arcuatis, angulis anticis productis posticis obtusis; elytris obscure rugulosis, 5-lineatim (plus minusve manifeste) longitudinaliter convexis, lineis glabris vix rugulosis.

Maris clypeo antice truncato subtiliter marginato, antennarum clava elongata.

Feminæ clypeo rotundato, antennarum clava minus elongata.

Long., $2\frac{1}{2}$ —3 l.; lat., $1\frac{1}{5}$ — $1\frac{2}{5}$ l.

Easily distinguishable by the form of the clypeus which in front is simply truncate in the male and rounded in the female with its margin not reflexed. The prothorax is notably less coarsely punctulate than in its allies and the tarsi are much more slender than those of *H. lineoligera*, Blanch.

S. Australia; Eyre's Peninsula.

H. Olliffi, sp. nov. Obscure viridis; *subnitida*; supra pilis griseis (in elytris vittatim dispositis), subtus pilis albidi vestita; capite prothoraceque grosse minus crebre punctulatis; hoc minus fortiter transverso, antice angustato lateribus arcuatis, angulis anticis productis posticis obtusis; elytris granulato-rugulosis, 5-lineatim (plus minusve manifeste) longitudinaliter convexis, lineis glabris vix rugulosis.

Maris clypeo antice fortiter reflexo, producto, late truncato; antennarum clava modice elongata.

Feminæ clypeo antice vix producto, anguste reflexo, late truncato; antennarum clava vix minus elongata. Long., 3 l.; lat., $1\frac{2}{5}$ l.

The decidedly green coloring of this species distinguishes it from all its known congeners except *viridis*, Blackb., and the clypeus of its male strongly produced and upturned in front with the apex sharply truncate distinguishes it from them all.

Northern N.S. Wales; given to me by the late Mr. Olliff.

H. lineoligera, Blanch. The synonymy of this species was given wrongly by Burmeister, and has been taken over by other authors from him. A very casual comparison of descriptions renders this manifest, and it seems incomprehensible that Bur-

meister could have made such a mistake; equally so that he should have re-described under another name (*grisea*) an insect which he believed to be already described by Blanchard and then have deliberately placed Blanchard's name as a discarded synonym below his own. Is it possible he can have thought this course justified by the fact that the specimen he described bore a MS. name affixed to it by Hope at a date possibly earlier than that of Blanchard's publication? However that may be *H. pilosa*, Burm. (and not *grisea*, Burm.) is evidently the same as *lineoligera*, Blanch., and therefore the name *pilosa*, Burm., must drop (as a synonym of *lineoligera*) and *grisea*, Burm., must stand as a good species.

CAULOBIUS.

I have discussed this genus above in connection with *Haplopsis*. The following species are I think new.

C. punctulatus, sp. nov. Sat nitidus; subcylindricus; rufescens, capite prothorace metasternoque picescentibus; pilis brevibus pallidis suberectis minus confertim vestitus; capite rugulose sat grosse sat crebre punctulato, clypeo antice truncato sat fortiter reflexo; prothorace transverso, antice angustato, rugulose grosse sat crebre punctulato, lateribus arcuatiss (latitudine majori paullo pone medium posita) basin versus subsinuatis, angulis anticis acutis posticis subrectis, basi media modice lobata; scutello parum manifeste punctulato; elytris fortiter sat grosse crenulato-striatis, interstitiis angustis inaequaliter nec fortiter convexis; tibiis anticis dentibus 2 prope apicem sat magnis et altero minuto ad basin externis armatis; antennis 9-articulatis, clava sat elongata quam articuli ceteri conjuncti vix breviori; tarsis 4 anterioribus (posticis exempli typici parentibus) modice elongatis, articulis ad apicem fortiter clavatis 2° quam 1^{us} longiori. Long., 3 l.; lat., 1 $\frac{3}{5}$ l.

I am uncertain of the sex of the unique type of this species, as I do not find any very reliable external sexual characters in *Caulobius*. The labrum is scarcely distinct from the front face of the clypeus and is pointed behind, its point being opposite to an emargination of the mentum.

W. Australia; taken by Mr. Meyrick, near Albany.

C. advena, sp. nov. Subnitidus; subcylindricus; piceo-brunneus antennarum stipite tarsis elytrisque plus minusve rufescensibus; pilis brevibus pallidis suberectis subtilibus minus confertim vestitus; capite crebrius minus grosse minus profunde punctulato, clypeo antice truncato sat fortiter reflexo, antennis 9 (?) articulatis, clava sat elongata quam articuli ceteri conjuncti vix breviori; prothorace transverso, antice

angustato, crebre minus profunde (nullo modo grosse) punctulato, lateribus arcuatis (latitudine majori paullo pone medium posita) basin versus manifeste sinuatis, angulis anticis acutis posticis sat acute rectis, basi media modice lobata; scutello vix manifeste punctulato; elytris inaequaliter subtilius punctulato-striatis, interstitiis sat latis inaequaliter minus fortiter convexis; tibiis anticis et tarsis anterioribus 4 ut *C. punctulati*, tarsorum posticorum articulo 2° quam 1^{us} plus quam duplo longiori. Long., 3 l.; lat., 1 $\frac{2}{3}$ l.

Very close to the preceding structurally but with the sides of the prothorax evidently more sinuate near the base, the hind angles distinctly sharper, the color throughout (very notably that of the antennal club) quite different, the puncturation of all the upper surface much feebler and finer, &c. It should be noted that there is a difference in the form of the clypeus between these two species for although it is truncate in both when viewed from above, its front outline viewed from in front is straight in this species but sinuate in *C. punctulatus*. The labrum seems to differ somewhat in form from that of *C. punctulatus* the middle of its hind margin not appearing pointed, but that difference is possibly only apparent as in the unique type of the present species the labrum is closely in contact with the mentum and in the other is fully exposed. The antennæ are in a very unfavorable position for examination of the minute joints that form the funiculus and I cannot get sight of them with a microscope but I am almost sure they are 9-jointed.

Australia or Tasmania; exact habitat not known, but probably Tasmania, as a considerably broken specimen in my collection from that island does not seem to me to differ from the type except in larger size (long. 3 $\frac{2}{3}$ l.) and decidedly more rufescent elytra.

C. discedens, sp. nov. Subnitidus; brevior; niger, capite prothoracis lateribus sutura antennis pedibusque obscure rufuscens; pilis brevibus suberectis albidis sat confertim vestitus; capite sat fortiter minus crebre vix rugulose punctulato, clypeo antice truncato sat fortiter reflexo; antennis 9-articulatis, clava sat elongata quam articuli ceteri conjuncti vix breviori; prothorace sat transverso, antice angustato, rugulose grosse sat crebre punctulato, lateribus arcuatis (latitudine majori paullo pone medium posita) basin versus subsinuatis, angulis anticis acutis posticis subrectis, basi media modice lobata; scutello coriaceo; elytris confuse vix perspicue sed sat grosse punctulato-striatis, interstitiis minus angustis leviter valde inaequaliter convexis; tibiis anticis ut *C. punctulati* sed brevioribus magis latis; tarsis anterioribus

4 fere ut *C. punctulati* sed brevioribus minus gracilibus; tarsis posticis sat brevibus, articulo 2° quam 1^{us} vix duplo longiori. Long., 2½ l.; lat. 1²/₅ l.

Differs from *C. punctulatus* (apart from color and size) chiefly as follows:—The clypeus viewed from in front is not sinuate; the prothorax is less strongly transverse; the sculpture of the elytra is extremely confused (and difficult to describe) consisting of coarse but not deep punctures which run unevenly in indistinct striae and have an *ill-defined* appearance, their interstices very little raised and much wider than in *punctulatus* and extremely irregular (here and there almost disappearing in vague rugulosity) and generally much serrated by the seriate punctures (in *punctulatus* the punctures of the striae being markedly coarser and deeper and much more regularly seriate); the tibiae are conspicuously shorter and evidently wider (though with similar external dentation, two well defined teeth close to the apex and one minute tooth at the extreme base); the anterior 4 tarsi are manifestly stouter and shorter; the whole insect is shorter and wider. The much coarser puncturation of the prothorax readily separates this species from *C. advena*.

W. Australia; taken by Mr. E. Meyrick.

C. compactus, sp. nov. Subnitidus; brevis; niger; palpis antenarumque stipite dilutioribus; pilis erectis in capite prothoraceque sat longis ferrugineis, in elytris brevibus pallidis vestitus; capite sat grosse crebrius rugulose punctulato, clypeo antice truncato fortiter reflexo; antennis 9-articulatis, clava elongata quam articuli ceteri conjuncti haud breviori; prothorace minus fortiter transverso, antice angustato, grosse rugulose sat crebre punctulato, lateribus arcuatis, (latitudine majori paullo pone medium posita), angulis anticis acutis posticis subrectis, basi media modice lobata; scutello coriaceo leviter inaequali; elytris minus distinete punctulato-striatis, interstitiis angustis vix convexis obscure rugulosis; tibiis anticis ut *C. punctulati*; tarsis anterioribus 4 fere ut *C. punctulati* sed intermediis quam antici sat brevioribus; tarsis posticis elongatis gracilibus, articulo 2° quam 1^{us} plus quam duplo longiori. Long., 2—2½ l.; lat. 1¹/₁₀—1³/₁₀ l.

This species is in general facies much like *C. discedens* but is notably blacker with the prothorax less strongly transverse and much more closely punctured; the elytra also are very differently sculptured; to a casual glance their sculpture might be described as closely rugulose the rugulosity having a seriate arrangement, but when closely examined they are seen to be in reality closely striate-punctulate, the rows of punctures so close as to be almost

confluent and the intervals (both between series and series and between puncture and puncture of the series) squamose-rugulose in such fashion as greatly to obscure the puncturation.

Mountains of Victoria and N.S. Wales.

C. evanescens, sp. nov. Minus nitidus ; sat brevis ; niger, palpis anternarum stipite et nonnullorum exemplorum tarsis dilutioribus ; pilis pallidis decumbentibus vestitus ; capite crebrius sat grosse punctulato, clypeo sat elongato antice minus lato subrotundato vix reflexo ; antennis 9-articulatis, clava sat elongata quam articuli ceteri conjuncti vix breviori ; prothorace leviter transverso, antice leviter angustato, crebrius rugulose sat grosse punctulato, lateribus arcuatiss (latitudine majori vix pone medium posita), angulis anticis acutis posticis obtusis (sed bene determinatis), basi media minus fortiter lobata ; scutello coriaceo parum inaequali ; elytris crebre minus fortiter seriatim punctulatis, parum rugulosis, interstitiis minus distinctis ; tibiis anticis fere ut *C. punctulati* sed brevioribus latioribus ; tarsis ut *C. discedentis*. Long., $1\frac{1}{2}$ l.; lat., $\frac{4}{5}$ l.

This minute *Lamellicorn* is evidently allied to *C. discedens* but may be at once separated from it and from all the other described *Caulobii* by its clypeus evidently more elongate and very much less strongly reflexed at the apex. Although I have not broken off an antenna for examination under a microscope (the only way to be absolutely certain of the number of minute joints in the funiculus) I have, I think, seen quite plainly through a Coddington lens that there are four joints in the funicle,—so that the antennæ are nine-jointed.

W. Australia ; taken by Mr. E. Meyrick.

MÆCHIDIUS.

This genus presents the difficulty usual in Australian entomology of containing a certain number of species so vaguely described that it is impossible to identify them without examining the types. The number of names that have been given to species of *Mæchidius* is, I believe, 33 (excluding *Albertisi*, Fairm., *bilobiceps*, Fairm., and *gracilis*, Waterh., which have not the prosternal sutures open to receive the antennæ and have the *Sericid* structure of the mouth ; they are allied to *Diphucephala* and are members of, or very near to, the genus *Epholcis*). Of the 33 names really appertaining to *Mæchidius* four must be dropped as synonyms, viz. *Kirbyanus*, Westw. = *spurius*, Kirby, *excisus*, Waterh. = *rugosicollis*, Macl., *raddonianus*, Westw. = *sordidus*, Boisd., and *sinuaticeps*, Blackb. = *mellyanus*, Westw. Of the remaining 29, two (viz. *obscurus*, Macl., and *parvulus*, Macl.) are so slightly described that it is impossible to form a clear idea of

them and I am obliged to pass them by. Thus I regard the genus as at present consisting of 27 valid species to which I shall presently add eight additional ones. Of the 27, there are six that I have been unable to identify, on which I offer the following notes.

M. spurius, Kirby is from N.S. Wales. It is a large species (long., 5 l.) with simple claws, the clypeus very feebly emarginate, the basal angle of the prothorax obtuse, the elytra with rows of minute tubercles, and the hind tibiae with their external apical process extremely elongate. This latter character enables me to place it confidently in tabulating the genus. I have no doubt the *Mæchidius* from W.A. which Mr. Waterhouse (Tr. E. S. Lond. 1875 p. 193) thinks a possible var. of *spurius* is *mellyanus*, Westw., which at p. 201 of the same paper the author mentions as unknown to him.

M. brevis, Waterh., from North Queensland, is scarcely described, the remarks on it consisting of little more than the mention of certain differences from *M. ater*, Waterh., without any definite statement whether in all respects not specified the description of *M. ater* stands good for *M. brevis*. Thus there is a considerable element of doubt about some of the characters,—e.g., the color (which is unusual and probably constant in *M. ater*). If *M. brevis* is of the same deep black color as *M. ater*, I have not seen it. If it is of a different color the description is valueless.

M. corrosus, Waterh., is a large species (long., $5\frac{1}{2}$ l.) from Tasmania with appendages to the claws, and the hind angles of the prothorax "not at all acute." I have seen nothing like it.

M. sexdentatus, Waterh., is a rather small species (long. $3\frac{3}{4}$ l.) from Adelaide with the head "tridentate on either side." Among the numerous South Australian examples of *Mæchidius* that I have seen there is not one with the head sculptured as that of *sexdentatus* is said to be. The only species I have seen from any locality with sculpture at all approaching it has the sides of the prothorax excised (which they do not appear to be in *sexdentatus*) and is from Sydney and agrees very well with the description of *M. emarginatus*, Waterh.

M. Froggatti, Macl., is a species of moderate size (long., 4 l.) from N.W. Australia. The only very notable character in the description is a costa running hindward from the humeral angle (?the humeral "callus"). I do not think I have seen the insect. *M. antennalis* (described below) has such a costa, but is quite different in other respects from the description.

M. bidentulus, Fairm., is a small species (long., 3 l.) from Queensland. It has simple claws and is said to be notable by the presence of two blunt teeth on the head. I am satisfied that I have not seen it.

It should be added that the identification of *M. sordidus*, Boisd., seems rather doubtful. Boisduval's description would apply to almost any *Mæchidius*, but Mr. Waterhouse (loc. cit.) gives some information regarding it which he says is founded on "authentic specimens," but without stating the grounds on which he considers them "authentic." Moreover there is a considerable difficulty in understanding his remarks. Under the heading of *M. sordidus* he says that that species is one of the commonest *Mæchidii* in S. Australia, and describes its prothorax as "very slightly narrowed posteriorly, the posterior angles slightly less than right angles." I can at once identify the insect (which is the only common one in S. Australia, and also occurs in Victoria and N.S. Wales) on which that description is founded, but under the description of the next species (*M. emarginatus*) Mr. Waterhouse speaks of the "posterior emargination" of the prothorax in "the preceding (species)" and says that *emarginatus* is closely allied to it. These statements appear quite impossible to reconcile with each other. I, however, suppose that by some means the place of *emarginatus* in the memoir was changed after the description was written and that *sordidus* was not intended by "the preceding," but some other species (perhaps *excisus*, Waterh.). Therefore I take *sordidus*, Waterh., to be the insect on which the remarks under the name "*sordidus*" were founded, —not that referred to (under the heading "*emarginatus*") as "the preceding."

Mæchidius is a genus in which the species are for the most part easily distinguishable *inter se* by well marked characters, and are readily tabulated. There is however one character that it is impracticable to disregard in a tabulation, but which nevertheless cannot conveniently be used without a few preliminary remarks, and that is the form of the hinder part of the prothorax, which is alike in scarcely any two species of the genus. But the gradations of difference from one species to another are not marked enough to make easy the division of the species into groups founded on this character. In a few species the base of the prothorax is straight or evenly curved, with the sides also evenly curved; then we find species in which the base is more or less sinuate and the sides evenly curved; then species in which the sinuation of the base becomes so strong that it should be called rather an "excision" (in some the excision being so angled at both ends that there is an opening for question which is the true basal angle); and then species in which the excision takes in more or less of the side of the prothorax so distinctly that there can be no hesitation in calling the hinder extremity of the excision the "hind angle of the prothorax." I have tried several methods of forming groups on this

character and find the most workable to be founded on the difference between a "sinuation" and an "excision" without regard to the question whether the inequality is in the side or the base. Even taking this as the crucial point, there is nevertheless a possibility of doubt in respect of a few species which group the insect should be referred to, and therefore it seems desirable to specify *M. clypealis*, *acutangulus*, and *imitator* as species in respect of which there is room for doubt whether the emargination of the hind part of the prothorax should be regarded as a strong sinuation or a moderate excision. With this qualification I believe that it will be easy to distinguish the described species by means of the following tabulation.

- A. Claws without basal appendage.
- B. Upper surface not clothed with long erect hairs.
- C. Hind tibiæ normal (not as CC).
- D. Prothorax not excised in its hinder part.
 - E. Hind tarsi not particularly slender,—their basal joint notably shorter than the next two together.
 - F. External apical process of hind tibiæ very long,—about same length as longer spur on inner side.
 - G. Hind angles of prothorax acute *mellyanus*, Westw.
 - GG. Hind angles of prothorax obtuse *spurius*, Kirby.
 - FF. External apical process of hind tibiæ notably shorter.
 - G. Hind angles of prothorax very acute and strongly prominent hindward.
 - H. Elytra with well defined costæ *latus*, Waterh.
 - HH. Elytra not costate ... *ater*, Waterh.
 - GG. Hind angles of prothorax right or moderately acute, not (or scarcely) prominent hindward
 - H. Clypeus very strongly triangularly excised in front.
 - I. Prothorax of normal convexity *major*, Blackb.
 - II. Prothorax strongly convex longitudinally ... *gibbicollis*, Blackb.
 - HH. Clypeus widely and feebly emarginate in front.
 - I. Basal joint of hind tarsi about same length as apical joint.
 - J. Base of prothorax feebly sinuate ... *crenaticollis*, Blackb.
 - *JJ. Base of prothorax profoundly sinuate on either side *clypealis*, Blackb.
 - II. Basal joint of hind tarsi notably shorter than the apical joint *ordensis*, Blackb.
 - GGG. Hind angles of prothorax obtuse (though not at all rounded off)
 - EE. Hind tarsi slender,—their basal joint about as long as the next two together.

- F. Hind angles of prothorax acute ... *longitarsis*, Waterh.
- FF. Hind angles of prothorax obtuse
(much rounded off) ... *rufus*, Hope.
- DD. Prothorax in hinder part distinctly excised,—the basal edging not continuous round the excision.
- E. A distinct angle immediately in front of the excision.
- F. The prothorax considerably narrowed in front.
- G. Basal joint of hind tarsi very short, not longer than apical spur of tibiae
- *H. The angle at front of prothoracic excision strongly dentiform ... *acutangulus*, Waterh.
- *HH. The angle at front of excision not dentiform ... *imitator*, Blackb.
- GG. Basal joint of hind tibiæ considerably longer than apical spur of tibiae ... *rugosicollis*, Macl.
- FF. The prothorax as wide in front as at base ... *modicus*, Blackb.
- EE. No angle at front of prothoracic excision ... *hopeanus*, Westw.
- CC. Hind tibiæ angularly dilated externally at about the middle of their length.
- D. Prothorax very sparsely punctulate ... *tibialis*, Blackb.
- DD. Prothorax closely punctulate ... *rugosipes*, Blackb.
- BB. Upper surface clothed with long erect hairs.
- C. The uppermost external tooth of front tibiæ placed at about the middle of their length ... *pilosus*, Blackb.
- CC. The uppermost external tooth of front tibiæ placed much below the middle of their length ... *variolosus*, Macl.
- AA. A quill-like appendage at the base of each claw.
- B. Prothorax not excised in front of the hind angles.
- C. Joints of the antennal club shorter than the rest of the antennal joints together.
- D. Uppermost tooth of the front tibiæ placed at about the middle of the length of the tibiæ.
- E. Base of prothorax strongly sinuate on either side, so that the angles are acute.
- F. Puncturation of prothorax not particularly coarse.
- G. Interstices of the elytral striae wide (each with two rows of punctures) ... *sordidus*, Boisd.
- GG. Interstices of elytral striae much narrower,—the striae being much more numerous ... *multistriatus*, Blackb.

* These species may be considered intermediate between the group in which the prothorax is excised and that in which it is merely sinuate in its hinder part.

FF. Punctuation of prothorax extremely coarse	<i>macleayanus</i> , Westw.
EE. Base of prothorax not sinuate,—the angles not acute	<i>caviceps</i> , Blackb.
DD. Uppermost tooth of front tibiae placed considerably below middle of length of tibia	<i>atratus</i> , Burm.
CC. Joints of antennal club as long as the rest of the antennal joints together ...	<i>fissiceps</i> , Macl.
BB. Prothorax excised in front of the hind angles.	
C. Club of antennæ three-jointed.	
D. Side of prothorax with a strong angle in front of the excision	<i>emarginatus</i> , Waterh.
DD. Side of prothorax rounded at front of excision	<i>excisicollis</i> , Blackb.
CC. Club of antennæ five-jointed	<i>antennalis</i> , Blackb.

M. gibbicollis, sp. nov. Late subovatus minus depresso; minus nitidus; piceus, antennis testaceis; setulis brevibus subtilibus minus crebre vestitus; capite antice triangulariter fortiter exciso, lateribus sat fortiter bisinuatis; prothorace gibbo fortiter transverso, antice sat angustato, confertim rugulose punctulato, lateribus sat fortiter crenulatis modice arcuatis, angulis anticis subacutis sat productis posticis rectis (vix acute), basi utrinque sat fortiter sinuata; elytris crebre punctulato-substriatis, interstitiis nonnullis leviter convexis quam ceteri paullo latioribus; tibiis anticis extus fortiter 3-dentatis (dentibus intervallis sat æqualibus inter se divisis); tarsorum posticorum articulo basali quam 2^{us} parum longiori; unguiculis simplicibus. Long., 4½ l.; lat., 2½ l.

This species bears a strong resemblance to *M. fissiceps*, Macl., but belongs to a different section of the genus owing to its having no quill-like appendages at the base of its claws. Its clypeus scarcely differs from that of *M. fissiceps*, but *inter alia* the general form of the insect is considerably wider and shorter, the prothorax is less narrowed anteriorly and the teeth of its front tibiae are much larger more acute and more evenly spaced *inter se*. It must also be near *M. bidentulus*, Fairm. (which has similar claws), but that insect is described as a *small* species (long. 6 mm.) of oblong form with the sides of the elypterus not sinuate, while the present insect is much larger, is of exceptionally short wide form, and has the sides of the clypeus strongly sinuate. The strong longitudinal convexity of the prothorax (best observed by looking at that segment from the side) is a little more marked than in *M. fissiceps* and distinguishes it from most of its congeners.

W. Australia; Roebuck Bay. Given to me, I believe, by Mr. J. J. Walker.

M. ordensis, sp. nov. Minus brevis, sat parallelus; minus nitidus; nigro-piceus, antennis dilutioribus; setulis minutis sparsim vestitus; capite antice leviter late nec triangulariter emarginato, lateribus vix sinuatis; prothorace sat fortiter transverso, antice parum angustato, confertim aspere nec grosse punctulato, lateribus subtilissime crenulatis leviter arcuatis, angulis anticis subacutis modice productis posticis obtusis retrorsum sub prominulis, basi utrinque sat fortiter sinuata; elytris crebre striatis, striis sat latis, interstitiis latis convexis biseriatim punctulatis et transversim rugatis (sculptura latera versus confusa); tibiis anticis extus (exemplorum visorum) obsolete obtuse 3-dentatis; tarsorum posticorum articulo basali crasso quam 2^{us} paullo longiori; unguiculis simplicibus. Long., 3 $\frac{2}{5}$ l.; lat., 1 $\frac{3}{5}$ l.

A rather narrow parallel little species, with a general resemblance to *M. modicus*, but differing by its clypeus only feebly and roundly emarginate in front with front angles quite rounded off, its prothorax not emarginate before the hind angles which are obtuse, and the much shorter and thicker basal joint of its hind-tarsi. In the two examples before me the front tibiae are externally feebly trisinuate rather than toothed, but it is possible this is due to the apex of the teeth having been worn off.

W. Australia; sent by Mr. Lea from Ord River, Kimberly district.

M. collaris, sp. nov. Sat brevis, latus; minus nitidus; piceus, antennis dilutioribus; setulis brevibus gracilibus testaceis suberectis vestitus; capite antice late minus profunde triangulariter emarginato, lateribus sat fortiter sinuatis; prothorace fortiter transverso, antice sat angustato, sat fortiter minus crebre punctulato, lateribus sat arcuatis, angulis anticis sat acutis modice prominulis posticis obtusis, basi recta; elytris substriatis, interstitiis planis vix in aequalibus puncturis sat magnis papillatis biseriatim impressis; tibiis anticis extus obtuse 3-dentatis (dentibus inferioribus 2 approximatis a 3° sat remotis); tarsorum posticorum articulo basali quam 2^{us} sat longiori; unguiculis simplicibus. Long., 4 l.; lat., 2 $\frac{1}{5}$ l.

This species is very notable in the genus through the base of its prothorax being quite straight,—not at all sinuate.

S. Australia; I have no record of the exact locality of capture.

M. imitator, sp. nov. Modice elongatus; subnitidus; piceus subrufescens, antennis dilutioribus; setulis brevissimis adpressis sat sparsim vestitus; capite antice sat fortiter triangulariter emarginato, lateribus latis leviter sinuatis, angulo ante oculum acute recto; prothorace fortiter trans-

verso, antice fortiter angustato, crebre fortiter rugulose punctulato, lateribus fortiter rotundatis perspicue crenulatis, angulis anticis minus prominulis minus acutis posticis oblique semicirculariter emarginatis (angulo ante emarginationem obtuso bene definito); elytris punctulato-substriatis, interstitiis inaequalibus (nonnullis quam cetera latioribus) irregulariter granulis rugisque nitidis ornatis; tibiis anticis extus obtuse tridentatis (dentibus inferioribus 2 subapproximatis, a 3° modice remotis; tarsorum posticorum articulo basali brevi quam 2^{us} vix longiori; unguiculis simplicibus. Long., 4 l.- lat., 1 $\frac{4}{5}$ l.

Allied to *M. rugosicollis*, Macl., easily distinguishable by the characters indicated above in the tabulation.

Australia; I am not certain of the exact locality, but believe it to be in Victoria.

M. modicus, sp. nov. Minus elongatus; minus nitidus; piceus plus minusve rufescens; setulis minimis gracilibus minus crebre vestitus; capite antice triangulariter sat fortiter exciso, lateribus sat fortiter sinuatis antice subacutis; prothorace fortiter transverso, antice parum angustato, conferunt rugulose nec grosse punctulato, lateribus subtiliter crenulatis leviter arcuatis, angulis anticis obtusis minus productis posticis oblique semicirculariter (fere ut *M. excisi*, Waterh.) emarginatis, angulo ante emarginationem fere recto; elytris crebre striatis, interstitiis leviter convexis inaequaliter rugulosis vel granulosis (nonnullis quam cetera paullo latioribus); tibiis anticis extus 3-dentatis (dentibus inferioribus 2 approximatis a 3° sat remotis); tarsorum posticorum articulo basali quam 2^{us} fere duplo longiori; unguiculis simplicibus. Long., 3 $\frac{1}{2}$ l.; lat., 1 $\frac{4}{5}$ l.

A very distinct species but bearing a general resemblance to *M. excisus*, Waterh., from which, however, it is readily distinguished *inter alia* by the much deeper excision of the clypeus, the much slighter narrowing of its prothorax in front, and the much greater length of the basal joint of its hind tarsi.

Coolgardie, W. Australia; sent by Mr. Lea.

M. multistriatus, sp. nov. Modice elongatus; subnitidus; piceus, antennis testaceis; setulis brevibus gracilibus suberectis minus crebre vestitus; capite antice sat fortiter triangulariter emarginato, lateribus latis sat fortiter sinuatis; prothorace fortiter transverso, antice modice angustato, crebre rugulose nullo modo grosse punctulato, lateribus sat fortiter arcuatis, angulis anticis obtusis sat prominulis posticis subacutis retrorsum directis, basi utrinque fortiter sinuata; elytris crebre striatis, interstitiis transversim aspere rugatis

(certo adspectu nonnullis quam cetera paullo latioribus); tibiis anticis extus 3-dentatis (dentibus inferioribus 2 approximatis a 3° sat remotis); tarsorum posticorum articulo basali quam 2^{as} sat longiori, apicali elongato; unguiculis singulis ad basin appendiculis singulis gracilibus armatis. Long., 4 $\frac{1}{3}$ —5 l.; lat. 2—2 $\frac{2}{5}$ l.

It is difficult to believe that this common species is undescribed and yet there seems to be no doubt that such is the case. It is nearest, I think, to *macleayanus*, Westw., to which it bears considerable resemblance; but it differs from that species *inter alia* in the wider form and less coarse puncturation of its prothorax and in the sculpture of its elytra; these in *macleayanus* present alternately more and less convex lines, the former more nitid and rugulose than the latter; in the present species the lines of sculpture are equally *inter se* convex nitid and rugulose and are narrower and separated from each other by more defined and numerous striae. The tarsi of *macleayanus*, moreover are shorter and more robust.

N.S.W. (Sydney, Forest Reefs, &c.)

M. excisicollis, sp. nov. Minus elongatus; sat opacus; piceus, antennis dilutioribus; setulis brevibus gracilibus suberectis minus crebre vestitus; capite antice sat fortiter triangulariter emarginato, lateribus latis fortiter sinuatis; prothorace fortiter transverso, antice angustato, crebre granuloso-punctulato, lateribus fortiter rotundatis obsolete crenulatis, angulis anticis sat prominulis vix acutis posticis oblique semicirculariter emarginatis (angulo ante emarginationem nullo); elytris seriatim punctulatis (puncturis singulis basi tuberculis nitidis instructis); tibiis anticis extus 3-dentatis (dentibus inferioribus 2 approximatis, a 3° sat remotis); tarsorum posticorum articulo basali quam 2^{as} paullo longiori; unguiculis singulis ad basin appendiculis singulis gracilibus armatis. Long., 5 l.; lat., 2 $\frac{1}{2}$ l. (vix).

A very distinct species with the prothorax very like that of *hopeanus*, Westw., but more narrowed in front, and having the basal angles dentiform; and differing from *hopeanus* *inter alia* by the presence of quill-like appendages at the base of the claws; also like *emarginatus*, Waterh., but differing from it *inter alia* by there being no angle before the posterior emargination of the sides of the prothorax.

Victoria; in the S. Australian Museum.

M. antennalis, sp. nov. Minus elongatus; sat opacus; castaneopiceus, antennis testaceis elava elongata 5-articulata; setulis sat gracilibus sat elongatis adpressis minus crebre vestitus; clypeo antice late subtruncato ad latera recto, angulis anticis

acute [rectis; prothorace fortiter transverso, antice haud angustato, leviter minus crebre punctulato, in disco bifoveolato, lateribus leviter sinuato-arcuatis subtilissime crenulatis, angulis anticis obtusis minus prominulis posticis subquadratim emarginatis, angulo ante emarginationem fere recto; elytris sat crebre punctulato-substriatis, interstitiis angustis inter se æqualibus (sed costa sat fortis postice longe abbreviata a callo humerali, et altera sublateralis antice breviter abbreviata a callo subapicali, procedunt); tibiis anticis extus 3-dentatis (dentibus inferioribus 2 approximatis a 3° sat remotis); tarsorum posticorum articulo basali quam sequentes 2 conjuncti haud breviori; unguiculis singulis ad basin appendiculis singulis gracilibus armatis. Long., 4 l.; lat., 2 l.

The extraordinary antennæ of this species with a club consisting of five very elongate joints (longer than all the preceding joints together) of which that nearest the base is a little shorter than the rest distinguish it from all its described congeners known to me. I do not think the character to be sexual inasmuch as of *fissiceps* (which has almost as elongate an antennal club though only three-jointed) I have seen enough specimens to render the presence of both sexes probable and I do not find any difference in the antennæ of different examples.

N. S. Wales; a single specimen taken near Sydney.

MELOLONTHIDES (true).

RHOPÆA.

R. hirtuosa, sp. nov. Sat elongata (præsertim mas); subtiliter pubescens et pilis erectis sat numerosis (præsertim in prothorace) vestita; testacea vel fusco-testacea; capite prothoraceque confertim aspera (clypeo grosse minus crebre nec fortiter) quam *R. heterodactylæ*, Germ. multo minus subtiliter, elytris dupliciter (ut *heterodactylæ*), pygidio ut prothorax, punctulatis; prothorace quam longiori fere duplo latiori, antice fortiter angustato, lateribus crenulatis modice arcuatis, angulis posticis obtusis; elytris ut *heterodactylæ* subcostatis.

Maris antennarum flabello elongato 7-articulato, articulo 3° (antennarum) intus producto.

Feminæ antennarum flabello brevi 5-articulato, articulis 4° 5° que (antennarum) intus productis. Long., 10 l. (mas.) 9 l. (fem.); lat., 4½—5 l.

This species is allied to *heterodactyla*, Germ. and *soror*, Blackb. (from the other described species its closely punctured prothorax in combination with a 7-jointed male antennal flabellum at once distinguish it) from both of which it differs by the presence of

numerous long erect hairs on the upper surface (they are almost wanting in *heterodactyla* and *soror*) and by the markedly stronger and more asperate puncturation of its prothorax, and from *soror* also by the much less strongly rounded sides of that segment. The antennæ of the male are very similar to those of the two species just named but the female has the club of its antennæ only 5-jointed (in *soror* it is 6-jointed,—I do not know the female of *heterodactyla*, but Germar implies that its antennal club is 7-jointed).

N.S. Wales.

R. morbillosa, sp. nov. *R. Mussoni* affinis. Minus elongata; supra breviter sparsim pubescens; testacea vel fusco-testacea; capite rugulose inaequaliter, prothorace fortiter vix crebre (quam *heterodactylæ* multo minus crebre), elytris rugulose sat grosse, pygidio confertim aspere, punctulatis; prothoracis conformatione fere ut *R. hirtuosæ* sed angulis posticis rectis bene determinatis; elytris subcostatis (fere ut *R. heterodactylæ*).

Maris antennarum flabello elongato 5-articulato, flabelli articulis 1° 2° que quam ceteri multo brevioribus (hoc quam ille longiori ad apicem profunde emarginato).

Fem. latet.

The club of the antennæ in the male having only three long joints at once separates this species from all its described congeners. In other respects it is very much like *R. Mussoni*, Blackb., but differs *inter alia* in its prothorax considerably more closely, and its elytra evidently more coarsely, punctured.

N.S. Wales; taken by Mr. Lea near Forest Reefs.

ON TWO DEEP-LEVEL DEPOSITS OF NEWER
PLEISTOCENE IN SOUTH AUSTRALIA.

By PROFESSOR RALPH TATE.

[Read June 7, 1898.]

The majority, if not all, of the low-level tracts fringing our coastline is generally known to be occupied by recent marine accumulations, indicating an elevation of about 12 to 14 ft. around St. Vincent's Gulf, and thence westward to Fowler's Bay (see Trans. R. Soc., S. Aust., II, 1879, pp. lxvii-lxix and 114; IV, 1881, p. 45; and XIII, 1890, pp. 172 and 181). In the South-East, stretching from Lake Alexandrina to the plateau of the Mount Gambier limestone, similar deposits of recent marine shells underlay this extensive paludinal area (see Woods, "Geol. Obs.," pp. 183 *et seq.*).

With the exception of the Port Creek shell-limestone (see Trans. Roy. Soc., S. Aust., X, 1888, p. 31), which extends from 18 to 26 ft. below high tidemark, no tangible evidences of deep-seated deposits of a like nature have been brought to scientific notice, though a passing reference to such an occurrence in the Tintinara bore was made at my instigation by Mr. E. V. Clark (Trans. Roy. Soc., S. Australia, XX, p. 115). The desirability of publishing particulars of the indications of recent marine deposits at considerable depths in the Port Pirie bore has influenced me in furnishing the data which fix a like age for the chief fossiliferous beds passed through in the Tintinara bore, though more than a decade has passed since the completion of that work, more especially so as my analyses extend the depth of the newer deposits for a further depth of 90 ft. than that stated by Mr. Clark.

TINTINARA BORE.

This bore was executed by our Department of Water Supply. Samples of the beds passed through and explanatory manuscript formed part of an exhibit staged by the Hydraulic Department in the Jubilee Exhibition held at Adelaide in 1887. This exhibit is now in the museum of our School of Mines, and the samples from Tintinara have been critically examined by me.

The Tintinara bore is located in the Ninety-mile Desert in near proximity to a station of that name on the railway line connecting Adelaide and Melbourne. Its site is sixty-two feet above sea level, and the main fossiliferous deposits extend in depth from 60 to 100 feet, though marine shells appear at 26 feet and at 154 to 244 ft. The deposits to 154 ft. in depth consist essentially of loose shell debris, with varying admixture of sand ; viewed as a whole, the shell debris is, by its nature and the species of molluscs represented, analogous to shell banks which occur between tide-marks on sheltered beaches of to-day, such for example as Hardwicke Bay.

The majority of the species, though not living between tide-marks, are those either frequent or not uncommon among the accumulation of shells on many of our beaches. The accompanying list of species is based on the examination of about two pints of material, belonging to the School of Mines, in three equal parts from 60 to 70, 70 to 80, and 90 to 100 ft. in depth ; and about half-a-pint in the aggregate from depths ranging from 154 to 244 ft. received from the Conservator of Water. All the commoner species occur at all the depths to 100 ft., so that a record of the position of the rarer forms was not considered necessary, but I have added the occurrences below that depth in support of my contention that the containing beds are Newer Pleistocene and not Eocene.

Some of the identifications in the subjoined list, either from the fragmentary, juvenile, or rolled condition of the specimens on which they have been based, are not certain though approximately correct ; these are indicated in the list by a sign of doubt after the author's name.

All the determined species, as a result of comparison with authenticated specimens, are with three exceptions living in our seas. The exceptions are :—*Strigilla* sp., this is represented by very little more than the hinge-line of a medium-sized left valve and by a right valve, 6 by 5 mm.; there can be no doubt as to the generic location, but the incomplete outline of the fragment and the very juvenile size of the perfect valve do not permit with safety an identity with the only Australian species of the genus, *S. Senegalensis*, occurring in North Queensland (Port Douglas, ex Brisbane Museum). The very much finer and closer sculpture does not agree with that on an equal area of the umbonal region of the Queensland shell. A minute Erycinid, genus and species yet to be determined, and *Syrnola Jonesiana* are the other exceptions, both occur in abundance. These I cannot associate with any Australian species known to me either by actual specimens or figures.

SUMMARY OF STRATA

Passed through in the Tintinara Bore. (Surface 62 ft. above sea-level).

RECENT (Terrestrial).

			Depth in Feet.
Travertine, compact and rubbly	...	...	0 — 24

NEWER PLEISTOCENE (Marine).

Sand (a few marine shells) ...	...	...	24 — 26
Yellow and grey sands (shells very abundant)		26	— 154
White friable calcareous silt (apparently comminuted polyzoal debris, shells rare)		154	— 160
Black clay (with scattered shells)	160	— 244

EOCENE (Marine).

Blackish-brown sand (with numerous fossils)	244	—	253
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Total thickness of the Newer Pleistocene beds is 220 ft., extending in depth from 38 ft. above sea level to 182 ft. below it.

The calcareous silt (154-160 ft.) was regarded by Mr. Clark as the equivalent of the polyzoal limestone of our Eocene, but, as may be gathered from my List, the under-laying black clay (160-244 ft.) contains the same species of mollusca as occur in the beds over-laying it.

To account for a few Eocene fossils in the washings from the material labelled 220-244 ft., there has been some reconstruction of the Eocene-surface or the basal portions of the black clay and the upper-most portion of the Eocene sand-bed have been accidentally mixed in the process of boring. But recognition of their respective sources is easy by the fact that the Pleistocene-shells show lustre in contrast with the dark-brown colour and opacity of the tests of the Eocene-species. The Bankiviae from 220-244 ft. still retain their colour-markings, and the Erycinid bivalve is quite pellucid.

LIST OF SPECIES.*

[The prefixed asterisk denotes abundance.]

Purpura textiliosa, Lamarck.

**Nassa monile*, Kiener. Also 145-154 ft.

Marginella muscaria, Lamarck.

Marginella muscaria, var. minor. At 220-244 ft.

**Marginella turbinata*, Lamarck. Also 220-244 ft.

Columbella semiconvexa, Lamarck.

**Neverita conica*, Lamarck.

Neverita sagittata, Menke?

Bittium estuarinum, Tate.

**Syrnola Jonesiana*, Tate.

*Examples are included in the Palaeontological Collection at the Museum of the School of Mines.

- Rissoia (Sabanæa) Tasmanica, *Ten.-Woods.*
 Calliostoma Allporti, *Ten.-Woods.*
Trochocochlea constricta, Lamarck.
 **Bankivia fasciata, Menke.* Also to 244 ft.
Adelactæon casta, A. Adams.
Volvulella rostrata, A. Adams.
Corbula tunicata, Hinds.
Corbula scaphoides, Hinds. At 180-200 ft.
 **Mactra rufescens, Lamarck.*
Mesodesma elongata, Deshayes.
Mesodesma erycinæa, Lamarck.
Strigilla sp., . Also 145-154 ft.
Rupellaria mitis, Deshayes? Also 145-154 ft.
Chione undulosa, Lamarck?
 **Gen. et sp. Erycinidæ (not determined).* Also 220-244 ft.
Carditella infans, E. A. Smith?
 **Nuculana crassa, Hinds.* Also to 244 ft.
Limopsis Forskali, A. Adams.
Magasella Cumingi, Davidson. At 154-160 ft.

POR T PIRIE BORE.

Operations at this bore were suspended at the date of preparation of this communication, after having passed through to a depth of 574 ft. of incoherent deposits, and a further depth of 61 ft. in siliceous clay-shales and limestones of Cambrian age. At the date of the reading of this paper the boring had been resumed, but with what object one is at a loss to understand, as previously a finality had been secured both from geological and economical standpoints. Samples of the beds passed through and a statement of their respective thicknesses have been obligingly placed in my hands by the Conservator of Water. From these data the following descriptive tabular schedule of the boring has been drawn up:—

Surface-level 14 ft. above low water-mark.

NEWER PLEISTOCENE.

		Depth in feet.
Light blue clay	... ... ... ...	— — 30
Mottled clayey gritty sand.	Marine shells	30 — 90
Reddish sub-angular gritty sandy clay.		
Marine shells	... ... ... ...	90 — 110
Light grey calcareous silt, slightly argillaceous, with <i>Plecotrema ciliatum</i>...	...	110 — 136
Brown clay with included subangular siliceous and calcareous grit.	Marine shells	136 — 150
Mottled (red and gray) gritty clay.	Salt water	150 — 178
Red-yellow sand or sandrock, consisting of coarse moderately abraded grains	...	178 — 180
Light red and cream colored mottled clay		180 — 276

Yellowish grey sandy clay.	A little salt water	...	...	276	—	290
Very fine grained, yellow, sand-rock.						
Brackish water	...	...	...	290	—	360

INFRA EOCENE ?

Fine grained, white, sand-rock, colored black by carbonaceous matter	...	...	360	—	455
Fine grained, white, sand-rock, colored black by carbonaceous matter. With iron pyrites	...	...	455	—	485
Brown, slightly argillaceous, sand-rock (color discharged on heating)	...	...	485	—	490
Brown and black bituminous clayey sand-rock	...	...	490	—	527
Fine grained clayey sand and sandy clay, with bituminous stains. Stock water			527	—	560
Sand with lignite fragments	...	...	560	—	574

CAMBRIAN.

Siliceous shales and limestones 574 — 641

Washings for macro-organisms have yielded the following results :—

Depth of 50-ft.—*Cerithium tenue*, Sowb. ; and *Clanculus Dunkeri*, Phil.

Depth of 70-ft.—*Cerithium tenue*.

Depth of 130-ft.—*Plecotrema ciliatum*, Tate.

Depth of 150 to 170-ft.—*Cerithium tenue* ; *Diala lauta*, A. Adams ; *Odontostomia Angasi*, Tryon ; *Cyclostrema Tatei*, Angas ; *Pseudoliotia micans*, var. *simplicior*, Tate ; *Clanculus Dunkeri* ; and *Utriculus eumicrus*, Crosse.

[NOTE.—The majority of the foregoing species has been presented to the Museum of the School of Mines.—R.T.]

The species and individuals are few in number ; but, considering the very small bulk of the material under analysis, they are proportionately rich. All, with one exception, are living in South Australian waters, and are commonly cast-up on our shell beaches. The exception is a varietal form of a somewhat common littoral shell—*Cyclostrema micans*.

Passing upwards from the Cambrian bed-rock, there are 314 ft. of unfossiliferous beds, more or less carbonaceous. These indicate a land-accumulation. Whether or not, they are virtually contemporaneous with the overlying marine-beds, or are on the same horizon as similar beds passed through in the Kent Town-bore,*

* Trans. Roy. Soc., S. Aust., V, 1882, p. 43 ; and XIII, 1890, pl. 4.

which underlay Marine Eocene, it is impossible to say. The succeeding 182 ft. of sandy and clayey beds, though unfossiliferous, have so much the character of the overlying strata with marine shells that they may be reasonably regarded as forming part of the same series. The chief fossiliferous beds range between 90 and 150 ft., but in the midst of them, at about 130 ft., is a band of calcareous silt charged with *Plecotrema ciliatum* in an excellent state of preservation. This pulmoniferous mollusc is living at extreme high tide-mark in the marine marshes abutting on the Port Creek, whilst the fine calcareous silt is analogous to the shell-travertine which delimits the margin of an upraised Pleistocene sea-bed, extending from Glenelg via Dry Creek to beyond Virginia. This ancient silt with *Plecotrema* must, therefore, at the period of its accumulation have been at the line of junction of sea and land, and is indicative of an actual depression of 130 ft. below high water-mark. The associated beds, from 30 to 150 ft. in depth, are, from their contained organic remains, shore-line accumulations, and the total amount of depression evidenced thereby is a few feet less than 150 ft. below high water-mark.

DESCRIPTIONS OF NEW SPECIES.

ODONTOSTOMIA JONESIANA, Tate, 1898.

Shell narrowly pyramidal, a little more than three times as long as wide, shining-white and smooth. Spire-whorls eight in a length of six millimetres, of moderately rapid increase, flat, separated by a well-defined linear suture. Last whorl with a regularly convex base; aperture pyriform, with a stout elevated plait at the origin of the columella, inner front angle of aperture slightly effuse and thickened with a slightly reflexed edge. Length, 6·25, vix; breadth, 2·0, vix, mm.

If *Syrnola* is a valid genus, then the present species belongs thereto. Among Australian species known to me by actual specimens it has the following alliances. It is narrower than *S. jucunda* and broader than *S. tincta*, but differs from both in its longer aperture and the far-backward position of the columella-plait; in respect of its apertural characters, it resembles *S. infrasulcata*, mihi, which is, however, a robust shell and has a sculptured body-whorl.

The species-name is in compliment to Mr. J. W. Jones, Conservator of Water, whose continued interest in the promotion of stratigraphical and paleontological investigations is abundantly evinced in the present communication.

PSEUDOLIOTIA MICANS, A. Adams, VAR. SIMPLICIOR, Tate, 1898.

Cyclostrema micans is the type of a new genus, *Pseudoliotia* which I propose to establish. The present variety differs by the acute axial costæ, which do not form nodulations on the spiral carinæ. In consequence, the periphery appears markedly truncate with a deep concave sulcus between the two peripheral keels. Nevertheless, the normal forms show some variation in the density of the nodulation and by decrescence of that character would graduate into the variety here described. Unfortunately only one example (an adult) was found, and that of 2 mm. diameter. This size is much smaller than usual, which ranges up to 4 mm., yet it is not smaller than a micromorph, which occurs abundantly at Port Western, Victoria, or than *Liotia speciosa*, Angas, which is conspecific.

NOTES ON THE GRAPHITIC SLATES AND ASSOCIATED ROCKS IN THE KALGOORLIE DISTRICT.

BY H. B. CORBIN, B.Sc.

(Communicated by Professor Tate.)

[Read June 7, 1898.]

On November 12, 1897, at a meeting of the Boulder Literary and Debating Society, Mr. Bethune read a paper on "Evidences of a Deep Level in the Kalgoorlie District," and therein expressed the opinion that certain graphitic slates in the Boulder North Extended mine at 240 ft. were the result of a filling-in of a cavity by alluvial deposits, and that subsequent lateral pressure had given the alluvial detritus a laminated structure.

I could not agree with him on the evidence adduced, and as a result of my criticism elicited that he had discovered certain fossils in these beds, which he regarded as conclusive evidence in support of his theory.

I subsequently in company with Mr. Bethune visited the mine and saw the only section available, and in this communication I propose to describe the geological features which are visible, and to discuss the nature and origin of the so-called fossils.

The shaft of the Boulder North Extended being close-timbered all the way, and the only open ground available for inspection being in the east and north crosscuts, I have had to rely a good deal on hearsay evidence for certain data.

Virtually, the whole of the way after the surface alluvium (by the miners called "made ground") had been passed through, the shaft was sunk in pink and white clay slates. At about 80 feet water was met with, and at 200 feet crosscuts were opened out N.E. and S.W., that is, at right angles to the general strike of the auriferous lodes in the Kalgoorlie district.

The west crosscut passed through about 12 feet of fairly hard clay-slates, almost vertical but with a slight underlay to the west. Several veins of ferruginous quartz were cut in the clay-slates; then a mass of decomposed rock was entered (which from its general appearance, kaolinitic nature and presence of "soapy heads" I take to be a porphyry) and continued to the head of the cross-cut at 50 feet, being occasionally traversed by vertical clay-slates, though not so defined as near the shaft.

On the east side, the foot wall of the clay-slates is noticed at about four or five feet in from the shaft, giving a total width of

20 ft. to the first series of clay-slates. This foot wall (?) carries a very hard band of ferruginous quartzite, about 10 ft. wide. Immediately beyond this vein an intensely hard diorite was met with. The crosscut was only driven about 15 ft. at the time of my visit, as it was intended to continue the shaft and to crosscut at a deeper level.

The bottom of the shaft was so wet that I could not see any of the features there, but I critically examined the stuff sent up from this position, and secured from it various specimens of the so-called fossils. These occur both in the semidecomposed rock and in a true graphitic slate, so that evidently the clay-slates have changed at some depth below 200 ft. to graphitic slates, and, according to Mr. Bethune, this change took place gradually at a depth of about 200 ft.

The specimens which Mr. Bethune regarded as fossils, I at first thought they were so; that one was the cast of a *Unio*, another of a *Rhynchonella*, and so on. Hence I considered that the diorite on the east side was the result of a flow over horizontal beds, represented now by the vertical clay-slates. But on going below and studying the section I changed my views, especially when I remembered that the graphitic schists at the Queen Margaret mine carried similar pyritous nodules, only they are for the most part spherical. I am now of the opinion that the clay-slates and graphitic slates are examples of contact-metamorphism.

I imagine that the diorite on the east side is an intrusive mass and found a partial vent in a fissure in the porphyry on the west side. The result of the intense pressure would be to cause the slaty structure assumed by the metamorphosed porphyry. The volatile hydrocarbons escaping from below, contemporaneous with diorite-intrusion, could easily supply the necessary carbon to render the slates graphitic. Surface oxidation would remove the graphitic matter above the water-level. The pseudo-fossils would be present before the intrusion of the diorite, and had at that time probably a spherical form. The upward and lateral pressures will account for the more or less elongated and flattened form which they now present.

The origin of the ferruginous quartzite bands I explain as follows:—The diorite and also the contact-metamorphosed rock on cooling would naturally contract and thus would cause fissures more or less irregular, which by deposition of silica and iron-salts from solution in percolating waters would be in course of time completely filled. Could one critically examine the locus of the pseudo-fossils, and should they be found to lie in a vertical plane, then my view would receive considerable support.

DISCUSSION.

Professor TATE was not satisfied as to the evidence of contact-metamorphism submitted by the author, or to that of alluvial deposition contended for by Mr. Bethune. He considered that those phenomena were explainable by the diminishing effects of disintegration in depth upon the same rock. The shapes of the pyritous bodies could not, in his opinion, be referred to bivalved molluscan casts.

Mr. J. G. O. TEPPER, F.L.S., remarking on the acute edges of the supposed fossils, said that the figure could not be due to lateral pressure, otherwise the edges would be perpendicular to the diameter as in ordinary discs, or at least a very blunt rounding off. The objects could not be compressed nodules, in his opinion, and that they were of organic origin was a view receiving some support from the great development of graphite associated with them in the containing rock. Graphite in rock-formations had long been claimed to have been derived from organic matter, since no other satisfactory theory to account for the isolation of the carbon had been advanced.

Mr. W. HOWCHIN, F.G.S., considered that in view of the "augen" structure so often produced in metamorphic rocks, the argument that the flattened shape was not due to pressure could scarcely be applied. A fuller knowledge of the actual local conditions and constitution of the rocks was required to make generalizations safe.

Mr. J. J. EAST, F.G.S., speaking from personal knowledge of the Kalgoorlie field, stated that the occurrences cited were in no way peculiar to the locality dealt with by Mr. Corbin. In the Queen Margaret mine at Bulong the same kind of thing was common. Where the graphite occurred plentifully the miners sought to get beyond it as quickly as possible, for, though seldom unassociated with gold, it rarely formed the matrix of good ore. The rocks of Kalgoorlie form a low range of ferro-magnesian silicates of diabasic character, which were broken up by intrusive dykes of diorite and porphyry. The diorite-dykes seem to be the dominant feature, and extend for miles in thin and thick bosses, alternating along the line of direction in such manner that a plan of them would suggest the figure of a huge cable. Each "link" forms a boss, and along the sides of the "link" the richest gold veins occur in the contact-zone. The graphitic belt is well marked in places, and its connection with the gold-deposit is evident. He regarded the graphite as having been derived from the breaking up of liquid carbonic acid contained in inclosures in the rocks, and by its agency the gold was precipitated from the waters holding it in solution. The nature of these waters we could only guess

at now. They had, however, developed kaolinization of the silicates to an amazing extent, and the iron-constituent had been completely peroxidised to red haematite. The haematite was everywhere finely disseminated throughout the kaolin. In the contact-zones the haematite was hydrated to limonite, and a little free silica in granular form, resembling quartzite, also occurred. In depth pyrites were plentiful, and much of the free gold was replaced by gold combined with tellurium. The porphyry-dyke cited by the author appeared to be genuinely obtrusive, as it cut off all the transverse veins it met. Kaolinization was greatly advanced and had spread to the greenstone rock alongside. It is between the dyke and the greenstone that a schistose structure has been developed by pressure and shearing-strain, but the number of secondary minerals is surprisingly few; colloid silica and limonite, forming the so-called "jasper" reefs, constitute the lode vein-stone proper, but its development is quite local. In fact, the bulk of the paramorphism would seem to have been a rapid passage of the greenstone to the stage of kaolin and chlorite. A swelling of the rock in consequence developed the jointings which now furnish the "soapy heads" of the author. Where such a paucity of secondary minerals has been developed, it is much more likely that they should aggregate into colonies or kernels than that they should occur minutely disseminated. To his mind the *lucus nature* of the writer were but nodules of secondary origin, and principally of the class termed "spear" pyrites, a variety which rapidly decomposes in contact with air or rain-waters. Wad and pyrolusite also plentifully occur along the graphito-pyritic belt. The pyrolusite is usually well crystallised, and is at times associated with very rich ore.

ON A NEW MYOPORUM FROM SOUTH
AUSTRALIA.

By J. H. MAIDEN, Hon. Memb., and E. BETCHE.

[Read July 5, 1898.]

MYOPORUM REFRACTUM, n. sp.

A glabrous shrub somewhat prostrate, attaining a height of 3 feet, but usually only $1\frac{1}{2}$ to 2 feet high as seen, with terete branches amply covered with resinous tubercles. Leaves alternate, crowded, oblong, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, very obtuse, entire or occasionally slightly crenulate, thick or somewhat succulent, sessile and refracted. Flowers usually solitary (sometimes two) in the axils, on slender pedicels shorter than the leaves. Calyx divided to the base, the segments broad and acute, imbricate at the base, about three lines long. Corolla white or often with small purplish dots on the inside of the lobes; glabrous inside, the lobes shorter than the tube. Stamens generally 4 (sometimes 5) exserted but rather shorter than the lobes. Ovarium and fruit 2-celled, not compressed. Fruit small, apparently only slightly succulent, ovoid tapering to the persistent base of the style. Colour of the thin pericarp cream or yellowish. Fifteen miles north of Mount Distance, S.A. (on very salty, mineralised damp soil—a salt-lake, now dry), M. Koch.

The specific name is in allusion to the set of the leaves. This is distinctly an ornamental species, worthy of cultivation.

In affinity it is nearest allied to *M. brevipes*, Benth., also a South Australian desert species, from which it is chiefly distinguished by the refracted leaves, the broad calyx-segments, and the shape of the fruit. The flowers seem to be remarkably variable, not only in the number of stamens, but also in the colour and perhaps in the hairiness of the corolla. All corollas we examined were perfectly glabrous inside, but as Mr. Koch describes the corolla in his notes as "bearded inside" it seems to be probable that both forms exist.



ON TWO NEW CRETACEOUS BIVALVES.

By PROFESSOR RALPH TATE.

[Read August 2, 1898.]

Lucina (?) Bonythoni, sp. nov. (1898).

Shell large, triangularly oval, with depressedly convex (right) valve. Umbo a little in front of the middle, moderately large, incurved in a transverse direction; lunule almost obsolete. Posterior and anterior dorsal slopes making an angle of 110° ; the posterior one straight, the anterior one slightly incurved, and shortly and bluntly extended at its junction with the semi-circular ventral margin, the post-ventral margin rounded.

The ornamentation consists of acutely - rounded radial threads and concentric thread-like lamellæ, forming by their combination a cancellated surface-structure of oblong or nearly square depressions, which extends over the whole surface. The thread-like margins of the concentric lamellæ are feebly vaulted on the radial threads. Towards the ventral margin in the medial

line, there are about eight radial threads, and about nine concentric threadlets in a square of 5 millimetres.

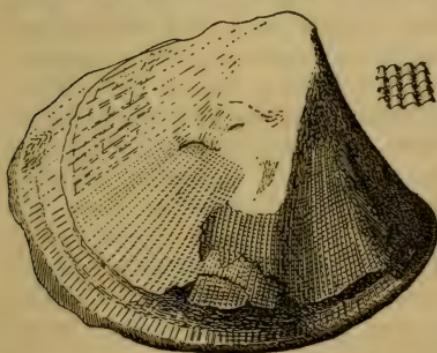
Dimensions.—Antero-posterior diameter 4·5; ventro-umbonal diameter 4·0; post-dorsal and antero-dorsal slopes about 2·5 mm.

Habitat.—One right valve, the test of which is replaced by Precious Opal. *UPPER*

CRETACEOUS at White Cliffs, New South Wales; the unique type in the Museum of the School of Mines at Adelaide.

The species-name is in compliment to Sir J. Langdon Bonython, Chairman of the Council of the School of Mines since 1890.

Remarks.—The only shells figured from Australian Cretaceous rocks at all comparable with the present species, apart from any presumptive generic affinity, are *Lucina anomala* and *L. ? australis*, Moore, in Quart. Journ. Geol. Soc., xxvi, 1870; more so



with the former than the latter. But *L. anomala* is suborbicular in shape, with a nearly straight dorsal line, whilst my species is triangularly oval or somewhat axiniform in marginal outline, and has a strong tessellated ornamentation. The Syrian Cretaceous species, *L. percancellata*, Whitfield, Bull. Mus. Nat. Hist., iii, p. 403, t.b, f.b, 1891, has a somewhat similar cancellate ornament, but that fossil is nearly circular in outline.

Until the interior is known, the generic location of *L. Bonythoni* will remain uncertain, though the shape and ornamentation are not incompatible with a reference to *Lucina*, but, on the other hand, the transverse direction of the umbonal incurvature may imply other affinities, if other than a mere specific characteristic.

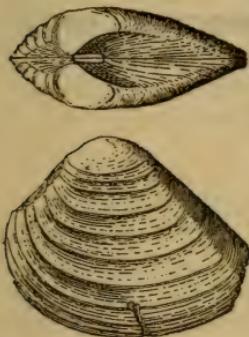
The distinguishing features of *L. Bonythoni* are:—The axial direction of the umbo, the axiniform shape, the cancellate surface-ornamentation (particularly the frilled edge of the concentric growth-lines).

Platopis (?) corrugata, sp. nov. (1898).

The fossil under observation is not like any figured species belonging to the Cretaceous fauna of Australia, though it has some resemblance to certain species of so-called *Cytherea*, but yet is more *Astarte*-like than they are. The interior is unknown, and, therefore, the generic relations are extremely dubious. Nevertheless, one exterior feature will narrow the arena of comparison, that is the possession of an erect exsert ligamental plate to each valve, as in *Psammobia* and other Tellinids, and thus indicates an external ligament. Among the genera presenting this character, *Platopis*, Whitfield, Bull. Mus. Nat. Hist., iii., p. 399, 1891, seems to include the main external features presented by the Australian shell. *Platopis*, which is placed by its describer in Astartidae, contains species which "externally somewhat resemble shells of the genus *Astarte*," the hinge dentition differs from *Opis* and *Opiosma*; they have a "flattened or depressed convex form," and "possess an abruptly flattened, or even depressed slope, which in many is sharply flattened, or even depressed between the umbonal angles, and the very ill-defined, although large-sized, lunule."

Shell transversely triangular, somewhat cuneiform, convexedly depressed. Umbones large, obtuse, antemedian; lunule ill-defined. The dorsal slopes straight, inclined at an angle of 95°, the posterior considerably the longer; post-ventral extremity roundly-pointed (the shell is deficient in this region), the ventral margin nearly straight to beyond the middle line, thence curving rapidly upwards to form the well-rounded anterior extremity. The post-dorsal line is bounded by a narrow declinous lanceolate

area and delimited on its inner aspect by an ill-defined obtuse ridge extending from the umbo to the post-ventral extremity.



The inner margin of the valves is smooth (at any rate visually so) at post-ventral extremity. The ornamentation consists of subacute concentric undulations of variable strength and at variable distances, separated by shallow concave spaces wider than the ridges; coincident with the undulations are widely-separated linear growth-lines; the concentric undulations are continued beyond the post-umbonal ridge as close-set growth-lines.

Dimensions.—Umbonal-ventral diameter, 18; antero-posterior diameter, 22 (by estimate); transverse diameter, greatest at about one-third from the unbo, 9 mm.

Habitat.—One specimen of two valves in apposition, the test replaced by Precious Opal; the interior matrix not opalized. **UPPER CRETACEOUS** at White Cliffs, New South Wales; the unique type in the Museum of the School of Mines, Adelaide.



ON SOME AUSTRALIAN SPECIES OF
EULIMIDÆ AND PYRAMIDELLIDÆ.

By PROFESSOR R. TATE.

[Read August 2, 1898.]

PLATE IV, FIGURES 1-7.

FAMILY EULIMIDÆ.

GENUS EULMA.

(a). *Shell straight.*

1. *E. augur*, *Angas*, Proc. Zool. Soc., 1865, p. 56; *Reeve*, Icon. Conch., t. f., 1866; *Tryon*, Man. Conch., vol. viii., p. 269, t. 68, f. 10, 1886.

Synonym, *E. proxima*, *Sowerby* in *Reeve's Icon. Conch.*, t. 6, f. 48, 1866; *Tryon*, op. cit., t. 68, f. 11.

I have compared the types of *E. augur* and *E. proxima* in the British Museum, and the only differences between them (*E. proxima* is slightly immature) are those of total length, the former having 10 whorls in a length of 12 m.m., and the latter 12 whorls in a length of 15 m.m., and a slight difference in the proportion of the length to the breadth. An examination of many examples of *E. augur* proves that the proportion of length to breadth is not constant, and that micromorphs occur; indeed there is a great tendency among Eulimidae to range from giant to dwarf-sizes; thus two extremes give the following ratio, 100 to 36 and 100 to 28 vix.

Tryon's figure of E. augur grossly misrepresents its shape, some individuals may show a barely perceptible torsion of the spire, but in general, *Angas' diagnosis* "marginibus spiræ rectioribus" is applicable.

Distribution.—For *E. augur*. South Australia (without locality), *Angas*, type specimen; Holdfast, Aldinga, and Fowler's Bays, Waurauftie and Wallaroo, Spencer Gulf, *Tate*; Royston Head (Matthews !)

TASMANIA (coll. Dr. Verco !)

For *E. proxima*. NEW SOUTH WALES, Port Jackson (type). The record for Tasmania of *E. proxima* by Tenison-Woods is based on an erroneous determination, the shell so-named is *Rissoina spirata*.

2. *E. orthopleura*, sp. nov. Pl. iv., fig. 1.

Pyramidal, straight, opaque-white, shining; whorls, nine, flat; last whorl subangular at the periphery, aperture rhomboidal.

Length, 6·25; width, 2·25.

Affinities.—This new species resembles *E. polygyra*, H. Adams (type compared), but it has a blunter apex, and the aperture is of a different shape. The rhomboidal aperture differentiates it from *E. polygyra* and *E. augur*, and in addition is is distinguishable from the latter by a subangular base.

Localities.—SOUTH AUSTRALIA; Holdfast and Aldinga Bays (*R. Tate*, many examples).

(b) *Shell tortuous.*

In the following descriptions I have employed the phrase “torsion in one or two directions,” that is lateral or vertical, or both. Hitherto the torsion has been described as either to the left or right, upwards or backwards; but as these positions are relative to the aperture, it is obvious that if the spire be inclined to the left at a given stage of growth, the addition of a half-turn to the body-whorl will bring the torsion to the right. The same change will happen when the torsion is in a vertical plane: at one stage, if the inclination be forwards, it becomes backwards with the increase of a half-turn.

The application of the terms expressive of the direction of the torsion can only be absolute as to the plane of the twist, that is whether vertical or lateral. It is only possible to extend their application when growth of the shell shall have ceased, or if the shell-growths be periodic and of one or more complete turns. This latter condition is certainly presented by *E. Tenisoni*, as pointed out to me by Dr. Verco, as traces of periodic growths are visible on the spire, and in alignment on the one side. But there are no distinctive features by which to recognise an adult Eulimid.

3. *E. Tenisoni*, Tryon, Man. Conch., vol. VIII., 1886, p. 269, t. 68, f. 16.

E. micans, Tenison-Woods, Proc. Roy. Soc., Tasmania, for 1875, p. 144 (1876), non Carpenter.

The early spire-whorls are very narrow, and impart to the adult shell an almost mucronate termination. The apical whorl is blunt, higher than wide, but it cannot be described as mammilated.

The shell attains to a length of 6 mm., and width of 2·5 mm.; the spire-whorls nine in number; the torsion of the spire is in two directions; aperture roundly oval.

This species makes a near approach to *E. brevis*, Sow. (with the type of which I have made comparison), but the shell is more tortuous, and the body-whorl more depressed.

Distribution.—TASMANIA (*Ten.-Woods*, type); VICTORIA!; SOUTH AUSTRALIA, Holdfast, Aldinga, Streaky, and Fowler Bays, Waurauitie, Spencer Gulf (*R. Tate*, many exs.).

4. *E. commensalis*, sp. nov. Pl. iv., fig. 2.

Shell elongate-pyramidal, strongly curved in two directions, translucent, vitreous, fawn-coloured with contained animal; whorls ten, moderately convex; body-whorl globosely inflated, thence rapidly tapering to the acute apex; aperture semi-circular; outer lip much ecurved medially; the front of the aperture is well-rounded, but the margin is slightly reflected, so that seen from behind there is the semblance of basal constriction. Long., 5; lat., 2 mm.

Habitat and Localities.—Commensal with *Amblypneustes*, spp., Holdfast and Aldinga Bays (*R. Tate*, many exs.); Port Stephens, N.S.W. (Aust. Mus.!).

Affinities.—From figures and description, this species resembles *E. parva*, Sowerby, but seems to differ by its more ventricose body-whorl and semi-circular aperture.

5. *E. indiserata*, sp. nov. Pl. iv., fig. 3.

Shell elongate-pyramidal, slightly curved in two directions, translucent, vitreous, colourless. Whorls eight, nearly flat, of regular increase; apex acute; base convex and attenuate at the front; aperture narrowly oval; outer lip much curved medially.

Long., 4·25; lat., 1·5; long. of aperture, 1·5.

Locality.—Shell-sand, Holdfast Bay (*R. Tate*, one ex.); Frederick Henry Bay, Tasmania (*W. L. May*!); Port Stephens, N.S.W. (Aust. Mus.!).

Not much unlike *E. commensalis*, but the whorls are much flatter and the aperture of a different shape. From figures and description this shell has an analogue in the European *E. incurva*, but the aperture appears to be proportionately less elongate in the Australian shell. *E. Petterdi*, Beddome, must be a near ally; it is diagnosed as follows:—"Shining white, curved; apex rounded; whorls 10; aperture narrowly pyriform; lip scarcely reflected; columella straight. Long., 4; lat., 1; apert., 1 m."

FAMILY PYRAMIDELLIDÆ.

GENUS EULIMELLA.

Of the diagnostically-known Australian species of this genus, five species are recorded from North Australia in the "Challenger Mollusca," and two others from New South Wales—*E. moniliformis*, Hedley, and *E. pulchra*, Brazier. In South Australian waters there occur two species, viz.:

1. *E. moniliformis*, *Hedley*, P.L.S., N.S.W., 1891, p. 247, t. 19, figs. 1-3.
Holdfast Bay, in shell-sand (*R.T.*).

2. *E. tricineta*, sp. nov. : Pl. iv., fig. 4.

Shell small, elongately conical, pellucid-white ; apex heterostrophe. Spire-whorls six, somewhat convex, the anterior whorl margining the suture, sculptured by three engraved spiral lines, one median and one near to each suture. Last whorl regularly convex and moderately attenuated at the base. Aperture pyriform ; outer lip straight and thin ; columella arched, there is no indication of a plait or tooth.

Length, 5·5; breadth, 1·75 mm.

Has somewhat the aspect of *Syrnola jucunda*, but apart from the different generic characters, the shell is narrower and the last whorl proportionately much longer.

Localities.—Streaky and Fowler Bays, in shell-sand (*R.T.*).

GENUS ODONTOSTOMIA.

1. *Odontostomia (Syrnola) infrasuleata*, sp. nov. : Pl. iv., fig. 5.

Shell narrow-lanceolate, about four times as long as wide, shining, white, feebly striated in an axial direction. Apex heterostrophe. Spire-whorls nine, flat, suture linear. Body-whorl imperforate, subangulate at the periphery, below which are about six revolving incised lines, the posterior one a little in front of the posterior angle of the aperture. Aperture narrow-oval ; columella-plait very prominent, in front of which the inner lip is effusively expanded, and its margin reflected ; outer lip not ribbed within.

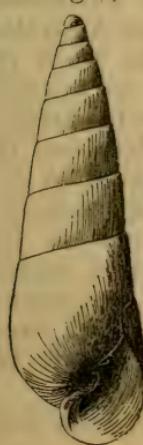
A specimen in Dr. Verco's collection has two sulci on the last whorl above the periphery, one of which is continued submedially on the spire-whorls.

Length, 11; breadth, 3·5 mm.

Localities.—Holdfast Bay, St. Vincent Gulf, and Wauraultie, Spencer Gulf, in shell-sand (*R.T.*). Dredged off Rapid Head in 10 to 12 fathoms by Dr. Verco.

Affinities.—This new species is conspicuous by its elongate-oval aperture, effuse at the front and the sulci on the base of the body-whorl. It seems to have no near ally among figured species, though *S. gracillima* is a micromorph of it as regards shape.

Supplemental Note.—The annexed figure of *O. (Syrnola) Jonesiana*, described in Part I of the present volume, p. 70, is added for comparison with the present species, between which there are great resemblances.



2. Odontostomia (Pyrgulina) Mayii, sp. nov. Pl. iv., fig. 6

Shell conoidally turreted, relatively solid, dull white. Whorls five (excl. the heterostrophe apex), separated by a deeply and broadly channelled suture; ornamented by rounded obliquely axial ribs wider than the interspaces, which are not visibly sculptured. Last whorl with about 20 axial ribs, which terminate at a spiral groove on the periphery; base somewhat flattened and radially ridged, defined by a spiral rib, which margins the peripheral groove. Aperture oval, outer and inner margins joined by a callus, columella-plait stout, almost parietal.

Length, 2·5; breadth, 1·0 mm.

Localities.—D'Entrecastreux Channel, Tasmania, whence type-specimen in my collection received from Mr. W. T. May, after whom the species is named.

Remarks.—There are several European species of this type of ornamentation presented by *O. Mayii*, such as *O. turbonilloides*, and one Australian species, *O. Henni*, Brazier. From the latter this new species differs (judging by description and figure) by its channelled suture, oblique and stout ribs, and ribbed base.

GENUS TURBONILLA.

Turbonilla erubescens, Tate.

1877. *Elusa bifasciata*, Tenison-Woods, Proc. Roy. Soc., Tasm., for 1876, p. 150; non *Turbonilla bifasciata*, A. Adams, 1861.

1877. *Turbonilla festiva*, Angas, Proc. Zool. Soc., p. 35, t. 5, f. 4; non Folin, 1867.

1879. *Turbonilla erubescens*, Tate, Trans. Roy. Soc., S. Aust., ii., p. 138, t. 5, f. 10.

The types which served for the definitions of the forenamed shells are from Tasmania, New South Wales, and West Australia (King George Sound). Mr. May is satisfied, as the result of comparison of authentic specimens, that the first two are one and the same; I have arrived at a like result in respect of the Tasmanian and West Australian shells. At the time of my definition of *T. erubescens*, my knowledge of *T. festiva* was restricted to the published description and figure; but now, with actual specimens before me, I find that the alleged differences prove to be invalid. The question remains as to which of the three names should be employed; as indicated in the above synonymic schedule *bifasciata* and *festiva* have prior use in the genus over their Australian applications, this leaves *erubescens* free to be employed.

The species is also known to me from South Australia and Victoria.

Turbonilla Beddomei, Petterd, sp.

1884. *Chemnitzia Beddomei*, Petterd, Jour. Conch., p. 136.

1892. *Turbonilla crenulifera*, Tate, Trans. Roy. Soc., S. Aust., xv., p 126, t. 1, f. 2.

The specimens, attributed to Petterd's species, given me by Mr. May, leave no doubt of the identity of my shell therewith, though the diagnosis of the Tasmanian shell does not refer to the tendency of decrecence of the costæ on the anterior aspect of the whorls, and to crenulation at the posterior suture.

So far as known to me, the species is restricted to South Australia and Tasmania.

Turbonilla varicifera, Tate, 1898. Pl. iv., fig. 7.

Shell elongate turreted, about four times as long as broad usually of a chestnut-brown colour, with the varices mottled with white, but various shades passing to white occur. Spire-whorls twelve in a length of fifteen millimetres, tipped by a heterostrophe protoconch; flatly convex, but separated by a well-defined suture; ornamented by close-set, slightly oblique, rounded, axial ribs, separated by much narrower interspaces, here and there two or more costæ are confluent to form a broad varix; the whole surface is crossed by incised spiral lines increasing to about fifteen on the penultimate whorl of a large specimen. Last whorl with axial costæ, about twenty, evanescent at the regularly rounded periphery; base spirally linear-sulcate; aperture oblong, columella with an obscure spiral plication.

Long., 15 mm.; lat., 4·00 mm. A micromorph of twelve spire-whorls measures 10 mm. by 2·5 (vix) mm.

This species has been represented in my cabinet for many years by incomplete beach-examples, which indicate a very large shell for the genus and the possession of varices. Its recent discovery in some numbers by Dr. Verco, through dredgings in the deeper parts of St. Vincent and Spencer Gulfs, has, now, made it possible to adequately diagnose the shell.

The feature of the variced spire, though exceptional, is however, presented by the recent species, *T. striatula*, Linne (the type of Montserrato's Section *Pyrgostylus*) and the Miocene species, *T. intermedia*, Grateloup; both of which I have under observation.

The Australian species, making the third enumeration under *Pyrgostylus*, differs from *T. striatula*, chiefly by its straighter costæ and narrower interspaces; and is distinguishable from *T. intermedia* by slenderness, less oblique ribs with narrower interspaces.

ON SOME RECENT AND FOSSIL AUSTRALASIAN
SPECIES OF PHILOBRYÆ.

By PROFESSOR RALPH TATE.

[Read August 2, 1898.]

PLATE IV., FIGURES 8-10.

The bivalved mollusca, which constitute the genus *Philobrya*, are minute shells, which present in their adult state various characters proper to the very young states of *Mytilidæ*, *Aviculidæ*, and *Arcidæ*. They were little known to malacologists till the appearance last year of M. Felix Bernard's "Etudes comparatives sur les genres *Philobrya* et *Hochstetteria*." Bernard has provisionally placed these two genera as a subfamily (*Philobryinæ*) in the family *Aviculidæ*; but the absence of prismatic structure of the test, and the existence of a copious periostracum incline me to the opinion that the systematic position of this subfamily is rather with *Mytilidæ* than with *Aviculidæ*.

Of the eleven species referred by Mr. Bernard to this subfamily, nine occur in the Southern Hemisphere, chiefly in moderately high latitudes. The recognition of the existence of *Philobrya* in Australian waters is, therefore, not unexpected; but greater interest is attached to the fossil record, here announced for the first time, as may be gathered from the following extract from M. Bernard's essay:—"Il est indispensable de rechercher si parmi les formes fossiles il n'en existe aucune qui pourrait soit rentrer dans le genre *Philobrya*, soit s'en rapprocher plus que ne font les Anisomyaires actuels. Je n'ai trouvé aucune indication de cette nature en ce qui concerne les faunes secondaire et tertiaire. La cause en est peut-être dans la petitesse de ces coquilles qui peuvent avoir échappé aux investigations, ou bien avoir été considérées par ceux qui les ont recueillies comme des jeunes ou de petites espèces d'*Aviculidés*, de *Mytilidés* ou même de *Lima*. Les fossiles primaires m'ont fourni quelques indications qui, tout en manquant pour le moment de précision, me paraissent devoir soulever une utile discussion." Journ. de Conch., No. 1, 1897, p. 41.

The additional species—subjects of the following records are:—Two living in Southern Australia and Tasmania, one from the Newer Tertiary of New Zealand, and two from the Older Tertiary of Victoria.

Philobrya crenulatifera, Tate.

Myrina crenatulifera, Tate, Trans. Roy. Soc., S. Australia 1892, p. 131, t.1, figs. 11 and 11a.

This shell has all the interior characters proper to *Philobrya*, but its inflated umbo is crowned by a subcircular (not calyculate) prodissococonch which does not interrupt the convexity of the umbo. The absence of costæ further suggests a reference to *Hochstetteria*, but the elongate ligamental pit and almost terminal umbo are, however, not in agreement thereto.

In addition to the South Australia locality of the type, specimens from two Victorian localities have been submitted to me. Barwon Heads, Mr. T. S. Hall; Flinders Island, Mr. G. B. Pritchard.

Philobrya fimbriata, sp. nov. Pl. iv., fig. 8.

Shell thick, ventricose, contour obliquely subquadrangular, umbosternal. Prodissococonch relatively small, though prominent, semicircular, its outer margin defined by an elevated rim. Anterior margin of valve inclined at an angle of from 60° to 70° to the dorsal margin; surface ornamented with about fourteen feeble angular radial ribs, crossed by regularly disposed concentric threads (not so strong as the radial ones), which form imbricating serratures at the intercrossing. Test covered with a tawny subpellucid epidermis, which is raised into setæ on the radial costæ (corresponding with the serratures thereon), and extends as a fringe around the ventral margin of the shell.

Ligamental pit lanceolate, directed obliquely backwards for one-third or one-half-length of the posterior hinge-line. The transverse crenulations on the posterior of the hinge-line are reduced to short crowded striae.

Dimensions of a large example.—Ant. post. diameter, 3·75; dorso-ventral diameter, 4·5; thickness, 3 mm.; but the average size is about three by four.

Habitats.—TASMANIA, Derwent and Frederick Henry Bay, coll. Mr. May; SOUTH AUSTRALIA in dredge-siftings from St. Vincent and Spencer Gulfs—dead shells numerous, living examples few, coll. Dr. Joseph Verco.

VICTORIA, among *Kellia rostulata*, Tate, dredged in life, seven to nine fathoms at Port Phillip Heads by the late Mr. J. B. Wilson (my collection).

Philobrya trigonopsis, Hutton, sp.

Mytilicardia trigonopsis, Hutton, Trans. New Zealand Institute, vol. xvii., p. 324, 1885; *id.*, "Macleay Memorial Volume," p. 85, t. 9, f. 94 a-b, 1893.

Habitats.—Wanganui (Pliocene) and Petane (Miocene), New Zealand.

The above emended generic reference is based on the study of cotypes kindly transmitted to me by the author of the species. It closely resembles *P. costata*, but which has thicker and closer ribs.

Philobrya Bernardi, sp. nov. Pl. iv., fig. 10.

Shell rather thin, ventricose, contour obliquely subquadangular; umbones nearly terminal, prodissoconch large and prominent. Anterior margin nearly straight, or slightly curved, making a right angle with the hinge-line; posterior margin straight, ventral-margin well-arched. An obsolete keel defines a somewhat steeply inclined post-umbonal slope; anterior to which the surface is ornamented by about eight slender costæ, which are crossed by concentric threads of nearly equal calibre with the radial threads, regularly disposed, but with increasing intervals towards the ventral margin; these concentric threads produce slight serratures on the radial threads.

Internally, the posterior margin is slightly interrupted by five or six crenulations. The ligamental pit is short, lanceolate, and directed backwards; posterior to which the hinge-line is obsoletely transversely ridged. A very deep byssal notch terminates the almost obsolete anterior of the hinge-line.

This new species is named in compliment to M. Felix Bernard,* of the Natural History Museum at Paris, whose gift of specimens of *P. costata* has largely assisted me in the elaboration of the species herein dealt with. It is conspicuous among congeners by open fenestrated ornament.

Horizon.—Eocene, Victoria; Muddy Creek (2 exs.), Shelford (1 ex.), Curlewis (1 ex.), collected by J. Dennant; and Fyansford (1 ex.), collected by J. F. Mulder.

Philobrya prænuntia, sp. nov. Pl. iv., fig. 9.

Shell rather thin, ventricose, inequilateral; obliquely oval-rhomboïd in contour; prodissoconch relatively very large and prominent.

The anterior margin is convex. The ornament consists of about twelve slender radial costæ, on which are formed slight serratures by the very feeble concentric laminations which are visible in the interradial spaces.

The ligamental pit is shortly oval-lanceolate and directed backwards; the anterior portion of the hinge-line has about fourteen transverse ridges, whilst the posterior portion is only obsoletely ridged.

* It is with profound regret that I announce this dedication to be posthumous, as that talented young malacologist died August 12, 1898, at the early age of thirty-five years.

This species has some resemblance to *P. Filholi*, but is less inequilateral, and the costæ are more numerous and slender. Its most striking feature is the relatively wide anterior area.

Horizon.—Eocene, Victoria, at Cape Otway, one ex. (since lost) collected by J. Dennant.

LIST OF DESCRIBED SPECIES OF PHILOBRYA.

(a) RECENT.

- P. setosa, *P. P. Carpenter*, 1864. California.
- P. Munieri, *F. Bernard*, 1896. France.
- P. atlantica, *Dall*, 1895. Argentine.
- P. meridionalis, *E. A. Smith*, 1885 (*Dacrydium*). Prince Edward and Marion Islands.
- P. aviculoides, *Velain*, 1876. Isle St. Paul.
- P. meleagrina, *Bernard*, 1896. Stewart Island, N.Z.
- P. costata, *Bernard*, 1896. Stewart Island, N.Z.
- P. Filholi, *Bernard*, 1897. Stewart Island, N.Z.
- P. crenatilifera, *Tate*, 1892 (*Myrina*). S. Australia and Victoria.
- P. fimbriata, *Tate*, 1898. S. Australia and Tasmania.
- P. (Hochstetteria) crenella, *Velain*, 1876. Isles St. Paul and Amsterdam.
- P. (Hochstetteria) modiolina, *Velain*, 1876. Isles St. Paul and Amsterdam.
- P. (Hochstetteria) trapezina, *Bernard*, 1897. Stewart Island.

(b) FOSSIL.

- P. trigonopsis, *Hutton*, 1885 (*Mytilocardia*). Pliocene and Miocene, N. Zealand.
 - P. Bernardi, *Tate*, 1898. Eocene, Victoria.
 - P. prænuntia, *Tate*, 1898. Eocene, Victoria.
-

EXPLANATION TO PLATE IV.

[All the figures considerably enlarged.]

1. *Eulima orthopleura*, *Tate*, 1898.
2. *Eulima commensalis*, *Tate*, 1898.
3. *Eulima indiscreta*, *Tate*, 1898.
4. *Eulimella tricincta*, *Tate*, 1898.
5. *Odontostomia infrasulcata*, *Tate*, 1898.
6. *Odontostomia Mayii*, *Tate*, 1898.
7. *Turbanilla varicifera*, *Tate*, 1898.
8. *Philobrya fimbriata*, *Tate*, 1898.
9. *Philobrya prænuntia*, *Tate*, 1898.
10. *Philobrya Bernardi*, *Tate*, 1898.

NOTES ON AUSTRALIAN LEPIDOPTERA.

By A. JEFFERIS TURNER, M.D.

[Read September 6, 1898.]

Plate V.

SYNTOMIDIDÆ.

The great majority of the Australian species of this family are referable to the genus *Hydrusa*. My attention was first called to this group by the difficulty experienced in identifying one of our commonest Brisbane insects, described below under the heading of *Hydrusa aperta*, Walk. Fortunately, nearly all the types of the species described by Mr. Meyrick (Proc. Linn. Soc., N.S.W., 1886, p. 773) are contained in local collections. During a recent short stay in Sydney, I took the opportunity of carefully examining those in the Macleay and Australian Museums, and comparing them with my own examples; and I must express my gratitude to the Curators of these museums for their kind assistance. I am also much indebted to Dr. T. P. Lucas for an opportunity of examining types in his valuable collection, and to the Queensland Museum for the loan of specimens.

The difficulty of determining the species of this genus lies in the great uniformity of marking, combined with the considerable range of variability in certain species. For this reason they cannot be satisfactorily studied from isolated museum specimens, but need large series of specimens from various localities for comparison. Series bred from the larvæ would be specially valuable. Mr. Meyrick has, I believe, in spite of the thoroughness and accuracy of his work, been misled in at least one instance into making several species out of one by the paucity of his material.

I do not regard the present contribution as in any way final, for much remains to be learnt of the species inhabiting Northern Queensland, where the genus is most abundantly represented. Of many species, I have seen only a few isolated types; and of those enumerated below, some may, I think, be regarded as perfectly well-established and distinct species:—*Hydrusa humeralis*, Butl.; *H. xanthosoma*, Turn.; *H. eclipsis*, Meyr.; *H. stelotis*, Meyr.; *H. pyrrhodera*, Meyr.; *H. leucacma*, Meyr.; *H. aperta*, Walk.; *H. orphnæa*, Turn.; *H. recedens*, Luc.; *H. annulata*, F.; *H. phepsalotis*, Meyr.; *H. bicolor*, Walk.

The following I regard as species concerning which further information is required, although the majority at least are likely

to stand :—*H. sphenophora*, Turn.; *H. chlorometis*, Meyr.; *H. hyalota*, Meyr.; *H. cyanura*, Meyr.; *H. antitheta*, Meyr.; *H. humeralis*, Butl.; *H. eschatias*, Meyr.; *H. trigonophora*, Turn.

There are three of Meyrick's species, concerning which, from lack of material, I am unable to form an opinion :—*Hydrusa paraula*, Meyr.; *H. anepsia*, Meyr.; *H. macroplaca*, Meyr.

In determining the species, the wing markings are of little value in most instances, as they are both very similar in different species, and variable in the same species. I have followed Meyrick in assuming a normal five spots on the forewings in each instance. A connecting spot between the fourth and fifth is sometimes present. Its full development, so as to unite these two into one large spot, is an important character, but its partial development is valueless, as a small spot in this region is frequently present, or completely absent, in one and the same species. Occasionally the first and third spots are partially confluent as an abnormal variety, but I have never seen them completely merged except in *H. ecliptis* and *H. lampetis*, where they are combined. The white apices to the antennæ of some species is a valuable character, also the presence or absence of yellow or orange spots on the thorax. The thorax is, however, frequently rubbed in imperfect or badly-pinned specimens. The presence or absence of orange on the posterior abdominal segments also furnishes good characters, though a slight extent of variation must here be allowed for.

I have given a complete list of the known Australian species of this family, and have incorporated the localities given in Meyrick's paper. But the section of the *Hydrusa* with black anal segments still remains in an unsatisfactory condition; *H. leucacma*, Meyr., is a well-defined species; for the discrimination of the other forms new series of specimens are required.

In Plate V., which is reproduced from a photograph, figures 1 to 6 inclusive and 8 are varieties of *H. aperta*, Walk.; 7. *H. trigonophora*, n. sp.; 9. *H. leucacma*, Meyr.; 10. *H. orphneea*, n. sp.; 11. *H. ecliptis*, Meyr.; 12. *H. lampetis*, n. sp.; 13. *H. phepsalotis*, Meyr.; 14. *H. pyrrhodera*, Meyr.

AGAPHTHORA, Meyrick.

AGAPHTHORA MELANORA, Meyr.

I know of only the type specimens in the Macleay Museum, which are from Cape York, Queensland.

AGAPHTHORA SPHENODES, Meyr.

Cairns, Queensland; Macleay and Queensland Museums.

SYNTOMIS, Ochsenheimer.

Tongue well developed. Antennæ in male simple, without serrations, with very short even ciliations ($\frac{1}{5}$). Palpi short,

porrected, loosely scaled. Spurs very short. Forewings with 2 from about $\frac{2}{3}$, 4 and 5 approximated at base, 7 out of 8 below 10; 9, 10, and 11 out of 8. Hindwings with vein 4 absent, 3 and 5 separate at base, 6 absent.

The neuration resembles *Choromeles*, Meyr., but the antennæ are non-pectinated.

SYNTOMIS ANGUSTIPENNA, Lucas.

Hydrusa angustipenna, Lucas, Proc. Linn. Soc., N.S.W., 1889.

Male and female, 23-27 mm. Head and face black, collar orange. Antennæ wholly black. Thorax black. Abdomen orange, bases of segments broadly black, two apical segments and anal tuft wholly black. Forewings blackish, spots rather small, semi-transparent, dull orange; basal spot absent; second wedge-shaped, with apex obtuse, anterior; third trapezoidal or triangular; fourth elongate, sometimes surmounted by a small dot; connecting spot absent; fifth roundish, fairly evenly bisected. Hindwings black with a roundish basal orange spot.

In the females the spots are rather larger than in the males.
Brisbane.

HYDRUSA, Walker.

TABULATION OF SPECIES.

1. Abdomen wholly orange	...	...	...	...	<i>xanthosoma</i>
Abdomen not wholly orange	...	...	...	...	2
2. Forewings wholly black without spots	...	...	...	...	3
Forewings with spots present	...	...	...	...	4
3. Anal tuft black	...	...	...	...	<i>bicolor</i>
Anal tuft orange	...	...	...	...	<i>eschatias</i>
4. Forewings with spots colourless	...	...	...	...	5
Forewings with spots more or less orange	...	...	...	...	6
5. Thorax with orange spots	...	...	...	...	<i>pyrrhodera</i>
Thorax wholly black	...	...	...	...	<i>hyalota</i>
6. Connecting spot between fourth and fifth completely developed (as long as fifth)	...	...	...	...	7
Connecting spot absent or only partially developed (less than half fifth)	...	...	...	...	11
7. First and third spots wholly confluent	...	...	...	...	8
First and third spots separate	...	...	...	...	9
8. Spots large, those of hindwings wholly confluent	...	...	...	...	<i>ecliptis</i>
Spots small, those of hindwings touching only	...	...	...	...	<i>lampetis</i>
9. Patagia partly yellowish	...	...	...	...	<i>chlorometis</i>
Patagia wholly black	...	...	...	...	10
10. Antennæ with apex white	...	...	...	...	<i>stelotis</i>
Antennæ wholly black	...	...	...	...	<i>sphenophora</i>
11. Abdomen with last two or three segments wholly black	...	...	...	...	12
Abdomen with last two or three segments not wholly black	...	...	...	...	14
12. Abdomen wholly black beneath, or with only a few orange scales	...	...	...	...	<i>cyanura</i>
Abdomen with orange markings beneath	...	...	...	...	13

13. Hindwings with basal spot obsolete	...	...	...	<i>leucacma</i>
Hindwings with basal spot well developed	...	...	...	<i>antitheta</i>
				<i>paraula</i>
				<i>anepsia</i>
				<i>macroplaca</i>
14. Antennæ with apex white	...	...	...	15
Antennæ wholly black	...	...	...	16
15. Spots small, opaque, deep orange	...	...	...	<i>phepsalotis</i>
Spots moderate, semitransparent	...	...	...	<i>annulata</i>
16. Abdomen hairy	...	...	...	17
Abdomen smooth-scaled	...	...	...	18
17. Thorax with yellowish markings	...	...	...	<i>recedens</i>
Thorax wholly black	...	...	...	<i>orphnæa</i>
18. Patagia orange	...	...	...	<i>humeralis</i>
Patagia black	...	...	...	19
19. Distal spot of hindwings triangular, touching basal spot on median vein	...	...	...	<i>trigonophora</i>
Distal spot of hindwings roundish	...	...	...	<i>aperta</i>

HYDRUSA XANTHOSOMA, n. sp.

Male, 25-28 mm. Antennal pectinations well marked, $1\frac{1}{2}$. Veins 3 and 5 of hindwings closely approximated at base.

Head and face orange. Antennæ fuscous, irrorated dorsally with orange scales. Thorax orange. Abdomen orange without black markings, tuft orange with a few lateral fuscous hairs. Legs orange, anterior and middle tarsi fuscous. Forewings blackish, with confluent orange spots; first spot, small, roundish; second, wedge-shaped; an additional orange streak separated by blackish vein from second spot, and by a narrow black line from costa; third, elongate prolonged upwards and inwards, separated from second only by median vein; fourth, elongate, surmounted by an additional spot; fifth, bisected by a black vein into two equal elongate segments; an elongate connecting spot developed between fourth and fifth; and another between fifth and third; these confluent spots leave two small black areas, first beyond second spot, sometimes confluent with costal and anal black areas; second separating first and third spots. Hindwings orange, hindmargin broadly but irregularly blackish, a small black dot below middle of costa.

Varieties.—The extent of orange suffusion relatively to black ground color varies. The connecting spot between fourth and fifth, usually well developed, may be completely absent.

A very distinct species, remarkable for the absence of black rings on abdomen, and the unusually developed confluent orange markings on wings.

Barrier Range, North-West Australia; some half-dozen specimens, all males (Coll. Macleay), one of which is now in my collection.

HYDRUSA ECLIPTIS, Meyr. Pl. v., fig. 11.

Brisbane. One specimen taken by Mr. Illidge. This exactly corresponds with the types in the Macleay collection, which are from Cooktown.

HYDRUSA LAMPETIS, n. sp. Pl. v., fig. 12.

Female, 35 mm. Head and face reddish-orange, with a broad black line between antennæ. Antennæ black to apex. Thorax wholly black. Abdomen orange, bases of segments black; two terminal segments wholly black, except anal hairs; beneath wholly black. Forewings dull-blackish fuscous, with a brilliant purple lustre in oblique light; spots small, pale-dull-orange, reddish-tinged, semi-transparent; first coalescing with third to form an elongated oblong spot of moderate size; second small, wedge-shaped; fourth elongate, connected with fifth by an equally large additional spot; fifth bisected unequally, upper segment elongated, lower sub-triangular. Hindwings dull-blackish-fuscous with purple lustre; spots pale-orange, semi-transparent; basal spot small, bisecting vein not black; second very small, triangular, touching first.

It is possible that this may be an extreme variety of *H. ecliptis*. The present species is distinguished by the much smaller spots and by the distal spot of hindwing not being completely merged with basal spot.

Bowen, Queensland; one specimen (Coll. Queensland Museum).

HYDRUSA SPHENOPHORA, n. sp.

Male and female, 31-36 mm. Head and face orange, with a narrow black line between antennæ. Antennæ black to apex. Thorax black, with a conspicuous posterior orange spot. Abdomen orange, base of segments narrowly fuscous above, more markedly so beneath, apical segment blackish-fuscous, tuft orange. Forewings black with greenish-iridescence, spots moderate or rather large, pale-dull-orange, opaque; first subquadrate, broadly separate from third; second wedge-shaped, apex anterior, obtuse; third irregular oblong, prolonged upwards anteriorly, where it is separated from second only by vein; fourth connected by an additional spot with fifth, the whole forming a broad wedge with apex downwards, separated by veins into four segments, decreasing in size from above downwards, upper three elongate, lowest triangular. Hindwings with spots same colour as forewings, large and confluent; leaving an irregular black line along hind-margin, thickest at apex, toothed below middle; and a black spot below middle of costa.

Allied to *H. ecliptis* and *H. stelotis*. From the former distinguished by separation of first and third spots, from the latter by

black-tipped antennæ, large and confluent spots of hindwings, &c., but more material is necessary to satisfactorily determine the limits of variation of these species. Barrier Range, North-West Australia; two specimens (Coll. Macleay).

HYDRUSA CHLOROMETIS, Meyr.

I have not seen a type of this species, but from the description it appears to be very distinct, belonging to the group in which connecting spot between fourth and fifth is fully developed, and characterised by the ochreous-yellow spots on patagia and thorax.

The type specimen was taken by Mr. Meyrick at Glen Innes, New South Wales, in December.

HYDRUSA STELOTIS, Meyr.

I have only seen the types, which appear very distinct. Cooktown (Macleay Museum).

HYDRUSA PYRRHODERA Meyr. Pl. v., fig. 14.

Thursday Island, Cape York, Cooktown, and Cairns, Queensland. The Queensland Museum contains a large series from the last-named locality.

HYDRUSA HYALOTA, Meyr.

Cape York, Queensland; one specimen each in the Macleay collection and that of the Queensland Museum. Fresh specimens are required to establish with certainty its distinctness from the preceding.

HYDRUSA LEUCACMA, Meyr. Pl. v., fig. 9.

There are five male specimens of this species in Coll. Lucas. It closely resembles some forms of the following species in the forewings and thorax; but may be readily distinguished by the obsolescence of basal spot of hindwings, and complete blackness of three apical abdominal segments including anal tuft. There are five orange markings on dorsal surface of abdomen of male.

Cairns, Queensland.

HYDRUSA APERTA, Walk. Pl. v., figs. 1-6 and 8.

Syntomis aperta, Walk., Suppl. 72, Meyr., l.c., 134.; *Hydrusa pyrocoma*, Meyr., 127; *H. synedra*, Meyr., 128; *H. hesperitis*, Meyr., 129; *H. mochlotis*, Meyr., 132; *H. nesothetis*, Meyr., 133.

The distinguishing features of this species are the large size, 33-48 mm. (but dwarfed specimens also occur), the black antennæ, the broadly orange head, the conspicuous yellow posterior thoracic spot, the seven orange bars on the abdomen of male, six in female (the last two of these may be reduced in size, or nearly obsolete), the very elongate fourth spot of forewings, and the well-developed basal spot of hindwings.

Varieties.—The wing-markings are extremely variable. The sexes are usually easily distinguishable, the males being broader-winged, with smaller and more widely separate spots; in the females the spots are usually larger, more closely approximated (rarely tending to coalesce), and supernumerary spots are often present.

To enter into details — The fourth spot is sometimes surmounted by a small extra spot. The connecting spot between fourth and fifth may be entirely absent, or rudimentary, or well-developed, about half-length or less of upper segment of fifth spot. A small spot resting on second spot is rarely present in the male, frequently in the female. Very rarely first and third spots are partially confluent (one specimen). In hindwings distal spot may be small (especially in males), with upper segment small or absent, or large (especially in females), with upper segment well developed. In the abdomen the orange on the dorsal surface of penultimate and ante-penultimate segments may be reduced to small central dots. Beneath the two ante-apical segments may have the orange fairly well-marked, reduced to a few scattered scales or absent. The anal tuft is always orange.

After careful comparison with the types in the Macleay and Australian Museums, I believe that all Meyrick's names given above are synonyms for one variable species. All the forms occur commonly about Brisbane. At the same time I would freely acknowledge, that if my material had been restricted to Mr. Meyrick's types, I should have regarded them as separate species as he has done.

With regard to *Syntomis aperta*, Walk., I have felt considerable difficulty. Walker's description of the wings I cannot understand, but he says "scutellum" is yellow, which is suggestive of this species. Meyrick describes the thorax as black, but this, I believe, after examining them, to have been due to his types being rubbed. That in Dr. Lucas' collection has a conspicuous posterior yellow spot. Mr. Meyrick describes the antennæ as white at apex, but I cannot help regarding this as an error. Careful inspection of the types named by him *aperta* in the Macleay, Australian Museum, and Lucas' collections shows no more than a doubtful paleness of the terminal joint in one instance, due to loss of scales. These types appear to me to be certainly referable to the common Brisbane species.

If my conclusions be correct, the species has a wide range from the extreme north of Queensland to South Australia. It is very common in the neighbourhood of Brisbane. Mr. R. Illidge finds the larvæ in his garden feeding on various weeds and decaying leaves and fruit they are densely clothed with brown hairs.

HYDRUSA TRIGONOPHORA, n. sp. Pl. v., fig. 7.

Male and female, 25-35 mm. It differs from *H. aperta*, Walk., in the smaller size, in the distal spot of hindwings triangular, instead of roundish, the apex of triangle touching basal spot on median vein, and in tuft of male being black laterally. At first, I regarded it as a variety of the preceding; but have now five specimens taken at Brisbane and Stradbroke Island, and have seen many others, all of which show the differences to be constant.

HYDRUSA CYANURA, Meyr.

One specimen (Coll. Lucas); said to be from Thursday Island, Queensland. There is a second specimen in this collection.

HYDRUSA ANTITHETA, Meyr.

I saw a type of this species in the Australian Museum, and it seemed to me distinct; distinguished from *H. aperta* by the two apical segments being wholly black. Whether a posterior thoracic spot was present I could not decide. No trace of it is discernible, but the pin goes through where it might have been.

I have received a specimen from Bundaberg, which resembles the type of *H. paraula*, Meyr., in the Macleay Museum. This may or may not be distinct from the foregoing. The posterior spot is very distinct.

I have not seen the types of *H. anepsia*, Meyr., and *H. macroplaca*, Meyr., and can therefore express no opinion on these species.

HYDRUSA HUMERALIS, Butl.

(Journ. Linn. Soc., 1876, 352).

Male and female 24-30 mm. Antennal pectination in male rather long (2). Head orange, obscurely fuscous between antennæ. Antennæ black to apex. Thorax black with orange patagia, and a conspicuous posterior orange spot. Abdomen orange, bases of segments broadly blackish; apical segment in male blackish, with a small dorsal orange spot, in female pale orange. Forewings blackish, spots pale orange, opaque, rather small; first, roundish or oval; second, wedge-shaped, apex anterior, obtuse; third, irregular-oblong or sub-triangular; fourth, elongate, sometimes surmounted by an additional dot; connecting spot absent; fifth, roundish or oval, evenly bisected by a black vein. Hindwings black, with spots large and confluent, somewhat constricted at point of union.

Distinguished by long antennal pectinations of male, confluence of spots of hindwings, and especially by the orange patagia.

Barrier Range, North-West Australia; two specimens (Coll. Macleay). The British Museum type is stated to be from North Australia. I have two specimens from Brisbane and Stradbroke Island, and have seen others, which differ from the types in spots of hindwings being separate; for the present I include them in the present species.

HYDRUSA ORPHNÆA, n. sp.

Male and female 24-27 mm. Head broadly black on crown, collar yellow. Face black in male, in female mixed with ochreous. Antennæ black to apex. Thorax black. Abdomen with hairy yellow scales, bases of segments black. Forewings black without iridescence, thinly scaled; spots moderate, pale orange, semitransparent; first, small, subquadrate; second, larger, bluntly wedge-shaped; third, nearly triangular, anterior angle produced towards second, and truncate; fourth, elongate, surmounted by a small dot, connecting spot absent; fifth, roundish, bisected by a black vein. Hindwings, basal spot rather larger, irregularly outlined, unequally divided by a fine black vein; distal spot well developed, upper segment nearly as large as lower.

Readily distinguished by the hairy abdomen and the scantily-clothed forewings, which give the species a very distinct appearance. The black face of the male is a very marked character, but may not be constant. The male is broader winged.

Ballandean, Queensland, and Tenterfield, New South Wales, three specimens in February.

HYDRUSA ANNULATA, Fab.

Zygaena annulata, F.E.S., 389; *Syntomis annulata*, Boisd. Zyg. 122, pl. vii., 8, pl. viii., 2; *Hydrusa cingulata*, Butl., Journ. Linn. Soc. 1876, 352; *H. nigriceps*, ib. 352; *H. intensa*, ib. 353, Meyr. l.c. 136.

The earlier synonymy is taken from Meyrick's paper. I have read Butler's descriptions and do not find in them any tangible points of distinction. His *Hydrusa intensa* is recognised by Meyrick, but the point of distinction given by the latter is untenable. I have taken every gradation from nearly complete absence to considerable development of upper section of distal spot of hindwings on the same day under circumstances which left no doubt as to specific identity.

Varieties.—A very constant form in its markings. In Brisbane the males are slightly larger and broader-winged than the females, in specimens from Ballandean and Tenterfield the disparity is much more marked. The anal tuft of the male, normally wholly orange, is sometimes black at the sides, as in *H. phepsalotis*. In forewings the fourth spot is rarely surmounted

by a small extra spot. I have one female specimen in which the first and third spots, normally widely separate, are confluent.

Brisbane, Stradbroke Island, and Moreton Bay District generally; Ballandean, Maryborough, Rockhampton, and Cooktown, Queensland; Tenterfield, Grafton, Sydney, and Wollongong, New South Wales; also from Tasmania. Common and generally distributed.

HYDRUSA PHEPSALOTIS, Meyr. Pl. v., fig. 13.

This may be distinguished best from *H. annulata* by the small, intensely orange spots on the wings. The anal tuft, orange, with black sides, is characteristic, but is occasionally found as a variety in the latter species, as is the obsolescence of upper part of basal spot of hindwings.

Var. aethiops. In the Macleay Museum are two specimens from Sydney and Illawarra, in which the spots on the wings are extremely small. In both the distal spots of the hindwings are absent. In one the posterior spots of the forewings are absent, only three minute basal spots being present.

Maryborough and Mount Tambourine, Queensland; Sydney and Illawarra, New South Wales.

HYDRUSA RECEDENS, Luc.

(Proc. Linn. Soc., N.S.W., 1891.)

Male, 17 mm. Head and face ochreous-yellow; a few fuscous scales between antennæ. Antennæ black to apex. Thorax black, with some ochreous-yellow scales posteriorly, patagia fuscous or light-ochreous-yellow. Abdomen with hairy yellow scales, bases of segments black; seven yellow markings on dorsal surface; tuft pale-ochreous, at sides fuscous. Forewings black, rather thinly scaled, without iridescence; spots pale-ochreous, semitransparent; first and second spots quadrangular; third triangular; a well-developed lenticular spot between second and third; fourth narrow-elongate, surmounted by a faint ochreous line; connecting spot indicated by a small dot; fifth spot roundish, evenly bisected. Hindwings with basal spot well developed; distal moderate, remote, upper segment small.

Immediately distinguished by its small size from all other species. It appears to be variable; the colour of the patagia differs in the two specimens. The lenticular spot between second and third spots would be a good character if constant. In the hairy abdomen it differs from all except *H. orphnæa*.

Duaringa, Queensland.

HYDRUSA ESCHATIAS, Meyr.

I have only seen the type in the Macleay Museum. The locality is unknown.

HYDRUSA BICOLOR, Walk.

Euchromia (Hydrusa) bicolor, Walk., Bomb. 255, Butl. Ill. Het. I. 19, pl. ix. *Hydrusa bicolor*, Meyr., l.c., 139.

Cairns, Queensland, apparently common (Macleay and Queensland Museums). Mr. R. Illidge has taken one specimen at Brisbane.

CHOROMELES, Meyrick.**CHOROMELES GEOGRAPHICA, Meyr.**

Taken commonly about Brisbane in October and again in March.

CHOROMELES STREPSIMERIS, Meyr.

I have seen only the type in the Macleay Museum ; it is from Bowen, Queensland.

EUCHROMIA, Hb.**EUCHROMIA POLYMENA, Lin.**

Sphinx polymena, Lin., Syst. Nat. II., 106 ; Cr. 13, D.; Meyr., l.c., 142. North Australia ; one specimen in the Macleay Museum.

EUCHROMIA IRUS, Cr.

Sphinx irus, Cr., 368A; *Slaukopis irius*, Boisd., Voy. Astr., V., 192 ; *S. ganymede*, Dbld. Soct. Disc., 519, Pl. III., 3 ; *Euchromia irus*, Meyr., l.c., 143. Cape York and Cookstown, Queensland.



A LIST OF PLANTS COLLECTED ON MT. LYND-HURST RUN, S. AUSTRALIA.

By MAX KOCH.

[Read, September, 6, 1898.]

This list embodies the result of my gatherings, which I undertook for the Central Agricultural Bureau, at the request of the General Secretary, Mr. A. Molineux. The classification is in accordance with the "Handbook of the Flora of Extratropical South Australia." The area worked is of comparatively small extent, not exceeding 200 square miles.

The exact locality is situated about 12 miles due north from the old Yeralina Head-station, embracing a portion of the Mt. Freeling Hills in the east, the Yeralina and Twins (now called Pindalpena) Creeks in a southerly and westerly direction, and terminating at the lower portion of the George Creek in the north. Though slightly to the north of District S., I have decided at Prof. Tate's suggestion and in accordance with the general complexion of my collection, to move the geographic boundary, by enclosing the Mt. Freeling Hills and the surrounding elevated country in District S. The collection would not have been by far so representative, if it was not for the enthusiastic co-operation of my neighbours, Messrs. J. Langley, of the Trinity Well, and W. Langley, of Mt. Fitton mine, and I wish hereby to acknowledge their valuable help in the cause of science.

The greater number of the plants had been named by Mr. J. H. Maiden, Director of the Botanic Gardens, Sydney, through the agency of the Central Agricultural Bureau, Adelaide, while the remainder have been named, and a large number of the whole revised, as indicated by prefixed asterisk, by Professor R. Tate, of the University of Adelaide.

Being intimately associated with the rearing of stock, I have made it my business to investigate which plants are most suitable and valuable for pasture, and notes of the economic value of each plant, as far as known to me by personal observation, are herewith given.

I have also ascertained a few aboriginal names for various plants, as well as the uses they are put to by the natives, and I trust these additions to my list will be of some interest.

Ranunculaceæ.

Ranunculus parviflorus, Linne. Good fodder.

*Myosurus minimus, Linne.

Papaveraceæ.

**Papaver aculeatum*, *Thumb.* Rare.

Capparideæ.

**Cleome viscosa*, *Linne.* Fodder.

Cruciferæ.

All useful fodder plants.

**Erysimum brevipes*, *F. v. M.*

**Erysimum Blennodia*, *F. v. M.*

**Sisymbrium trisectum*, *F. v. M.* I note three forms here. My No. 221, with white flowers and linear-filiform leaves, is probably the typical form. No. 325 resembles very much the above, but has pale-yellow flowers, and being generally found in the presence of *S. nasturtioides*, it may be a hybrid. No. 328. The foliage of this form is denser, the leaves are broader, somewhat thick and succulent, and the racemes more robust. The flowers of this form are always at the top end of the stalk, which gradually grows longer as the flowering proceeds; while in Nos. 221 and 325 the flowering begins at the bottom end of the raceme, which only shows buds at the top-end.

**Sisymbrium nasturtioides*, *F. v. M.* "Mustard-bush."

**Sisymbrium procumbens*, *Tate.* Rare.

**Stenopetalum lineare*, *R. Brown.* Aboriginal name, *Warcoontoo*. An article of food for the natives.

**Alyssum minimum*, *Pallas.*

**Menkea australis*, *Lehm.*

Menkea australis, *Lehm.* My No. 326 is a variety differing from the typical form by the paucity of foliage. It is quite prostrate, racemes are filiform, flowers white, more minute than with *M. australis*, and the fruits somewhat narrower at the apex, and slightly wrinkled.

Capsella cochlearina, *F. v. M.*

Capsella ochrantha, *F. v. M.*

**Lepidium phlebopetalum*, *F. v. M.* "Cress."

**Lepidium papillosum*, *F. v. M.* "Cress." Aboriginal name, *Nalaka*. The seeds are eaten by the natives.

**Lepidium ruderale*, *Linne.* Three forms are noticed here. My No. 272 is a stout herb, with radical, deeply-lobed glabrous leaves, flowers in short corymbose racemes, pods half-line long. No. 324. Leaves glabrous and lobed, flowers in long racemes, pods half-line long. No. 388. Stems and leaves slightly hairy, lower leaves lobed, upper ones entire, pods $1\frac{1}{2}$ line long.

Frankeniaceæ.

**Frankenia laevis*, Linne. Useless for fodder. Two forms I have noticed, one with ovate leaves, the other with linear leaves.

Pittosporaceæ.

Pittosporum phillyraeoides, De Can. "Apricot-tree." An ornamental tree; the foliage is eaten by cattle. Aboriginal name, *Madroo*. The seeds are eaten by the natives.

**Bursaria spinosa*, Cav. "Boxbush." Collected by Mr. Langley near Mt. Livingstone.

Rutaceæ.

**Eriostemon diffiformis*, Cunn., var. *teretifolius*. Collected by Mr. Langley near Mt. Livingstone.

Zygophylleæ.

**Tribulus hystrix*, R. Br. Fodder. Aboriginal name, *Koola*.

Though some species of *Zygophyllum* are said to be injurious to stock, I have no evidence to that effect, but I noted stock feed freely of them.

**Zygophyllum apiculatum*, F. v. M. Fodder. Collected by J. Langley, Trinity Well.

**Zygophyllum fruticosum*, De Can. Useful fodder. Aboriginal name, *Medeeuwurta*; an article of food for the natives.

Zygophyllum ammophilum, F. v. M.

Zygophyllum Billardieri, De. Can.

**Zygophyllum prismatothecum*, F. v. M.

**Zygophyllum Howittii*, F. v. M. Collector, J. Langley.

**Zygophyllum iodocarpum*, F. v. M. Suspected of being injurious.

**Zygophyllum glaucescens*, F. v. M. Useful fodder. Aboriginal name, *Nilday*. An article of food for natives.

Geraniaceæ.

Erodium cygnorum, Nees. Valuable fodder. Aboriginal names, *Yarpee*, *Windoo*, *Wunooka*. The herb is largely eaten by the natives.

Oxalis corniculata, Linne. Sourobs. Fodder; eaten by the aborigines.

Sapindaceæ.

Heterodendron oleaefolium, Dësf. The foliage of this tree is greatly relished both by cattle and sheep. Aboriginal name, *Mindra*, the seed of which forms an article of food for the natives.

**Dodonæa viscosa*, Linne. "Hopbush."

Dodonæa viscosa, variety, *angustifolia*.

**Dodonæa lobulata*, F. v. M. "Hopbush."

All three collected by W. Langley at the Daly and Stanley mine.

Dodonæa microzyga, *F. v. M.* "Red Hopbush."

All the above Dodonæas are cropped by sheep.

Phytolacceæ.

*Codonocarpus pyramidalis, *F. v. M.* "Poplar tree."

Malvaceæ.

All more or less useful for fodder.

Sida corrugata, *Lindl.*

Sida virgata, *Hooker.* Aboriginal names, *Watteeworroo* and *Burdaddee.*

Abutilon Mitchelli, *Bentham.* Ornamental. Aboriginal name, *Yarreedee.*

*Abutilon oxycarpum, *F. v. M.*

Abutilon Fraseri, *Hooker.*

*Lavatera plebeia, *Sims.* A valuable fodder plant, also ornamental. Aboriginal names, *Wirpa*, *Koornma*, and *Wurnma*.

The roots (*apara*) of young plants are eaten by the natives.

Malvastrum spicatum, *A. Gray.* Useful fodder.

*Hibiscus brachysiphonius, *F. v. M.* Rare.

*Gossypium Sturtii, *F. v. M.* A very ornamental shrub.

Tiliaceæ.

*Corchorus longipes, *Tate, n. sp.* Fodder.

Euphorbiaceæ.

*Euphorbia erythrantha, *F. v. M.* Fodder.

Euphorbia Drummondii, *Boiss.* Fodder.

Euphorbia eremophila, *Cunn.* Fodder.

These herbs are looked upon with suspicion as poisonous, but reliable proofs are wanting.

*Phyllanthus rhytidospermus? *F. v. M.* Rare.

Phyllanthus lacunarius, *F.v.M.*

*Phyllanthus trachyspermus, *J Hooker.* Collector, W. Langley
The same as the Mount Parry plant, which was wrongly attributed to *P. Gunnii*. [R.T.]

*Beyeria opaca, *F. v. M.* Collected by W. Langley.

Portulaceæ.

All these herbs are eaten by stock.

Portulaca oleracea, *Linne.* Good fodder; Aboriginal name, *Monyeroo.* The leaves and seeds are an article of food for the aborigines.

Claytonia Balonnensis, *F. v. M.?* Aboriginal name, *Parakilya.*

*Claytonia pumila, *F. v. M.* The only previous record for South Australia is "near Macdonnell Range, C. Giles."

*Claytonia volubilis, *F. v. M.* Though described to have 8 to 10 stamens, I often found 18 or 20.

Caryophylleæ.

**Spergularia rubra*, Camb. It occurs in two forms, one is prostrate, the other erect; fodder.

Polygonaceæ.

Muehlenbeckia Cunninghamii, F. v. M. Fodder. "Lignum"; Aboriginal name, *Burdinga*.

Chenopodiaceæ.

Comprising the most important and widely distributed fodder-plants of the district.

Atriplex stipitatum, Benth.

Atriplex nummularium, Lindl. "Old - man Saltbush"; aboriginal name, *Nilpena*.

Atriplex vesicarium, Hew. Bladder saltbush. This is the most valuable saltbush of all. A variety has been noted by me in the Mt. Freeling Hills, which resembles the typic form in habit and foliage, but the fruits show only the inner herbaceous valves, while the bladder-like appendages are either wanting or very minute. Aboriginal names, *Billacurroo*, *Dandayree*.

Atriplex velutinellum, F. v. M. Collector, J. Langley.

Atriplex fissivalve, F. v. M.

**Atriplex angulatum*, Benth. I notice a variety differing in habit, form of foliage, and fruits. The latter consist of two thin three-angled valves with either one or two small hornlike dorsal appendages, which, however, are not unusual.

Atriplex leptocarpum, F. v. M.

**Atriplex limbatum*, Benth. "Spreading Saltbush."

Atriplex halimoides, Lindl. About four varieties have been noticed by me, the chief difference is in the shape of fruits. Aboriginal name, *Maltoo*, which seems to be also employed for several other annual saltbushes.

**Atriplex holocarpum*, F. v. M. Annual or Pop-saltbush, so called on account of the popping noise the fruits produce when trod upon. Aboriginal name, *Maltoo*.

Several varieties of this species has been noticed by me.

(a). Stems robust fruits large, nearly globular and spongy, This is the typic form.

(b). Foliage much crowded and very watery; fruits ovoid, somewhat acuminate. Stems herbaceous. This is the *spongiosa*-form of F. v. Mueller.

(c). Stems rather rigid, woody and brittle; fruits obovate, intermediate in shape, but with a hard and shining epiderm.

Atriplex Kochianum, Maiden. Stems erect, angular, woody, and brittle. Leaves very angular, whereby it can be easily

distinguished from *A vesicarium*, to which it is allied. Fruits have two large, thick, nearly basal ovate-lanceolate appendages.

Rhagodia spinescens, *R. Br.* Useful fodder. Spinescent only when very old, or in adverse seasons. Aboriginal name, *Yillaroo*.

Rhagodia nutans, *R. Br.* Good fodder.

**Chenopodium nitrariaceum*, *F. v. M.*

Chenopodium auricomum, *Lindl.* Good fodder.

Chenopodium cristatum, *F. v. M.* Fodder.

Enchytraea tomentosa, *R. Brown.* Fodder. Aboriginal name, *Burlahmee*. These fruits are an article of food for the natives.

**Threlkeldia proceriflora*, *F. v. M.*

Kochia lobiflora, *F. v. M.* Rare.

Kochia brevifolia, *R. Brown.* "Bluebush."

Kochia pyramidata, *Benth.* "Bluebush." Aboriginal names, *Oneroo* and *Koonambirra*.

Kochia eriantha, *F. v. M.* Rare.

**Kochia spongiocarpa*, *F. v. M.* "Bluebush."

Kochia villosa, *Lindl.* "Cotton-bush." Four forms have been noticed here; the difference is principally in the more or less dense woolliness of stems and foliage, size of fruits, and habit of growth of the plants.

Kochia sedifolia, *F. v. M.* "Bluebush."

Kochia aphylla, *R. Br.* "Cottonbush." Valuable fodder, often spinescent. Aboriginal names, *Bulka* and *Poondoo-poondoo*.

Kochia ciliata, *F. v. M.* Aboriginal name, *Moodlee*.

Kochia brachyptera, *F. v. M.*

**Bassia Dallachyana*, *Benth.* Fodder, but injurious to sheep when in fruit, as these are densely enveloped in cottony wool, and if partaken of in quantities they will form indigestible felty balls in the entrails of sheep, which often die in consequence of them.

Bassia tricornis, *Bentham.*

Bassia biflora, *F. v. M.*

Bassia paradoxa, *F. v. M.*

Bassia lanicuspis, *F. v. M.*

Bassia diacantha, *F. v. M.*

**Bassia uniflora*, *F. v. M.*

Bassia bicornis, *F. v. M.*

Bassia eriochiton, *Tate.*

**Bassia quinquecuspis*, *F. v. M.* Aboriginal name, *Yate*.

**Bassia divaricata*, *F. v. M.* Aboriginal name, *Yalkirray*

Bassia bicuspis, *F. v. M.*

**Bassia Tatei*, *F. v. M.*

All the Bassias, especially in the earlier stages of growth, provide palatable and succulent fodder for stock; and, although the spiny nature of the fruits of some of them is objectionable in wool, the pastoralist of the Far North should not condemn these plants on that account, because these spiny fruits are the very safeguards against eradication of a most useful class of fodder-plants.

Babbagia dipterocarpa, *F. v. M.*

**Babbagia acroptera*, *F. v. M.* and *Tate*.

**Babbagia pentaptera*, *F. v. M.* and *Tate*.

**Salicornia arbuscula*, *R. Brown*. Aboriginal name, *Tarapoolia*. *Salsola Kali*, *Linne*. "Roley-Poley." Aboriginal name, *Yilka*.

Very useful fodder.

Amarantaceæ.

Euxolus Mitchellii, *F. v. M.* Fodder.

Euxolus interruptus, *Miguel*. Rare. The first record for South Australia.

Ptilotus obovatus, *F. v. M.* Good fodder.

Ptilotus exaltatus, *Nees*. Ornamental. Collector, Mr. Langley.

**Ptilotus nobilis*, *F. v. M.* Ornamental. Good fodder. Aboriginal name, *Anemaheewurta*.

**Alternanthera triandra*, *Lam.* Good fodder.

Nyctagineæ.

**Boerhaavia repanda*, *Willd.* Collected by W. Langley at Mt. Fitton.

Boerhaavia diffusa, *Linne*. Good fodder. Two forms are noted here, which the aborigines also seem to distinguish. No. 65, Stems and leaves hairy; aboriginal name, *Tawo*. No. 66, Stems and leaves glabrous; aboriginal name, *Padloo*. The natives eat the roots of these herbs, which they call *Murra*.

Urticaceæ.

Parietaria debilis, *A. Forster*. Good fodder.

Casuarineæ.

Casuarina glauca, *Sieb.* "Blackoak." The foliage is a valuable fodder. Aboriginal name, *Alkoo*.

Leguminosæ.

**Daviesia genistifolia*, *Cunn.* Collected near Yudnamuttena by Mr. W. Langley.

Templetonia retusa, *R. Brown*. Collected by Mr. H. L. Hughes, of Umberatena.

Templetonia egena, *Benth.* "Broombush." Aboriginal names, *Atara* and *Binyee*.

- **Goodia medicaginea*, *Salisb.* Collected by Mr. W. Langley near Mt. Livingstone.
- [**Crotalaria Cunninghamii*, *R. Br.* Not eaten by stock.
"Hacks' Bean, Parrot-plant," ornamental. Introduced by me into the district.]
- **Æschynomene indica*, *Linne.* Rare.
- **Indigofera australis*, *Willd.*
- **Indigofera brevidens*, *Bentham.* Both collected by Mr. W. Langley at Mt. Livingstone.
- Clanthus Dampieri*, *Cunn.* Good fodder; perhaps the most ornamental plant in the North. Aboriginal names, *Ngarabana* and *Minyee-minyeelparry*.
- **Swainsonia phacoides*, *Benth.*
- **Swainsonia campylantha*, *F. v. M.*
- **Swainsonia stipularis*, *F. v. M.*
- **Swainsonia oroboides*, *F. v. M.* These Swainsonias, or Vetches, yield fattening fodder, and as far as can be ascertained are not injurious to stock.
- **Psoralea patens*, *Lindl.* Fodder.
- Trigonella suavissima*, *Lindl.* Good fodder. "Scented clover." Aboriginal names, *Walpurla*, *Kanba*, *Kadumma*, and *Columba*. The latter name is from Innamincka blacks.
- Lotus australis*, *Andrews*, var. *Behrianus*. A variety with white flowers has been noticed here. "Poison-weed." Mr. H. L. Hughes, an experienced man with stock, informs me that this weed is very dangerous to sheep, especially when in fruit. It affects sheep most when they partake of it in quantities on an empty stomach, or when they are kept in a yard after feeding freely of the herb. The symptoms are a drooping of the ears of the sheep, which soon become drowsy and stupid; their stomachs are getting distended, and at last they lie down and die. Sheep, when grazing in a paddock, rarely die from the herb, because they feed on other herbage as well. In the event of a flock being driven over a patch where the herb grows thickly, the best plan is to take them from it, and to let them go. Do not yard them under any circumstances, and should symptoms of poisoning appear after yarding, turn the sheep out on feed as quickly as possible. Bleeding will often save a sheep.
- **Glycine tabacina*, *Benth.* Fodder.
- Rhynchosia minima*, *De Can.* Fodder.
- **Cassia pruinosa*, *F.v.M.*
- **Cassia desolata*, *F.v.M.*
- Cassia Sturtii*, *R. Brown.*
- Cassia artemisioides*, *Gaudichaud.*
- **Cassia eremophila*, *Cunn.*

**Cassia phyllodinea*, *R. Brown.*

All these Cassias are ornamental, the foliage and the pods are eaten by sheep. Aboriginal names, *Bundey* and *Wammalleroo*. The seed used to form an article of food for the natives.

**Petalostylis labicheoides*, *R. Br.* Ornamental. Aboriginal name, *Warreedee*.

[**Bauhinia Carronii*, *F. v. M.* Beantree; very ornamental and shady, introduced by me from Strezelecki Creek into the district. Aboriginal name, *Moodloo*.]

Acacia tetragonophylla, *F. v. M.* "Deadfinish." Aboriginal name, *Bararrecka*.

**Acacia papyrocarpa*, *Bentham.* A tree up to 20 feet high. Aboriginal name, *Myall*. Collected by Mr. J. Langley at Trinity Well.

Acacia Sentis, *F. v. M.* "Prickly Acacia." Aboriginal name *Kalyoo*.

**Acacia retinodes*, *Schlecht.* "Wattle." Aboriginal name, *Weerilda*.

Acacia sp. No. 9. Aboriginal names, *Aroo*, *Kakooroo*, *Wurra*. Blacks use the ashes of the leaves in the preparation of Pitchorree (a narcotic).

**Acacia salicina*, *Lindl.* "Native Willow," and variety *varians*. Aboriginal name, *Balkoora*.

**Acacia iteaphylla*, *F. v. M.* (?) Material incomplete.

**Acacia Osswaldi*, *F. v. M.* "Bastard Myall." Aboriginal name, *Whyacka*.

Acacia aneura, *F. v. M.* Local and aboriginal name, *Mulga*.

The Acacias provide useful fodder for stock, especially in adverse seasons. The foliage of *A. aneura* being particularly relished, while *A. sentis* is greatly patronised by the camel. The timber of *A. aneura* is much esteemed and used for posts in preference to all others, and the bark of *A. salicina* is often used by bushmen for tanning skins, with good results.

The seeds of some species are used by the aborigines as an article of food, and the very hard timber of *A. tetragonophylla* is utilised for clubs (waddies) when the knobby roots of the Mallee are not procurable.

Thymelæa.

Pimelea simplex, *F.v.M.* A seemingly useless weed, which no animal will eat. Aboriginal name, *Namala*.

Pimelea microcephala, *R. Brown.* Foliage much in request for fodder by sheep. Aboriginal name, *Willparee*, name of berries, *Narreemahee*.

The aborigines make use of this shrub and its fruits for medicinal purposes. They boil, for instance, the bark of the roots and drink the liquid for the throat and chest complaints, and they twist the extremely tough and fibrous bark of the roots into strings or thin cords, and tie them around their stomach or around their aching head, or other parts of the body, in order to remove the pain. Seeds when chewed are very injurious.

Proteaceæ.

**Grevillea lavandulacea*, Schlecht, var. Collector, Mr. W. Langley.

**Hakea Ednieana*, Tate. "Cork-tree." Collector, Mr. J. Langley, Trinity Well. Aboriginal name, *Yantana*.

Hakea leucoptera, R. Br. "Needle-bush." Aboriginal name, *Kooloova*. The aborigines when hard-pressed for a drink extract water from the running roots, called *Nappa-koparee*. They first burn down the bush, thus driving all the moisture into the roots, which they dig out. One end of the root is exposed to the heat of a fire, and the water trickles out from the other end into a receptacle, often consisting of a wallaby skin turned inside out.

Crassulaceæ.

**Tillæa verticillaris*, De Can.

Ficoideæ.

Tetragonia expansa, Murray. "Native Spinach." A valuable fodder plant; also used as a pot-herb by Europeans as well as blacks, who name the herb, *Paldooroo*.

Aizoon quadrifidum, F. v. M. Fodder.

**Aizoon zygophylloides*, F. v. M. Fodder.

Also, a variety with pink sepals has been noted by me.

Trianthema crystallina, Vahl. Aboriginal name, *Maparee*.

**Zaleya decandra*, Burm. Fodder.

Mollugo hirta, Thunberg. Fodder.

**Mollugo Cerviana*, Seringe.

Lythrariææ.

**Lythrum hyssopifolia*, Linne. Collector, Mr. W. Langley.

Myrtaceæ.

**Callistemon teretifolius*, F. v. M. Collector, Mr. W. Langley.

Melaleuca glomerata, F. v. M. "White tea-tree." Aboriginal names, *Wooda*, *Kooda*.

Melaleuca, species. "Black tea-tree." Aboriginal names, *Woota*, *Koota*.

Eucalyptus oleosa, F. v. M. Aboriginal name, *Mallee*.

Eucalyptus rostrata, Schlecht. "Gumtree." Aboriginal name, *Kalpooroo*; the seed, *Power*, an article of food for the blacks,

Rhamnaceæ.

**Cryptandra phlebophylla*, F. v. M. Near Mt. Livingstone, Mr. W. Langley. The only previous record is "Elder's Range, near Lake Torrens."

Santalaceæ.

Santalum lanceolatum, R. Br. "Cattle-bush," "Currant-tree." Aboriginal name, *Mandaworra*. Ornamental. Good fodder. Blacks eat the fruits. A friend of mine asserts that on a hot summer's day he was driving a flock of sheep in company with a black boy, and met with a tree loaded with ripe fruit. Both ate a large quantity of it and fell asleep. Awaking, they drove the sheep further on, and met with another tree; ate some more fruit with the same result. My friend is of opinion that the berries contain narcotic properties.

Santalum acuminatum, De Can. "Peach-tree." Aboriginal name, *Nakala*. Both Europeans and blacks use the fruits as an article of food. Cattle will greedily eat the foliage, breaking the rather brittle branches off with their horns.

Halorageæ.

**Loudonia aurea*, Lindley. Near Yoodnamuttena Mine.

**Haloragis aspera*, Lindl. Fodder.

Umbelliferæ.

**Didiscus glaucifolius*, F. v. M. Fodder.

Daucus brachiatus, Sieb. Fodder. "Native-carrot."

**Hydrocotyle trachycarpa*, F. v. M.

Cueurbitaceæ.

Melothria maderaspatana, Congn. Aboriginal name, *Willalillalee*. Blacks eat the fruits.

Loranthaceæ.

**Loranthus linophyllus*, Fenzl. Aboriginal name, *Partapee*.

**Loranthus pendulus*, Sieb. Aboriginal name, *Weedla*.

Loranthus Quandang, Lindl. Aboriginal name, *Yappée mulgatee*. These mistletoes are gradually destroying all shrubby vegetation. They are, however, eaten by stock, and the berries are in demand by the natives for food.

Compositæ.

**Wedelia platyglossa*, F. v. M.

**Flaveria Australasica*, Hooker. Fodder.

**Aster pimeleoides*, Cunn. Collected by W. Langley.

**Dimorphocoma minutula*, F. v. M. and Tate.

**Podocoma cuneifolia*, R. Br. Collected by J. Langley.

**Vittadinia australis*, Rich. Fodder. Also a variety with narrow and entire leaves, J. H. Maiden.

- Minuria leptophylla*, *De Can.* Ornamental.
 **Minuria integrifolia*, *Benth.*
 **Minuria suaedifolia*, *F. v. M.*
Calotis hispidula, *F. v. M.* Objectionable.
Calotis cymbacantha, *F. v. M.* Fodder.
Calotis scabiosifolia, *Sonder* and *F. v. M.* Ornamental.
Calotis plumulifera, *F. v. M.* Fodder.
 **Brachycome calocarpa*, *F. v. M.*
 **Brachycome pachyptera*, *Turcz.* Good fodder.
 **Brachycome ciliaris*, *Less.* Good fodder. Two forms have been noticed here. No. 261, stems woolly, leaves linear lobed and dense, rays blue. No. 346, stems and leaves glabrous; leaves few, broader, with short lobes ; rays blue.
 **Senecio Gregorii*, *F. v. M.* Good fodder.
 **Senecio laetus*, *Solander.* Good fodder.
 **Senecio magnificus*, *F. v. M.* Not eaten by stock, but ornamental.
 **Senecio anethifolius*, *Cunn.* Collected by Mr. W. Langley, Yoodnamuttena.
Senecio brachyglossus, *F. v. M.* Fodder.
 **Centipeda thespidioides*, *F. v. M.* Useless.
 **Stuartina Muellieri*, *Sonder.*
 **Elachanthus pusillus*, *F. v. M.*
 **Rutidosis helichrysoides*, *De Can.* Fodder.
 **Pterigeron latroides*, *Bentham.*
 **Pterigeron dentatifolius*, *F. v. M.*
 **Ixiolæna leptolepis*, *Benth.* Not much use.
 **Ixiolæna tomentosa*, *Sonder* and *F. v. M.*
Cassinia laevis, *R. Br.* A shrub, collected by Mr. H. L. Hughes] Umberatena.
 **Podolepis canescens*, *Cunn.* Ornamental. Collected by W. Langley, Mt. Distance.
Podolepis Lessoni, *Bentham.*
Gnaphalium luteo-album, *Linne.* Useless.
 **Gnaphalium indutum*, *Hooker.*
 **Gnaphalium Japonicum*, *Thunberg.*
 **Leptorrhynchos pulchellus*, *F. v. M.*
 **Helipterum moschatum*, *Bentham.*
Helipterum polygalifolium, *De Can.* Ornamental.
Helipterum strictum, *Benth.* Good fodder.
Helipterum floribundum, *De Can.* Ornamental.
 **Helipterum pygmaeum*, *Benth.*
 **Helipterum microglossum*, *Tate.* Ornamental.
 **Helipterum Troedelii*, *F. v. M.* Slightly odoriferous.
 **Helichrysum podolepideum*, *F. v. M.*
 **Helichrysum semipapposum*, *De C.*
 **Helichrysum ambiguum*, *Turcz.* Collected by J. Langley.

**Polycalymma Sturtii*, *F. v. M.* Ornamental.

**Hyalolepis rhizocephala*, *De C.*

Angianthus pusillus, *Bentham.*

**Gnephosis skirrophora*, *Bentham.*

**Gnephosis eriocarpa*, *Bentham.*

**Gnephosis cyathopappa*, *Bentham.*

**Gnaphalodes uliginosum*, *A. Gray.*

**Craspedia chrysantha*, *Bentham.*

**Craspedia pleiocephala*, *F. v. M.*

**Pterocaulon sphacelatus*, *Benth.* and *Hooker.* Local name,
“Horehound.” Aboriginal name, *Yunga-yunga*. The
decoction of the leaves of this perennial plant is used by
bushmen for colds. Others flavour their tea by putting a
leaf or two in it.

Campanulaceæ.

Isotoma petraea, *F. v. M.* Fodder.

**Wahlenbergia gracilis*, *De Can.* “Native Bluebell.” Ornamental.

Goodeniaceæ.

Scævola spinescens, *R. Br.* Fodder. Aboriginal name, *Poorntoo*.
Blacks eat the berries.

**Goodenia pinnatifida*, *Schlecht.* Variety with linear-lanceolate
leaf-segments.

**Goodenia ovata*, *Smith.*

**Goodenia calcarata*, *F. v. M.*

**Goodenia glauca*, *F. v. M.*

**Goodenia heteromera*, *F. v. M.*

Convolvulaceæ.

**Ipomæa heterophylla*, *R. Br.* Aboriginal name, *Woonooroo*.
Natives eat the roots.

**Convolvulus erubescens*, *Sims.* Fodder. Aboriginal name,
Noonyay.

**Evolvulus linifolius*, *Linne.* Collected by W. Langley, Mt.
Livingstone.

Boragineæ.

All but of slight fodder-value.

Heliotropium curassavicum, *Linne.*

Heliotropium Europæum, *Linne.*

**Heliotropium tenuifolium*, *R. Brown.*

**Pollichia Zeylanica*, *F. v. M.* Ornamental.

Echinospermum concavum, *F. v. M.*

Eritrichium australasicum, *De Can.*

**Cynoglossum Drummondii*, *Benth.* Collected by W. Langley,
Mt. Fitton.

Asclepiadæ.

Sarcostemma australe, *R. Br.* "Milk-bush." Almost extinct. Aboriginal names, *Meeninya* and *Parde-bardettee*. Bushmen use the milk to heal sores. I have often seen sheep to feed off this bush.

Marsdenia Leichhardtiana, *F. v. M.* Fodder. "Native Pear." Aboriginal name, *Howla* (fruit). Name of plant, *Toopara*. The natives eat the roots, leaves, flowers, and seeds of this plant.

Gentianæ.

**Erythræa spicata*, *Pers.* Fodder.

Plantagineæ.

Plantago varia, *R. Br.* "Rib-grass." Good fodder.

Solanaceæ.

**Solanum esuriale*, *Lindl.* Aboriginal name, *Puddadee*. Berries when ripe are eaten by blacks.

**Solanum chenopodium*, *F. v. M.*

**Solanum ellipticum*, *R. Br.* Aboriginal name, *Yoomeroo*. Berries are edible.

Lycium australe, *F. v. M.* Fodder. Aboriginal names, *Beeree*, *Wadneree*. The aborigines eat the fruits.

Datura Leichhardtii, *F. v. M.* As this plant is closely allied to *Datura stramonium*, it would be interesting to know whether it possesses the same medicinal properties as the former. Sheep will readily eat it.

Nicotiana suaveolens, *Lehm.* "Native tobacco." This plant is injurious to stock.

Labiatæ.

**Mentha australis*, *R. Br.* "Mint," strongly odoriferous
Teucrium racemosum, *R. Br.* Fodder.

**Prostanthera striatiflora*, *F. v. M.* An ornamental shrub, "Lilac-bush." Aboriginal name *Yulpoo*.

Serophularineæ.

**Stemodia Morgania*, *F. v. M.* Collected by Mr. W. Langley near Ooloo Tank.

**Limosella Curdieana*, *F. v. M.*

Acanthaceæ.

Justicia procumbens, *Linne.* Rare.

Myoporineæ.

**Myoporum montanum*, *R. Br.* "Myrtle-tree." Aboriginal name *Adloo*. Fruits are eaten by blacks.

Myoporum refractum, *Maiden.* Useless for fodder.

Eremophila scoparia, *F. v. M.* "Balsambush."

Eremophila longifolia, *F. v. M.* Aboriginal name, *Kooyamurra*.

The natives use the branches of this tree for the sacred purpose of covering their dead.

**Eremophila Freelingii*, *F. v. M.* "Honeysucklebush." A white flowering form has been observed. Aboriginal name, *Kaltya* or *halya*.

Eremophila oppositifolia, *R. Br.* Aboriginal name, *Weeooka*.

Eremophila Brownii, *F. v. M.*

Eremophila Duttonii, *F. v. M.* Aboriginal name, *Kaltya, halya*.

Eremophila maculata, *F. v. M.* "Emubush." Aboriginal name, *Nanyoo*.

Eremophila latifolia, *F. v. M.* Rare.

**Eremophila alternifolia*, *R. Br.* "Honeysucklebush." Aboriginal names, *Kaltya, halya*.

The Myoporineæ are more ornamental than useful, still sheep will feed on them sparingly in bad seasons, and thus prolong their existence, and I have often seen them lick up the shed corollæ with avidity.

Coniferæ.

Callitris verrucosa, *R. Br.* "Pinetree." Collected near Mt. Livingstone by Mr. W. Langley.

Amaryllideæ.

Crinum pedunculatum, *R. Br.* Ornamental.

**Calostemma luteum*, *Sims.* Ornamental. Aboriginal name, *Waddywurra*.

Liliaceæ.

Wurmbea dioica, *F. v. M.* "Lily."

Dianella revoluta, *R. Br.*

Bulbine bulbosa (?) *Hav.* Aboriginal name, *Boontooka*.

**Thysanotus tuberosus*, *R. Br.* Blacks eats the tubers.

**Xanthorrhoea quadrangulata*, *F. v. M.* "Grass-tree." So far as the material permits of identification.

Fluviales.

**Triglochin calcitrappa*, *Hooker*.

Cyperaceæ.

Cyperus rotundus, *Linne.* Ornamental. This species has a cormlike root.

**Cyperus vaginatus*, *R. Brown.*

Cyperus subulatus, *R. Br.* (?)

N.B.—There is a cyperus species growing here which, however, is not satisfactorily identified. It has a small

bulbous root, from which long filiform roots spring, at the ends of which new bulbs are formed. These small bulbs have a nut-like taste, and are eagerly dug after by the natives, who call them *Kudnamurra*, *Ala*, *Yower*, *Tharaka*, the name *Yower* being mostly used by Mt. Lyndhurst blacks.

Cyperus laevigatus, *Linne*, var. Collected by Mr. J. Langley, Trinity Well.

**Cyperus alterniflorus*, *R. Brown*.

**Heleocharis acuta*, *R. Brown*. Collected by Mr. J. Langley, St. George Creek.

**Scirpus litoralis*, *Schrader*. Also collected by Mr. J. Langley at Fishponds. Walparinna Springs, near Mount Freeling.

Gramineæ.

Only a very few of this order are not fit for fodder, and those species which are most widely distributed through the district are generally considered the most useful. The aborigines call grass and other small herbage *Kanta*.

Panicum coenicolum, *F. v. M.* Rare. Aboriginal names, *Talghee*, *Allee*. The seed called *Power-tundra* is an article of food for the blacks of the district.

**Panicum divaricatissimum*, *R. Br.* Rare.

**Panicum gracile*, *R. Br.* "Food-grass." Aboriginal name, *Talghee*. Blacks eat the seeds of this species. A quickly-growing grass after a flood.

**Panicum leucophœnum*, *H. B. K.*

Panicum reversum, *F. v. M.* Not sufficiently plentiful to be of value for fodder.

**Setaria viridis*, *Palisot*. Rare.

**Erianthus fulvus*, *Kunth*. "Sugar-grass." Aboriginal name, *Aldroo*. A valuable grass.

Andropogon sericeus, *R. Rr.* "Rattail-grass." Very valuable.

Andropogon punctatus, *Roab.* Good fodder.

Andropogon exaltatus, *R. Br.* "Scent-grass." Of no fodder value.

**Anthistiria ciliata*, *Linne*. "Kangaroo-grass." Ornamental, but rare.

**Anthistiria membranacea*, *Lindl.* "Barcoo-grass." Useful fodder.

Eriochloa polystachya, *Humb.* and *Kunth*. Much esteemed.

Tragus racemosus, *Haller*. "Bur-grass." Fodder.

Pappophorum commune, *F. v. M.*, and var. *avenaceum*. "Summer-grass." Useful.

**Alopecurus geniculatus*, *Linne*.

**Stipa scabra*, *Lindl.* "Spear-grass." Fodder.

- Chloris acicularis*, *Lindl.* "Spider-grass." Good fodder.
 **Chloris divaricata*, *R. Br.* Fodder. New for South Australia.
 **Chloris truncata*, *R. Brown.* Found by Mr. Langley near Mount Livingstone.
- Aristida arenaria*, *R. Br.* "Mulga-grass." Fodder.
 **Aristida depressa*, *Retz.* Rare. [*A. ramosa* of my "Hand-book" belongs here.—R. TATE.]
 **Aristida calycina*, *R. Br.* "Spear-grass."
 **Sporobolus actinocladus*, *F. v. M.* Useful fodder. I have often noticed this grass to be infested by a fungus.
 [Cynodon Dactylon, *Rich.* "Couch-grass." This grass was introduced by me into the district.]
- Triraphis mollis*, *R. Br.* Rare.
Astrebla pectinata, *F. v. M.* "Mitchell-grass." A perennial. One of the most valuable grasses of the North. Aboriginal name (Queensland), *Taldra anta*.
 **Astrebla triticoides*, *F. v. M.* "Annual Mitchell-grass." Very much esteemed for fodder.
- **Bromus arenarius*, *Labillard.*
Diplachne loliiformis, *F. v. M.* Too minute to be of value.
Eleusine cruciata, *Lam.* "Summer-grass." "Eight-day-grass." A very quick-growing, though not lasting, grass. Aboriginal name, *Wallamurroo*.
Triodia irritans, *R. Br.* "Porcupine-grass." Of no value, except the young shoots after a burning of the old grass. The long fruit-spikes are eaten by stock.
 **Triodia pungens*, *R. Brown.* Found by Mrs. J. Stamford in the sandhills near Farina.
- **Schedonorus litoralis*, *Palisot.*
Eragrostis pilosa, *Palisot.* Useful fodder.
Eragrostis Brownii, *Nees.* Good fodder.
Eragrostis chaetophylla, *Steud.* (?)
 **Eragrostis falcata*, *Cand.* Good fodder.
Poa ramigera, *F. v. M.* "Cane-grass." Rare. Aboriginal name, *Dickeree*.

Rhizospermæ.

Marsilea quadrifolia, *Linne.* Fodder. Aboriginal name, *Nardoo*. The natives eat the spore-cases by pounding them up into flour.

Filices.

Cheilanthes tenuifolia, *Swartz.* "Rock-fern."
Cheilanthes vellea, *F. v. M.* "Hairy Rock-fern."

INTRODUCED PLANTS, noticed at Mt. Lyndhurst.

- **Sisymbrium officinale.*
 - Erodium cicutarium.*
 - Chenopodium murale.*
 - **Papaver hybridum.*
 - Centaurea melitensis.*
 - Sonchus oleraceus.*
 - Xanthium spinosum.*
 - **Cryptostemma calendulacea.*
 - Malva rotundifolia.*
 - Nicotiana glauca.*
 - **Silene gallica.*
 - **Lithospermum arvense.*
 - **Hordeum murinum.*
 - **Phalaris canariensis.*
 - **Pieris hieracioides.*
 - **Capsella bursa-pastoris.*
 - **Medicago denticulata.*
-

ON SOME NEW OR LITTLE-KNOWN SOUTH
AUSTRALIAN PLANTS.

By PROFESSOR RALPH TATE.

[Read October 4, 1898.]

CORCHORUS LONGIPES, *n. sp.*, 1898.

A prostrate diffuse undershrub, with several wiry branches, radiating to one foot or more in diameter, sparsely short glandular hirsute. Leaves glabrous or slightly stellate-hirsute, oblong-lanceolate, bluntly pointed, somewhat attenuate at the base, coarsely serrate-crenate, about 10 mm. long, on stalks about one-third the length of the leaf. Stipules broadly and obliquely triangular, toothed, or simple.

Peduncles about 10 mm. long, bearing one or two pedicellate flowers in the axils of two small obliquely triangular bracteoles connate on one side, and forming a slight incomplete cup; pedicels about half the length of the peduncles, both with minute glandular hairs.

Sepals broadly lanceolate, acuminate, 3.5 mm. long, almost glabrous.

Petals bluish-white, narrow-spathulate, attenuate into a long claw, midrib distinct, 4 mm. long.

Stamens five, free, longer than the ovary, 2.5 mm. long.

Ovary thickly beset with short stellate-hairs, 2 mm. long, terminated by a much abbreviated style.

Capsule on straight not recurved pedicels, oval oblong, obtusely rounded at both ends, 6 mm. long, exteriorly minutely stellate-hairy and contracted between the seeds; valves five, membranous. Seeds somewhat horse-shoe shaped, smooth, 12 to 16 in each cell, without transverse partitions between them.

Mount Lyndhurst Run in the neighbourhood of Farina, South Australia.—*Max Koch*.

This species differs from its Australian congeners, which are subshrubby in habit, in many particulars; of these may be noted the long peduncles, the erect capsule, the inconspicuous vestiture of glandular hairs, the fewness of stamens, the shape of the numerous seeds. In general appearance it resembles *C. vermicularis*.

ACACIA PAPYROCARPA, *Bentham*.

It is with some hesitation that I refer the *rigens*-like *Acacia* from Mount Lyndhurst to the rare *A. papyrocarpa*, on account

of the incomplete diagnosis of that species, as published in Fl. Aust., ii., p. 338. But so far it agrees with it, and differs from *A. rigens* in those particulars pointed out by Bentham. The material before me permits of a full definition of the species, which here follows incorporating the new facts with Bentham's diagnosis :—

“ A small tree of about 25 feet, the branches nearly terete, glabrous or minutely hoary-pubescent. Phyllodia linear-subulate, rigid, thick, but slightly flattened (1), 2 to 3 in. long, tapering into a recurved (or straight) but not pungent point, narrowed at the base, striate with numerous fine parallel nerves only visible under a lens, slightly hoary-tomentose, especially along the centre, without any midrib.”

Peduncles axillary, solitary, about half-an-inch long, bearing each a globular head, 4·5 mm. diameter, of about 20 pale-yellow 4-merous flowers.

Calyx of four sepals slightly united at the base, half as long as the corolla ; each sepal narrow-oblong, slightly dilated atop, ciliate (not hair-tufted as in *A. rigens*) on the margin of the spatulous tip, thin and transparent except the yellow summit.

Corolla of four, slightly unequal, free, incurved petals. Each petal somewhat oval in outline, slightly apiculate at the summit, and distinctly attenuated into a claw, with a distinct midrib ; smooth, thin and transparent, but yellow in the upper half.

Ovarium wholly concealed beneath long silky-white threads.

“ Pod flat, falcate or flexuous, 3 to 4 inches long, 4 to 5 lines broad (only here and there slightly contracted between the seeds), valves almost membranous (with raised reticulated nerves). Seeds longitudinal (acutely ovoid, flat, brown and shining, 7 x 4 vix mm.); funicle with (two) very short folds (beneath the strophiole), gradually and not much thickened from the base.”

Affinities and Differences.—Bentham compared his species with *A. rigens*, with which it has much resemblance, and pointed out that the finer and more numerous veins on the phyllodes, and the form of the pod were specific differences. The further anatomical details which I have reported above, while they indicate on the one hand other characters in common, yet they augment the difference between the two species ; notably the tetramerous flowers (as noted without exception in the numerous flowers analysed) and the hairy ovary. The hairy ovary and 4-merous flowers agree with *A. sessiliceps*, but the sepals, phyllodes, seeds, and funiculus are different.

Localities.—The type-specimen was collected by R. Brown on the “South Coast.”

In seeking to give more topographic definition of this phrase we have in the first place a choice of the localities in South Aus-

tralia, botanically explored by Robert Brown. These are Memory Cove, Port Lincoln, Kangaroo Island, Petrel Bay, Fowler Bay, St. Peter's Isles, Spencer Gulf, and Head of Spencer Gulf. And in the second place we have to consider the known distribution of the species. Of the twenty records "S. coast," a large number may be interpreted Port Lincoln, but in other cases, as *Craspedia globosa*, such an attachment is incompatible with known habitats.

As regards *A. papyrocarpa*, such an inquiry is of interest, as the original locality has long remained unique. To be in geographic harmony with subsequent records "S. coast" in this case may be regarded as signifying either the costal tracts about Fowler Bay or at the Head of Spencer's Gulf.

Baron F. v. Mueller attributes this species also to West Australia in his "Census Aust. Plants," 1882; but he had not published any other fact supplemental to Bentham's account of it, and it has no place in his Monograph of the Australian Acacias.

The only authentic record is Mount Lyndhurst Run, cited in Mr. Koch's list (see ante).

HELIPTERUM MICROGLOSSUM, Tate.

Ref.—Trans. Roy. Soc., S. Aust., VII., p. 104, 1883.

Syn.—*H. corymbiflorum*, var. ? *microglossa*, F. v. M., in Fl. Aust., III., p. 647. *H. microglossum*, Maiden and Betche, Proc. Lin. Soc., N.S.W., XXII., p. 151, 1897.

Localities.—In South Australia, slopes of Mount Parry and Termination Hill, and extending thence into Lake Torrens Plain (*R.T.*) ; Mount Lyndhurst Run, *M. Koch*! this last locality is in the same botanic region ; Port Augusta, *Mrs. Richards*! ; and Gawler Range, *Dr. Cleland*!. Warrina, *Mrs. Richards*; Mount Eba, *E. Giles*; and Yorke Peninsula, *O. Tepper*, from data in Melbourne Herbarium on the authority of its present Curator ; but the last locality is an error, as I have ascertained by examination of Mr. Tepper's original set. In New South Wales, Goyninga Mountains, *Fl. Aust.*, and other localities recorded by Maiden and Betche, *op. cit.*



**DIMORPHISM IN TWO SOUTH AUSTRALIAN
CRUCIFEROUS PLANTS.**

By PROFESSOR RALPH TATE.

[Read October 4, 1898.]

Bentham, in Fl. Austral., I., p. 80, thinks it possible that *Geococcus pusillus* (a monotypic genus) "may be a dimorphic state of a species of another genus . . . a radical-leaved *Blennodia*, for example."

Geococcus pusillus is recorded by F. von Mueller in "Census Australian Plants," 1882, for W.A., S.A., V., and N.S.W.; and Queensland is added in the second supplement to that census published in 1885. For South Australia the species has occurred at the following localities on the authority of Baron F. v. Mueller:—River Murray (*in litteris* to the writer), Fowler Bay (*Mrs. Richards*, in Trans. Roy. Soc., S. Aust., vol. III., p. 172, 1880), and Ardrossan, Yorke Peninsula (*J. G. O. Tepper*, T.R.S., S. Aust., vol. III., p. 175, 1880).

From these three widely separated localities I have seen plants of so-called *G. pusillus* from Ardrossan only. The duplicate set submitted to me by the collector permits me to state that the late Baron confounded two very distinct species under the one name, one being a state of *Stenopetalum sphærocarpum*, and the other a plant agreeing fairly well with Bentham's description of *Geococcus pusillus*. The first of these offers some points of interest, which I will at once describe, whilst the nature of the other will be considered in its relationship to other similar plants observed elsewhere.

STENOPETALUM SPHÆROCARPUM.

Under *Geococcus pusillus*, F. von Mueller included in the Ardrossan List of Plants, *op. cit.*, a dwarf state of this species, differing in one particular only from the normal condition in having cleistogamous flowers (though not observed by that botanist). The flowers are more or less closed by the adpression of the relatively large sepals, so that all the interior organs are concealed. Each petal has a filiform claw, spatulately expanded upwards, and terminated by a rather long filamental extension. The latter in the dried specimens is spirally coiled in a horizontal direction, and is included within the calyx. The capsules are prolific in seeds, and though the pedicels are recurved, yet they are not abnormally lengthened, so as to bring the fruit to the ground.

BLENNODIA CARDAMINOIDES, *Bentham.*

The second of the Ardrossan plants represents the "Geococcus-state" of this species. But before submitting evidences of such an attachment, I desire to discuss the advisability of the *Retention of the genus Blennodia*, R. Brown, 1849.

The majority of Australian botanists influenced by their compeer has accepted his dictum that *Blennodia* is made up of species of the genera *Sisymbrium* and *Erysimum*. A critical examination of the 10 species of the South Australian flora, collectively included under these two generic names, satisfies me that the venation of the capsule is not that proper to *Sisymbrium*; as in all the species, there is only a midrib, without a lateral vein on each side. The midrib varies, however, in its prominence—being conspicuous in *B. filifolia*, slender in *B. trisecta*, inconspicuous in *B. lasiocarpa*, or obsolete in *B. canescens*, though in the related species *B. curvipes* there is a distinct keel on the capsular valve. There is no justification for the employment of *Sisymbrium* for some of our crucifers, and I take, therefore, this opportunity to refer my *S. procumbens* to *Blennodia* as *B. procumbens*, Tate, 1898. The seeds not distinctly in a single row separate *Blennodia* from *Erysimum* as also from *Sisymbrium*.

GEOCOCCUS PUSILLUS, a dimorphic plant and of what one or more species?

I have already referred to Bentham's perspicuity in regard to *G. pusillus*, which subsequent investigations have proved him to be correct. Following on, in the order of time, I find that Mueller in "Key to Victorian Plants," p. 131 (1888), under *Sisymbrium cardaminoides*, describes the "Geococcus-state" of the species in the following words:—"Or in a stemless state of this plant (fruits) very short, rather thick and turgid, singly forming on their stalks, and during maturation burying themselves in the ground; the flowers of this state very minute." This implies that all the Victorian plants previously quoted as *G. pusillus* belong to *Blennodia cardaminoides*. In the following year the same author in the fourth supplement to his "Census of Australian Plants," indicates at p. 5 that "*Geococcus pusillus* = *Sisymbrium cardaminoides*," which implies that *G. pusillus*, Drummond, is a dimorphism of the quoted species. This may be true in the majority of cases, but in view of the fact that *Blennodia*, in the sense used by Bentham, is represented in W. Australia, by the three following species only—*B. trisectum*, *B. Richardsii*, and *B. brevipes*, it is inconsistent to regard Drummond's plant as belonging to *B. cardaminoides*, the normal condition of which is not known to inhabit the same country as

Drummond's type. At the same time I must admit that the specific description of Drummond's plant well agrees with the South Australian examples of the "Geococcus-state" of *B. cardaminoides*.

Examples of so-called *Geococcus pusillus* have been studied by me from the following South Australian localities:—Ardrossan, *J. G. O. Tepper*; Mount Remarkable, *C. F. Johncock*; Craddock, *Central Agricult. Bureau*. They all agree in general characters with Bentham's diagnosis—in radical pinnatifid leaves, stemless, the fruits born singly on radical axillary reflected peduncles, burying the capsules in the ground. The flowers I have not seen. The capsule is cylindrical, at its longest about 7 mm., not exceeding 9 mm., and from four to five times as long as wide, the pedicels about 10 mm. long, broad and flat; but the fruits are often deformed, some reduced to an ovoid outline of 3 by 2·5 mm., or even slightly less, this deformity may arise from the resistance to penetration offered by hard ground. Each fruit-valve flatly convex from a median keel, reticulately streaked on the sides and sparsely stellately-hairy, apex obtusely pointed.

Though the foliage is that of *Blennodia cardaminoides*, yet the other structures are not in agreement therewith. Thus the stigma is sessile, the pod is not curved (though this character is not constant in *B. cardaminoides*), and is not attenuated at the base, whilst its conspicuous midrib and the reticulate veining on the side are additional distinctions. These marked differences must be related to the habit of dimorphism; inasmuch as I possess a plant of *B. cardaminoides* from Cooper Creek, which has four single-flowered short stalks (about 7 mm. long), some erect others horizontal, among the radical leaves; otherwise it is normal, the single flowers are not yet advanced enough to show no more than a slight passage towards a fully developed "geococcus-state." However, a little has been gained in the direction of correlating the two very dissimilar states of *Blennodia cardaminoides*, which have in common virtually only leaf-form.

LIST OF BIRDS COLLECTED BY THE CALVERT
EXPLORING EXPEDITION IN WESTERN
AUSTRALIA.

By ALFRED J. NORTH, C.M.Z.S., Ornithologist to the Australian Museum, Sydney. With Field Notes by G. A. KEARTLAND, Naturalist to the Expedition.

[Read October 4, 1898.]

I have received from the South Australian Museum, Adelaide, for examination, an interesting collection of North-West Australian bird skins, prepared by Mr. G. A. Keartland. The collection was formed chiefly during the time Mr. Keartland had charge of the camp at the junction of the Fitzroy River and Margaret River, about forty-five miles from Derby, and while the leader, Mr. L. Wells, was absent in search of the missing members of his staff—Mr. C. F. Wells and Mr. G. Jones. Owing to the intense heat, and scarcity of water and feed for the camels, over 300 bird-skins obtained prior to the main party leaving Separation Well, together with guns, tools, and clothing, had to be abandoned in the desert.

Unfortunately for science, the attempts of late years to wrest Nature's secrets from the arid inland regions of North-West Australia have been more or less attended with disaster. In 1886 Mr. E. J. Cairn, who was collecting natural history specimens on behalf of the Trustees of the Australian Museum about 100 miles inland from Derby, narrowly escaped losing his life. In the broad daylight his party was suddenly attacked by the natives, who were concealed behind some rocks, and the head of a spear passed through the fleshy part of one of Mr. Cairn's arms. Although suffering no further injury from the natives, misfortune still pursued him, for after weary months of toil, portion of his collection, consisting of many bird-skins, nests, and eggs, was lost in transit to the Museum, and was never recovered.

Early in the same year the late Mr. T. H. Bowyer-Bower left Sydney for Derby with a taxidermist, who had accompanied him from London. This gentleman and his assistant succeeded in forming a splendid collection, although part of it was destroyed during their absence one day from the camp through the grass catching fire, and burning one of their tents and everything in it. After spending nearly twelve months in the district, shortly before Mr. Bowyer-Bower left Derby, he contracted a malignant

fever, which, to the deep regret of all who knew him, terminated fatally a few days after his arrival at Port Darwin. These calamities are now overshadowed by the sad fate of the lost explorers of the Calvert Expedition, who perished from thirst in the desert. The indomitable perseverance, however, of the leader, Mr. L. Wells, in his heroic attempts to rescue his late companions, forms a bright page in the recently-added chapter to the history of Australian exploration.

Dr. E. P. Ramsay, in the Proceedings of the Linnean Society of New South Wales,* has enumerated the species contained in Mr. Cairn's and the late Mr. T. H. Bowyer-Bower's collections. The former, which consisted only of the recovered portion of the collection, contained examples of 66 species, and numbered among them were specimens of *Malurus coronatus* and *Emblema picta*, recorded, probably, for the first time since the types were described by Mr. Gould.

Although the extent of the late Mr. Bowyer-Bower's collection had been materially reduced by a disastrous fire, it was the largest ever obtained in North-West Australia, numbering 152 species. It was formed within a radius of 25 miles of Derby, and included in it a number of migratory and littoral species not represented in the present collection.

The abandonment near Johanna Springs of the first collection made by the Calvert Expedition is a most serious loss, especially to my indefatigable friend, Mr. Keartland, who joined the party purely for the love of the ornithological results it would yield. It is, however, a matter for congratulation that he was able to save his field notes.

The collection brought back by Mr. Keartland was formed between December 22, 1896, and May 1 of the following year, and numbers, exclusive of the nests and eggs, 167 specimens, referable to 59 species.

I had the pleasure of examining Mr. Cairn's and the late Mr. Bowyer-Bower's collections, and note that many beautiful forms contained therein are absent from the present collection. One misses the lovely little *Malurus coronatus*, *Erythianura crocea*, and *Poëphila mirabilis*, and also the duller-plumaged, but rarer, *Astur cruentus*.

On the other hand, several remarkable species, not included in either of the above collections, are now recorded for the first time from North-West Australia, notably the chastely-coloured *Spathopterus alexandræ*, obtained near Johanna Springs, and *Ptilotis keartlandi*, procured near Derby. The latter species was one of the novelties discovered by Mr. Keartland during the

* Ramsay, Proc. Linn. Soc., N.S.W., vol. I., Second Series, p. 1,085 (1886); *id. op. cit.*, vol. II., Second Series, p. 165 (1887).

journey of the Horn Scientific Expedition in Central Australia. It could hardly be expected that the district in which the present collection was made would yield any but well-known forms, especially as the late Mr. Bowyer-Bower and his assistant had systematically worked the adjacent neighbourhood for nearly 12 months. Nevertheless, the collection, although comparatively small, is of great interest, as it has increased our knowledge of the range of several species, and contains the hitherto unknown eggs of *Lophophaps ferruginea*.

In the accompanying paper, as in the Report of the Horn Expedition, Mr. Keartland's notes on his observation of the different species in the field are placed between square brackets.

No. 1. *CIRCUS ASSIMILIS* (Spotted Swamp Harrier).

Circus assimilis, Jard. & Selby, Ill. Orn., vol. I., pl. 51 (1826); Sharpe, Cat. Bds. Brit. Mus., vol. I., p. 63 (1874); Ramsay, Proc. Linn. Soc. N.S.W., vol. II., 2nd series, p. 165 (1886); North, Nests and Eggs, Austr. Bds., p. 1 (1889).

Circus jardini, Gould, Bds. Austr., fol., vol. I., pl. 27 (1848); Sturt, Exped. Centr. Austr., vol. II., App., p. 12 (1848).

An adult female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. Wing, 17 inches.

[This beautiful Harrier was frequently met with in the course of our trip. Near Lake Way several were observed flying slowly near the ground, seeking their prey in the form of lizards, &c. Whilst collecting in the vicinity of the camel dépôt on August 18, 1896, Mr. Chas. F. Wells pointed out a nest containing two eggs, from which he had just disturbed the bird. The nest was about 30 feet from the ground on an horizontal branch of a gum-tree. On September 25 Mr. L. A. Wells took two eggs slightly incubated from a nest situated in the forked branch of a gum-tree about 20 feet from the ground. They were somewhat rough-shelled, white, with slight brown stains as though soiled with coffee. On several occasions these birds were seen near the junction of the Fitzroy and Margaret Rivers. When in quest of food they seem very restless. I never saw one perch on a tree, but disturbed many engaged in devouring their prey in the long grass which abounds on the tributaries of the Fitzroy River.]

No. 2. *FALCO MELANOGENYS* (Black-cheeked Falcon).

Falco melanogenys, Gould, Proc. Zool. Soc. (1837), p. 139; *id.*, Bds. Austr., fol., vol. I., pl. 8 (1848); Sturt, Exped. Centr. Austr., vol. II., App. p. 14 (1849); Sharpe, Cat. Bds., Brit. Mus., vol. I., p. 385 (1874); Ramsay, Proc. Linn. Soc. N.S.W., vol. II., 2nd series, p. 166 (1887); North, Nests and Eggs, Austr. Bds., p. 16, pl. III., fig. 4 (1889).

One young female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers.

[These falcons are numerous all through Kimberley, especially near water. They are known locally as the "Snake Hawk," but the specimen shot had been feeding on grasshoppers. As it is well known that these birds are generally found in rocky country, it is probable that the homes of those noted will be found in the Oscar, Leopold, and Barrier Ranges.

No. 3. STRIX DELICATULA (Delicate Owl).

Strix delicatulus, Gould, Proc. Zool. Soc. (1836), p. 140; *id.*, Bds. Austr., fol., vol. I. pl. 31 (1848); Sturt, Exped. Centr. Austr., vol. II., App. p. 17 (1849).

Strix delicatula (*subsp.*), Sharpe, Cat. Bds. Brit. Mus., vol. II., page 297 (1875); North, Nests and Eggs, Austr. Bds., p. 24 (1889).

Strix delicatula, Ramsay, Proc. Linn. Soc., N.S.W., vol. II., 2nd series, p. 166 (1887).

An immature male, obtained at the camp, about five miles from the junction of the Fitzroy and Margaret Rivers.

[These beautiful birds were met with in the Mulga scrubs east of Lake Way, where they presented a most grotesque appearance as they gazed at the passing caravan. At the camel dépôt several more were noted, and specimens obtained. These birds were all perched amongst the foliage of the trees. Whilst shooting at one of the creeks passed, Mr. C. F. Wells disturbed a pair from the hollow spout of a eucalypt, and on another occasion, at the Fitzroy River, I had sent a native to examine a hollow branch, when another pair flew out, striking him in the face with their wings as they escaped.]

No. 4. NINOX OCELLATA (Fawn-bellied Owl).

Chevéche ocellée, Hombr. and Jacq., Voy. Pôle Sud, Atlas, pl. 3, fig. 2 (1843).

Athene ocellata (Homb. et Jacq.) Jacq. et Pucher., Voy. Pôle Sud, tom. III., p. 51 (1853).

Ninox ocellata (*subsp.*), Sharpe, Cat. Bds. Brit. Mus., vol. II., p. 170 (1875).

One immature male. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. This specimen has the entire face snow-white, rendering the brown ear-coverts very conspicuous, the head and hind neck more strongly washed with ochraceous fawn, and the under parts slightly paler than adult examples from Port Essington. Total 11 inches, wing 8.6, outer tail-feathers 5, tarsus 1.45.

[I had only one opportunity of securing this species. Whilst collecting near the Fitzroy River, my blackboy noticed a pair perched just overhead. They gazed at us whilst he climbed to secure a Honey-eater's nest, and on his descending the tree, I shot one, the other escaping before I could reload. I was much struck with the manner in which these birds seemed to compress their feathers so as to make themselves appear remarkably small.]

No. 5. *NINOX OCCIDENTALIS* (Western Winking Owl).

Ninox connivens-occidentalis, Ramsay, Proc. Linn. Soc. N.S.W., vol. I., 2nd. series, p. 1,086 (1886); *id.*, op. cit. vol. II., 2nd. series, p. 166 (1887).

A young male and a young female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. This north-western form of *N. connivens* may be distinguished by the pale rufous-brown stripe down the centre of each feather of the under surface. The young resemble the adults in plumage.

[Although nocturnal in their habits, I found these birds were capable of keeping a sharp lookout in the brightest sunshine. On disturbing a pair near the Fitzroy River I shot the female. Her mate flew off, pursued by several Friar birds, Grallinas, Red-throated Honey-eaters, Kingfishers, and Wood Swallows, but, although his attention was somewhat absorbed in repelling their attacks, I had great difficulty in securing him after a chase of nearly a mile. These Owls are also numerous along the course of the Nerrima and Jilgelly Creeks, where they frequent the dense bushes near the waterholes, and feed on the small animals, birds, and reptiles which come to drink in the evening.]

No. 6. *CACATUA GALERITA* (Sulphur-crested Cockatoo).

Psittacus galeritus, Lath., Ind. Orn., vol. I., p. 109 (1790).

Cacatua galerita, Gould, Bds. Austr., fol., vol. V., pl. 1 (1848); Sturt, Exped. Centr. Austr., vol. II., App. p. 35 (1849); North, Nests and Eggs, Austr. Bds., p. 250 (1889); Salvad., Cat. Bds. Brit. Mus., vol. XX., p. 16 (1891).

One freshly-moulted adult female, some of the quills and tail-feathers being not full grown. This specimen is smaller than examples from other parts of Australia. Total length, 17 inches; wing, 11·8; tail, 7. Camp about five miles from the junction of the Fitzroy and Margaret Rivers.

[During February a few of these birds visited the Fitzroy River, but they are regarded as rare in that locality. I shot one, which proved to be a female, evidently on the lookout for a nest, as the ovaries were well developed. This bird was much smaller in size than any of the species I have seen.]

No. 7. CALYPTORHYNCHUS MACRORHYNCHUS (Great-billed Black Cockatoo).

Calyptorhynchus macrorhynchus, Gould, Proc. Zool. Soc., 1842, p. 138; *id.*, Bds. Austr., fol., vol. V., pl. 8 (1848); Salvad., Cat. Bds. Brit. Mus., vol. XX., p. 110 (1891).

	Total Length.	Wing.	Tail.
Female, imm. sk.	22 in.	16·5	11·8
Female, imm. sk.	22 in.	16·2	11·7

Two immature females. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. In addition to the difference in size, the females of this species may be distinguished from those of *C. banksi* and *C. stellatus* by the greater extent of yellow in the cross-bars on the tail.

[These birds were first observed at Mullawa, and were subsequently seen on several occasions as they passed overhead, but at the Fitzroy River they were very numerous. During December they came in large flocks to a small lagoon near our camp, just before sunset and in the early morning. They spent some time on the ground after satisfying their thirst, during which they appeared to be feeding on the bulbs of a species of water-lily. Young birds were taken by the natives from the spouts of the eucalyptus on the Margaret River early in November.]

No. 8. SPATHOPTERUS ALEXANDRÆ (Princess of Wales' Parrakeet).

Polytelis alexandriæ, Gould, Proc. Zool. Soc., 1863, p. 232.

Polytelis alexandriæ, Gould, Suppl. Bds. Austr., pl. 62 (1869); Salvad., Cat. Bds. Brit. Mus., vol. XX., p. 479 (1891); North, Rec. Austr. Mus., vol. II., p. 19, pl. 2., fig. 5 (1892); Sclater, List Vert. Anim. Zool. Gard., 9th ed., p. 358 (1896).

Spathopterus alexandriæ, North, Ibis, p. 339 (1895); Spencer, Horn Exped. Centr. Austr., part 1 *Narr.* pp. 100, 147 (1896); North and Keartl., op. cit., pt. 2, Zool., p. 69, pl. 5 (1896).

A female, obtained two miles S.W. of Johanna Springs. Specimens were also procured N.W. of Mount Bates, before the party separated, but were left in the desert when the collections were abandoned. It is interesting to extend the range of this beautiful Parrakeet to West Australia.

[On the flying trip made by Messrs. L. A. Wells and G. L. Jones during August they found numbers of these birds about one hundred miles North-East of Mount Bates, and on several subsequent occasions, but when we traversed the same track about five weeks later I only saw them twice, and succeeded in shooting one pair. Again in April a pair were seen within two miles of Johanna Springs, and several days later a flock of about 20 was noted in the same neighbourhood. They appear to be

confined to the most dreary desert country, and must either travel long distances to water or require very little of it. In the stomachs of those opened the seed of the *Triodia* predominated. When noted they were disturbed whilst feeding amongst the "*Spinifex*," and usually perched on the nearest tree irrespective of species. Mr. Wells has since reported seeing several within a few miles of the Fitzroy River.]

No. 9. PTISTES ERYTHROPTERUS (Red-winged Lory).

Psittacus erythropterus, Gmel., Syst. Nat., vol. I., p. 344 (1781).

Aprosmictus erythropterus, Gould, Bds. Austr., fol., vol. V., pl. 18 (1848).

Ptistes erythropterus, North, Nests and Eggs, Austr. Bds., p. 255. pl. 14, fig. 5 (1889); Salvad., Cat. Bds., Brit. Mus., vol. XX., p. 481 (1891).

Three adult males, one adult female, one young male. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. Similar in colour and size to examples from Eastern Australia, except in having the tail-feathers slightly more yellowish-green. Two eggs, taken from a hollow trunk of a tree near the Fitzroy River, March 17, 1897, are rounded ovals in form, white, and slightly nest-stained, the measurements of both being alike, 1·18 x 0·97 inch. Gould records in his "Birds of Australia" that he met with this species on the Liverpool Plains, but neither Dr. Ramsay in his "Tabular List of Australian Birds," nor Count Salvadori in Catalogue XX. of British Museum include New South Wales in the habitat of the Red-winged Lory. These birds are by no means uncommon in the Northern and North-Western parts of the colony. I met with them on Namoi River in November, 1896, and I have known of their eggs being taken from nesting places in trees on the Bogan, Macquarie, and Warrego Rivers.

[This beautiful Lory was only found in the vicinity of the Fitzroy River, where it appears to be fairly plentiful. Seldom more than two or three birds are seen at a time, excepting at the *Ficus*-trees which happen to be in fruit, and then as many as half-a-dozen are to be found devouring the small berries, of which they are very fond. Probably in the latter case it is only a family group. On March 18, Mr. Arch. Blyth pointed out a tree into which he had noticed one of these birds enter. As we approached the tree a bullock-whip was cracked several times, but the bird sat close until the limb was struck, when she emerged from a hollow branch about 40 feet high. A native was sent up, but holes had to be cut along the horizontal limb and down the trunk until the nest was located, about six feet from the ground.

The four partly-incubated eggs it contained were simply deposited on the decayed wood at the bottom of the hollow.]

No. 10. *Ptilosclera versicolor* (Red-crowned Lorikeet).

Trichoglossus versicolor, Vigors, in Lear's Ill. Parr., pl. 36 (1832); Gould, Bds. Austr., fol., vol. V., pl. 51 (1848); Ramsay, Proc. Linn. Soc. N.S.W., vol. I., Second Series, p. 1,095 (1886).

Ptilosclera versicolor, Salvad., Cat. Bds. Brit. Mus., vol. XX., p. 66 (1891).

Three adult males, two adult females, one young male. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. The females are smaller, and duller in colour, than the males. Immature males resemble the adult female.

[During November and the early part of December immense flocks of these beautiful Lorikeets were seen passing over our camp in the early morning, but, before January 1, they all disappeared and were not again seen. In habits and voice they closely resemble the Musk Lorikeet (*T. concinnus*), and are not easily scared from the trees on which they happen to be feeding. On one occasion I fired five shots before they took flight. They used to visit one or two *Eucalyptus*-trees near our camp soon after sunrise, and by their loud cries quickly attracted attention. There they were found actively climbing and clinging to the foliage, extracting the honey from the blossom in such a manner as to convey the idea that they were anxious to be off again to some distant part. The female is scarcely so bright in plumage as the male. I was informed that they breed in the hollow limbs of the trees on the margin of the Margaret River.]

No. 11. *Cacomantis flabelliformis* (Fan-tailed Cuckoo).

Cuculus flabelliformis, Lath., Ind. Orn. Suppl., p. xxx., (1801); Ramsay, Proc. Linn. Soc. N.S.W., vol. II, 2nd. series, p. 170 (1887).

Cuculus cineraceus, Gould, Bds. Austr., fol., vol. IV., pl. 86, (1848).

Cacomantis flabelliformis, North, Nests and Eggs, Austr. Bds. p. 244, pl. 13, fig. 7 (1889); Shelley, Cat. Bds. Brit. Mus., vol. XIX., p. 266 (1891).

A nestling. Wing 2·65 inches. Camp about five miles from the junction of the Fitzroy and Margaret Rivers.

No. 12. *Scythrops novæ-hollandiæ* (Channel-billed Cuckoo).

Scythrops novæ-hollandiæ, Lath., Ind. Orn., p. 141 (1790); Gould, Bds. Austr., fol., vol. IV. pl. 90 (1848); Ramsay, Proc. Linn. Soc. N.S.W., vol. I., 2nd. series, p. 1,094 (1886); North, Nests and Eggs, Austr. Bds., p. 248 (1889); Shelley, Cat. Bds. Brit. Mus., vol. XIX., p. 330 (1891).

An adult female. Mount Campbell near Fitzroy River, seven miles west of camp. This species has a very wide range. It is found in the Moluccas, Celebes, New Guinea and adjacent islands, Northern and North-Western Australia, Eastern Queensland, and New South Wales, and occurs as a rare straggler in Tasmania.

[At the approach of the tropical rain in January the *Scythrops* made its appearance in the early morning, always coming from the west and going east. Their loud notes, which they utter when flying, were always noticed by the Crows at our camp, which at once assembled and attacked the intruder. Then a battle royal ensued. Two or more Crows attacked simultaneously, and the sharp snap of their bills might be heard for some distance. When the Channel-bill was chased for about a mile the Crows returned to their quarters. On Mount Campbell a pair of *Scythrops* frequently resorted to a fig-tree to feed. I shot the female on 3rd March, and found the stomach full of figs. The ovaries were well developed, and contained three yolks, varying in size, one being as large as a small cherry, the other two slightly less. Near the Margaret River the natives took two young ones from a Crow's nest near the homestead, which the *Scythrops* had frequently visited. They are locally known as "Stormbirds."

No. 13. *CENTROPUS PHASIANUS* (Pheasant-Coucal).

Cuculus phasianus, Lath., Ind. Orn., vol. II., Suppl., p. xxx., (1801).

Centropus phasianus, Gould, Bds. Austr., fol., vol. IV., pl. 92 (1848); North, Nest and Eggs, Austr. Bds., p. 249 (1889); *id.*, Rec. Austr. Mus., vol. II., p. 17 (1892); Shelley, Cat. Bds. Brit. Mus., vol. XIX., p. 340 (1891).

Centropus melanurus, Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 1,094 (1886).

Three adult males, two adult females. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. Similar to examples from Eastern Australia. The wings of the males vary in length from 9·8 to 10·25 inches; those of the females from 10·6 to 11·4.

[Amongst the long grass near the Fitzroy River these birds were found either singly or in pairs, but after rain six or seven might be seen assembled on a patch of burnt ground. All those shot during January and February had a few brown feathers scattered through the black on the head, neck, and breast, a fact which suggests either that all those shot were changing from the immature to the adult stage, or that they are subject to variations of plumages at different times of the year. The females were invariably larger than the males, but in other respects the sexes were alike. Occasionally they were found

amongst the branches of the gum-trees along the creeks. At early morning and about sunset their dual notes revealed their presence. The natives of three different tribes call this bird the "Book Book."]

No. 14. HALCYON SANCTUS (Sacred Kingfisher).

Halcyon sanctus, Vig. and Horsf., Trans. Linn. Soc., vol. XV., p. 206 (1826); Gould, Bds. Austr., fol., vol. II., pl. 21 (1848); Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 1,086 (1886); North, Nests and Eggs, Austr. Bds., p. 37 (1889); Sharpe, Cat. Bds. Brit. Mus., vol. XVII., pp. 267, 500 (1892).

One adult male, two immature males. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. Similar to examples from Eastern Australia. Wing of adult male 3·6 inches.

A set of three eggs, taken from a hollow limb about 30 feet from the ground in January, 1897, are nearly round, pure white, and lustreless. They are slightly smaller than examples taken in New South Wales, and measure as follows:—(A) 0·98 x 0·85 inch; (B) 0·97 x 0·81 inch; (C) 0·98 x 0·83 inch.

[Numbers of these birds were seen in the timbered country around the telegraph station at Fitzroy River, and all along the course of that stream. Their notes were not only totally different from those of the same species found in other parts of the Continent, but the birds and their eggs were so much smaller as to suggest the possibility of a different species. During December and January a number of their nests were found in the hollow branches of the trees near the river. Four eggs constitute the clutch.]

No. 15. HALCYON PYRRHOPYGIUS (Red-rumped Kingfisher).

Halcyon pyrrhopygia, Gould, Proc. Zool. Soc. (1840), p. 113; *id.*, Bds. Austr., fol. vol., II., pl. 22 (1848); Sturt, Exped. Centr. Austr., vol. II., App., p. 20 (1849); Ramsay, Proc. Linn. Soc. N.S.W., vol. I., 2nd. series, p. 1,086 (1886).

Halcyon pyrrhopygus, North, Nests and Eggs, Austr. Bds., p. 38 (1889); Sharpe, Cat. Bds. Brit. Mus., vol. XVII., p. 258 (1892); North and Keartl., Horn Sci. Exped. Cent. Austr., part II, *Zool.*, p. 66 (1896).

One adult female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. This species is found all over the dry inland portions of Australia.

[The first specimen was obtained near Cue. Subsequently they were found wherever suitable shelter existed until we reached the Fitzroy River, where others were shot. They are not numerous in the North.]

No. 16. *DACELO LEACHII CERVINA* (Fawn-breasted Kingfisher).

Dacelo cervina, Gould, Bds. Austr., fol., vol. II., pl. 28 (1848); Ramsay, Proc. Linn. Soc. N.S.W., vol. I., Second Series, p. 1,086 (1886); North, *op. cit.*, vol. IV., Second Series, p. 1,024 (1889).

Dacelo cervina (subsp.), Sharpe, Cat. Bds. Brit. Mus., vol. XVII., p. 207 (1892).

Two adult females, one adult male, one young male. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. The subspecific distinction accorded to the northern and north-western race of *D. leachii* does not hold good in many instances. I have specimens now before me from Derby, N.W. Australia, that, except for their slightly-smaller size cannot be distinguished from examples of *D. leachii* from Port Denison. Specimens of *D. leachii* from Cairns, North-Eastern Queensland, have a slight fulvous wash on the under-surface, and are precisely similar to birds obtained at Broome, North-West Australia. Farther north they become smaller and darker. All the examples from Port Essington in the Australian Museum are typical *D. cervina*. They have tawny-buff breasts, darker-blue quills and tail, and smaller white tips to the tail-feathers. An adult male and female from Roeburne, North-West Australia, are slightly paler than the specimens from Port Essington, and are furthermore distinguished by the very narrow brown streaks down the centres of the feathers on the crown of the head. Examples obtained intermediate between these two localities vary considerably in the depth of the buff-coloring on the under-parts.

[These birds were heard and seen for the first time by our party along the Fitzroy River, where they were numerous. Although in flight and shape *D. cervina* so closely resembles *D. gigas*, its note is totally different, and conveys an impression that its vocal organs are out of gear, as it gives forth a succession of short jerky sounds bearing no resemblance to the hearty laugh of *D. gigas*. It has also a stronger bill, and is much more brilliant in its markings on the wings. An adult female shot near Jilgelly Creek had nearly the whole of its back a beautiful pale metallic blue.

No. 17. *EURYSTOMUS AUSTRALIS* (Australian Roller).

Eurystomus australis, Swains., Anim. in Menag., p. 326 (1827); Gould, Bds. Austr., fol., vol. II., pl. 17 (1848); Sharpe, Cat. Bds. Brit. Mus., vol. XVII., p. 36 (1892).

Eurystomus pacificus, Ramsay, Proc., Linn. Soc., N.S.W., vol. II., 2nd series, p. 166 (1887); North, Nests and Eggs Austr. Bds., p. 35 (1889).

One nearly adult female. Obtained in a tree near the Fitzroy River, about five miles from the camp.

[Whilst at Fitzroy River I was frequently told of a very rare bird, which was described as black, with a white spot in each wing, and advised to keep a sharp lookout for it along the course of the rivers. I did so, with the result that the *rara avis* proved to be the Roller or Dollar bird. They were rather shy, and generally perched on the top branches of the highest trees. As they were all in heavy moult at the time (January), I did not shoot many.

No. 18. *MEROPS ORNATUS* (Australian Bee-eater).

Merops ornatus, Lath., Ind. Orn., vol. II., Suppl., p. 35 (1801); Gould, Bds. Austr., fol., vol. II., pl. 16 (1848); Sturt, Exped. Centr. Austr., vol. II., App., p. 19 (1849); Ramsay, Proc. Linn. Soc., N.S.W., vol. II., 2nd series, p. 166 (1887); North, Nests and Eggs Austr. Bds., p. 34 (1889); Sharp, Cat. Bds. Brit. Mus., vol. XVII., p. 74 (1892).

Three young females. Camp about five miles from the junction of the Fitzroy and Margaret Rivers.

[Although the Bee-eater is generally found tunnelling in the banks of creeks at breeding time in North-West Australia, they more frequently burrow in the sand on the open plain. During January they became quite a feature in the bird-life around our camp, and I had many opportunities of examining most gorgeous specimens as they flew past, or permitted me to approach within a few yards of the trees on which they were perched. The majority of them appeared to be young ones, but adult birds in full livery were frequently noted.]

No. 19. *EUROSTOPODUS ARGUS* (Spotted Nightjar).

Eurostopodus guttatus, Gould (nec. Vig. and Horsf.), Bds. Austr., fol., vol. II., pl. 8 (1848); Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 1,097 (1886); North, Nests and Eggs Austr. Bds., p. 27, pl. 11, fig. 2 (1889).

Eurostopus argus, Hartert, Cat. Bds. Brit. Mus., vol. XVI., p. 608 (1892).

One female in the moult. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. In vol. XVI. of the "Catalogue of Birds in the British Museum," Mr. Hartert points out that the type specimen of the Nightjar, described by Vigors and Horsfield under the name of *Caprimulgus guttatus* is only the young of *Eurostopodus albicularis*.

[During the early part of our journey the peculiar note of this bird gave rise to a considerable amount of speculation as to its origin, but at Mount Campbell I not only got the required information from the natives, but also satisfied myself by shooting the bird whist uttering it. This note consists of a "caw, caw,

caw, gobble, gobble, gobble." In the whole of the desert these birds are seen soon after sunset skimming over the tops of the spinifex in search of insects, but camp-fires possess a strong attraction for them in the form of winged insects attracted by the light. Whilst on watch on the night of August 17, I counted ten birds flying round the burning spinifex at one time. Although seen far into the desert at night, they prefer rocky country in which to pass the day. On the hillside, near Mount Campbell, I disturbed fourteen birds from about half an acre of ground, and subsequently flushed several lots of five or six, but never saw one perch. They appear to spend all their time on the wing or ground. They lay one egg on the bare ground, without making any nest. The egg is a pale-green, lightly spotted with black.]

No. 20. *ARTAMUS LEUCOGASTER* (White-bellied Wood-Swallow).

Ocypterus leucogaster, Valenc., Mem. Mus. d'Hist. Nat., tom. VI., p. 21, pl. 7., fig. 2 (1820).

Artamus leucopygialis, Gould, Bds. Austr., fol. vol., II., pl. 33 (1848).

Artamus leucogaster, North, Nests and Eggs, Austr. Bds., p. 43 (1889); Sharpe, Cat. Bds. Brit. Mus., vol. XIII., p. 3 (1890).

One adult and one young male. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. The young male has the bill brown, all the feathers of the back, scapulars, and greater wing-coverts tipped with rich buff, those on the centre of the throat and the tips of the quills and the tail whitish.

[A few of these birds were seen along the course of the Fitzroy River, and near our camp I found them in company with *A. melanops*. On February 15 a pair were seen feeding their young brood. They were not by any means numerous, being generally found in pairs. They seem to be of a most affectionate disposition, and, when not engaged in soaring overhead or seeking food, might be observed perched side by side on some dry twig pluming each other's feathers. They were never seen far from water.]

No. 21. *PARDALOTUS RUBRICATUS* (Fawn-browed Diamond Bird).

Pardalotus rubricatus, Gould, Proc. Zool. Soc., (1837), p. 139; id., Bds. Austr., fol., vol. II., pl. 36 (1840); Sharpe, Cat. Bds. Brit. Mus., vol. X., p. 60 (1885); Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 1,087 (1886); North, Nests and Eggs, Austr. Bds., p. 54 (1889); North and Keartl., Rep. Horn Sci. Exped. Cent. Austr., part 2, Zool., p. 69 (1896).

One adult male. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. Similar to examples from Northern and Central Australia.

[The singular soft note of this little Pardalote was first heard in the Eucalypts on the margin of a creek near our camel dépôt during August, and Mr. C. F. Wells soon procured a nice specimen in full plumage. Others were frequently shot, but they were not so brilliant in colour as those I obtained in Central Australia in 1894.]

No. 22. LALAGE TRICOLOR (White-shouldered Caterpillar-eater).

Ceblepyris tricolor, Swains., Zool. Journ., vol. I., p. 467 (1825).

Campephaga humeralis, Gould, Bds. Austr., fol., vol. II., pl. 63 (1848); Sturt, Exped. Centr. Austr., vol. II., App., p. 23 (1849); Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 1,088 (1886).

Lalage tricolor, North, Nests and Eggs Aust. Bds., p. 78 (1889); Sharpe, Cat. Bds. Brit. Mus., vol. IV., p. 92 (1879).

One adult male. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. This is a migratory species, visiting New South Wales about the end of September, and departing again in February. It is found in most parts of the Australian Continent.

[Whilst near Lake Way, in July, a number of young birds of this species were seen, and as the season progressed we found the immature males exchanging their modest brown garb for the bright black-and-white of the adult male. Near the Fitzroy River during February they were breeding, and several clutches of eggs taken, which presented considerable variation in colour, some being heavily blotched with red on a pale-green ground, whilst others were streaked and blotched with dark-brown on a rich-green ground. The nests, which were small for the size of the birds, were built of fine grass, moss, cobwebs, and scraps of bark in the horizontal forks of the Eucalypt- and Bauhinia-trees, in such a manner as to make their discovery somewhat difficult. They were so shallow that the least shake dislodged the eggs.]

No. 23. COLLYRIOCINCLA BRUNNEA (Brown Shrike-Thrush).

Colluricincla brunnea, Gould, Proc. Zool. Soc., 1840, p. 164; *id.*, Bds. Austr., fol., vol. II., pl. 76 (1848); Ramsay, Proc. Linn. Soc. N.S.W., vol. II., 2nd series, p. 167 (1887); North, Nests and Eggs Austr. Bds., p. 81 (1889).

One adult male only. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. This species agrees with Gould's figure and description of this species. In the Catalogue of Birds in the British Museum, Dr. Sharpe describes the adult as having a distinct white eyebrow, like *C. superciliaris*, Masters, which Dr. Sharpe includes as a synonym of *C. brunnea*. None of our adult males from Port Essington and Derby, in the

Australian Museum Collection, have any indication of white eyebrows, but it is apparent in a young male in the Macleay Museum. Dr. Sharpe's *C. pallidirostris* agrees with the female of *C. brunnea*, but of which he has omitted to give a description. Gould also only describes the male, but figures the two sexes in his Birds of Australia.

[Near Kurrajong Creek this bird was first seen, its well-known note attracting attention to it as it flew from tree to tree along the course of the creek. During February a pair hatched their brood near our camp on the Fitzroy River, and afforded considerable amusement by the manner in which they fluttered near my dog to divert its attention from the young ones.]

No. 24. *Oreoica cristata* (Crested Bell-bird).

. *Turdus cristatus*, Lewin, Bds. New Holl., pl. 9 (fem.).

Oreoica gutturalis, Gould, Bds. Austr., fol. vol. II., pl. 81 (1848); Sturt, Exped. Centr. Austr., vol. II., App., p. 23 (1849).

Oreoica cristata, Gadow, Cat. Bds. Brit. Mus., vol. VIII., p. 174 (1883); North, Nests and Eggs Austr. Bds., p. 70, pl. 8., fig. 6 (1889); Stirling and Zietz, Trans. Roy. Soc. South Austr., vol. XVI., p. 157 (1893); North and Keartl. Rep. Horn Sci. Exped. Centr. Austr., part 2, *Zool.* p. 73 (1896).)

One adult male. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. With the exception of the extreme northern portions, this species is found all over the Australian Continent.

[The *Oreoica* was found scattered from Mullawa to the Fitzroy River. Although they were most plentiful in the vicinity of water, at times they were seen or heard on the sandhills of the desert far from it. Their nests were also frequently noted in the Corkbark and other trees in the valleys where they had probably been built soon after rain, but were all abandoned at the time of our visit. The well-known ventriloquial accomplishment of this bird afforded frequent amusement to our party. One perched within a few yards of our camp was watched for nearly an hour, and, as it turned its head, it appeared to throw its voice in different directions.]

No. 25. *MALURUS LEUCOPTERUS* (White-winged Superb Warbler).

Malurus leucopterus, Quoy et Gaim., Voy. de l'Uranie, *Zool.*, p. 108, pl. 23, fig. 2 (1824); Gould, Bds. Austr., fol., vol. III., pl. 25 (1848); Sturt, Exped. Centr. Austr., vol. II., App., p. 25 (1849); Sharpe, Cat. Bds. Brit. Mus., vol. IV., p. 290 (1879); North, Nests and Eggs Austr. Bds., p. 116 (1889); North and Keartl., Rep. Horn Sci. Exped. Cent. Austr., part II., *Zool.*, p. 79 (1896).

One adult male and female. Johanna Springs. This species is also distributed over the southern half of the Australian Continent. The type was obtained by M. M. Quoy and Gaimard on Dirk Hartog Island, Shark Bay, West Australia.

No. 26. *MALURUS CRUENTATUS* (Crimson-backed Warbler).

Malurus cruentatus, Gould, Proc. Zool. Soc. (1839), p. 143; Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 1,090 (1886); North, Nests and Eggs Austr. Bds., p. 118 (1889).

Malurus brownii, Gould, Bds. Austr., fol., vol. III., pl. 27 (1848).

Malurus dorsalis, Sharpe, Cat. Bds. Brit. Mus., vol. IV., p. 296 (1879).

Seven adult males, two adult females. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. The males are of a deeper red on the backs than examples from Cairns and Cape York. Similar specimens were obtained by the late Mr. T. H. Bowyer-Bower.

A nest of this species, taken from a low bush, is a dome-shaped structure with an entrance near the top. It is rather loosely put together, and is formed throughout of very fine dried grasses and strips of white bark intermingled, with the covering of some composite plant. Externally it measures two inches and a-half in diameter by four inches and a-half in height. Eggs, three in number, white, finely dusted with pinky-red markings over the entire surface of the shell. Length (A) 0·6 x 0·5 inch, (B) 0·62 x 0·44 inch, (C) 0·6 x 0·44 inch. In another set of four the markings are slightly larger and are confined principally to the thicker end of the egg, and in one specimen they are confluent and form a well-defined zone.

[This delicate but gorgeous little bird was first noted near the junction of the Fitzroy and Margaret Rivers. Although usually found in long grass and undergrowth, it occasionally resorts to the larger trees, and one specimen was shot from a branch 50 feet high. It is very tame, and easily approached. Unlike most species of this genus, the present species usually constructs its nest some distance from the ground. Those found by Mr. Wells and myself were located in either what is known as the Peach-bush or Bauhinia-tree, and four to ten feet from the ground. The nests are built of fine dry grass, with a rather large opening near the top. The clutch of eggs, three or four in number, show considerable variation in colour and markings, but they have usually a fleshy-white ground, more or less spotted with red, which in some cases forms a zone.]

No. 27. *SMICRORNIS FLAVESCENS* (Yellow-tinted Scrub Tit).

Smicrornis flavescentis, Gould, Proc. Zool. Soc., 1842, p. 134; *id.*, Bds. Austr., fol., vol. II., pl. 104 (1848); Masters, Proc. Linn. Soc., N.S.W., vol. II., p. 272 (1877); Sharpe, Cat. Bds. Brit. Mus., vol. IV., p. 210 (1879); Ramsay, Proc. Linn., N.S.W., vol. I., p. 1,889 (1886); North and Keartl., Rep. Horn Sci. Exped. Centr. Austr., part II., *Zool.*, p. 84 (1896).

Four adult males and one female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. Similar to examples from Northern and Central Australia.

[This beautiful little songster was frequently noted near the junction of the Fitzroy and Margaret Rivers, where it might be seen fluttering and hopping amongst the foliage of the Eucalypt trees or saplings. The sexes are alike in plumage and size].

No. 28. *PÆCILODRYAS CERVINIVENTRIS* (Grey-breasted Robin).

Petroica? cerviniventris, Gould, Proc. Zool. Soc., p. 221; *id.*, Bds. Austr., fol., suppl., pl. 15 (1869).

Pœciolodryas cerviniventris, Sharpe, Cat. Bds. Brit. Mus., vol. IV., p. 242 (1879); Ramsay, Proc. Linn. Soc., N.S.W., vol. II., 2nd series, p. 167 (1887).

One adult male. Camp about five miles from the junction of the Fitzroy and Margaret Rivers.

[This bird was only seen in the dense mangrove scrub on the margin of the Fitzroy River, where its loud note betrayed its presence. On the first January I saw a pair of young ones, which had apparently just left the nest, being fed by their parents. Although several were shot they became so quickly decomposed by the heat that I was unable to obtain more than one skin. The sexes are alike in plumage].

No. 29. *MIRAFRA HORSFIELDI* (Horsfield's Bush-Lark).

Mirafra horsfieldi, Gould, Proc. Zool. Soc., 1847, p. 1; *id.*, Bds. Austr., fol., vol. III., pl. 77 (1848); Ramsay, Proc. Linn. Soc. N.S.W., vol. I., 2nd series, p. 1,098 (1886); North, Nests and Eggs Austr. Bds., p. 159 (1889); Sharpe, Cat. Bds. Brit. Mus., vol. XIII., p. 604 (1890).

One female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. Slightly smaller than examples obtained in New South Wales, and approaching in colour the South Australian bird, separated by Dr. Sharpe under the name of *M. secunda*.

Four eggs taken in February, 1897, from a nest built under a tuft of grass, are of a pale-yellowish-grey ground colour, thickly covered with numerous yellowish-brown freckles and faint underlying dots of slaty-grey. Length, (A) 0·8 x 0·57 inch,

(B) $0\cdot75 \times 0\cdot55$ inch, (C) $0\cdot77 \times 0\cdot57$ inch, (D) $0\cdot77 \times 0\cdot57$ inch. Another specimen has the ground-colour of a clear greyish-white, and the markings larger and darker. Length, $0\cdot8 \times 0\cdot57$ inch.

[On the grassy flats, which extend for some distance on each side of the Fitzroy River, these birds are so numerous as to convey the idea that the headquarters of the species is in that locality. When we arrived at the lagoon near the river mentioned on November 6, I was surprised at their numbers. As we passed along a constant succession of birds kept rising from the ground and flying to the right and left of our line, but seldom went more than 20 yards before they again settled. It was impossible to throw a stick in any direction without disturbing several. Around the lagoon they were found in such numbers as to remind one of sparrows in a dry thistle field. They were very plentiful near the Fitzroy River Telegraph Station and at Mount Campbell, where they were found breeding in February. Their nests are usually placed near a small tussock of grass, or in a slight hollow formed by the pressure of a horse's foot; the material used to line them with is fine grass. The eggs are beautifully glossy, the ground being a pale-stone colour, almost obscured with brown spots. Four is the usual clutch.]

No. 30. BATHILDA RUFICAUDA (Red-tailed Finch).

Amadina ruficauda, Gould, Proc. Zool. Soc., 1836, p. 106.

Estrellda ruficauda, Gould, Bds. Austr., fol., vol. III., pl. 84 (1848); Ramsay, Proc. Linn. Soc. N.S.W., vol. I., 2nd series, p. 1,090 (1886).

Bathilda ruficauda, Sharpe, Cat. Bds. Brit. Mus., vol. XIII., p. 374 (1890).

Four adult males, four adult females, four immature males. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. Apparently very common. The females may be distinguished by their duller plumage, the less extent of crimson on the face and head, and the larger white spots on the throat and sides of the body. Young birds when first assuming the plumage of the adult have the white spots on the under-surface very much larger than when they attain their full livery.

Three eggs taken in March, 1897, from a dome-shaped nest constructed entirely of green grass, are pure white. Length, (A) $0\cdot57 \times 0\cdot41$ inch, (B) $0\cdot57 \times 0\cdot43$ inch, (C) $0\cdot6 \times 0\cdot42$ inch.

[These birds were only found in the vicinity of the telegraph line, near the junction of the Fitzroy and Margaret Rivers, where they appeared to be permanently located. They were generally seen in small flocks. A nest of this species, from which I shot the bird, was flask-shaped, and built entirely of fresh, green grass, from which the colour had not had time to fade. It contained five white eggs.]

No. 31. STICTOPTERA ANNULOSA (Black-rumped Finch).

Amadina annulosa, Gould, Proc. Zool. Soc., 1839, p. 143.

Estrelida annulosa, Gould, Bds. Austr., fol., vol. III., pl. 81 (1848); Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 1,090 (1886).

Stictoptera annulosa, North, Nests and Eggs Austr. Bds., p. 161 (1889); Sharpe, Cat. Bds. Brit. Mus., vol. XIII., p. 314 (1890).

An adult male and female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers.

Four eggs taken from a dome-shaped nest of dried grasses in March, 1897, are white, with an almost imperceptible tinge of blue.

Length—(A) 0·55 x 0·41 inch, (B) 0·55 x 0·38 inch, (C) 0·54 x 0·4 inch, (D) 0·55 x 0·4 inch. The eggs of this Finch are the smallest of all our Australian birds.

[This pretty Finch was only seen near the Fitzroy River, where it was breeding during February and March. By a close observation of the material used it is possible to determine to which species of Finch the nest belongs. The Ringed Finch usually chooses a site in some drooping branch about 10 ft. from the ground. In the case of those examined the outer covering was invariably very coarse—dead grass loosely woven together—but the lining was of the finest silver-grass, and a marvel of neatness. Six eggs form the usual clutch. Although some were perfectly white, one clutch from which I caught the bird had a faint bluish tinge, similar to those of the Chestnut-eared Finch.]

No. 32. MUNIA PECTORALIS (White-breasted Finch).

Amadina pectoralis, Gould, Proc. Zool. Soc. (1839), p. 127.

Donacola pectoralis, Gould, Bds. Austr., fol., vol. III., pl. 95 (1848).

Donacicola pectoralis, Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 1,091 (1886).

Munia pectoralis, Sharpe, Cat. Bds. Brit. Mus., vol. XIII., p. 354 (1890).

An adult male and female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. This species is also found in the neighbourhood of Normanton.

[This Finch was only seen between the Telegraph Station and the Margaret River. It proved very shy, and although frequently disturbed whilst feeding amongst the long grass, or seen flying from tree to tree, only two or three were shot.]

No. 33. PÆPHILA ACUTICAUDA (Long-tailed Grass Finch).

Amadina acuticauda, Gould, Proc. Zool. Soc., 1839, p. 143.

Pæphila acuticauda, Gould, Bds. Austr., fol., vol. III., pl. 90 (1848); Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 1,091 (1886); North, Nests and Eggs Austr. Bds. p. 167 (1889); Sharpe, Cat. Bds. Brit. Mus., vol. XIII., p. 375 (1890).

Three adult males, one adult female. Shot in the forest timber near Derby. This species is confined to the Northern and North-western portions of the Continent. Live specimens brought to Sydney by Mr. Burton, who accompanied the late Mr. T. H. Bowyer-Bower on his collecting expedition to North-West Australia, bred readily in confinement.

[This Finch was seen for the first time by our party near the Fitzroy River as we approached Derby, and at the wells which supply the latter place with water. The birds are very tame, and easily caught by simply covering the troughs and placing a dish of water under a frame covered with cheese-cloth. Several brought down alive are thriving in captivity].

No. 34. NEOCHMIA PHÆTON (Crimson Finch).

Fringilla phæton, Homb. et. Jacq., Ann. des Sci. Nat., tom. VI., p. 314 (1841).

Estrelda phæton, Gould, Bds. Austr., fol., vol. III., pl. 83 (1848); Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 1,091 (1886).

Neochmia phæton, North, Nests and Eggs Austr. Bds., p. 388 (1889); Sharpe, Cat. Bds. Brit. Mus., vol. XIII., p. 389 (1890).

Two adult males, one adult female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. Similar te examples from Eastern Queensland.

Six eggs taken from a flask-shaped nest of coarse grasses in March, 1897, are pure white. Length—(A) 0·63 x 0·45 inch, (B) 0·6 x 0·47 inch, (C) 0·6 x 0·5 inch, (D) 0·6 x 0·47 inch, (E) 0·6 x 0·47 inch, (F) 0·67 x 0·45 inch.

[At each of the homesteads near the junction of the Fitzroy and Margaret Rivers these birds make their appearance during December, and immediately after the rainfall in January commence building their nests. At the Police Camp there were eight pairs of birds, which had located their structures on the plates of the verandah. Others had buried their nests in the reedy thatch of the stable. At Mr. Blyth's Camp they were nesting under the eaves of the thatch, and the birds were so tame as to hop about the ground close to where we sat at breakfast. Although two birds were taken off their eggs and handled, they

returned to their nests immediately they were liberated. At Mr. Harris's quarters that gentleman showed me an old nest fixed in a bundle of wire hanging on the wall in his storeroom, which was an enclosed galvanised-iron building without windows. The birds had to enter under the corrugations in the iron in front, and fly across the room. The birds usually disappear again as soon as their young take wing. The material used for the exterior of the nests is coarse outer blades of grass, so large that it is surprising how they carry it, but the lining is fine and soft. Six pure white eggs constitute the clutch. I never saw nests belonging to this species on trees or bushes.]

No. 35. EMBLEMA PICTA (Painted Finch).

Emblema picta, Gould, Proc., Zool., Soc. (1842), p. 17; *id.*, Bds. Austr., fol., vol. III., pl. 97 (1848); Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 1,092 (1886); Sharpe, Cat. Bds. Brit. Mus., vol. XIII., p. 295 (1890); North and Keartl., Rep. Horn Sci. Exp., Centr. Austr., part II., *Zool.*, p. 88 (1896); North, Rec. Austr. Mus., vol. III., p. 14 (1897), N.S.W.

Four adult males, one female. Johanna Springs.

During the prolonged drought of 1896 in New South Wales three adult males of this species were obtained within 20 miles of Sydney.

[This rare Finch was first seen and shot at Johanna Springs, where they came in company with the Chestnut-eared Finch to quench their thirst. They were very shy, and single specimens were only procured at the sacrifice of many of their companions. They were afterwards seen near the hospital at Derby, and when the steamer "Australind" was off Broome five Painted and two Chestnut-eared Finches perched in the rigging and kept flying about the vessel for some time. They were seen in large flocks.]

No. 36. CHLAMYDODERA NUHALIS (Great Bower-bird).

Ptilonorhynchus nuchalis, Jard. and Selby, Ill. Orn., vol. II., pl. 103.

Chlamydera nuchalis, Gould, Bds. Austr., fol., vol. IV., pl. 9, (1848).

Chlamyodorra nuchalis, Sharpe, Cat. Bds. Brit. Mus., vol. VI., p. 391 (1881); Ramsay, Proc. Linn. Soc., N.S.W., vol. II., 2nd series, p. 169 (1887).

Two fully adult females, two not adult females, one young female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. It is remarkable that all the specimens obtained are females. It would be interesting to know if the adult males of this species entirely lose their rose-pink nuchal plumes for a period during the moulting season.

[Soon after reaching the Fitzroy River in November I secured a young bird of this species, and on mentioning the matter to several gentlemen at camp, was informed that a pair had been taken from the nest by a black boy a few weeks previously. Subsequently specimens were obtained at the horse-trough near the well, where they came frequently to drink and bathe. Their chief food seems to be a small black native fig, and wherever that fruit existed on the Fitzroy River the peculiar note of the Bower-bird was frequently heard. Several of their bowers which were discovered contained the usual collection of bleached bones, shells, bits of glass, and parrot feathers.]

No. 37. POMATOSTOMUS RUBECULUS (Red-breasted Pomatostomus).

Pomatorhinus rubeculus, Gould, Proc. Zool. Soc. (1839), p. 144; *id.*, Bds. Austr., fol., vol. IV., pl. 21 (1848); Sharpe, Cat. Bds. Brit. Mus., vol. VII., p. 421 (1883).

Pomatostomus rubeculus, Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 1,088 (1886); North, Nests and Eggs Austr. Bds., p. 155 (1889); North and Keartl., Rep. Horn Sci. Exp. Centr. Austr., part II., *Zool.*, p. 91 (1896).

One adult female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. Similar to specimens from Northern and Central Australia.

[These remarkable birds were frequently noted between Mullawa and Lake Augusta. Owing to their sociable habits they have acquired the name of "Family birds," as they are generally found in flocks of six or seven. They seem equally at home on tree or ground, but are seen to the best advantage when disturbed. They then fly off one after another, alighting near the base of the nearest tree, which they ascend by a series of hops or jumps, keeping up an incessant chatter or mewing like a cat. During their antics their bills are generally elevated, and their tails erect or spread like a fan. Their huge stick nests, containing fresh eggs, were found on the Cue-road in June. At Fitzroy River they were found breeding in February.]

No. 38. STIGMATOPS OCULARIS (Brown Honey-eater).

Glyciphila (?) ocularis, Gould, Proc. Zool. Soc. (1837), p. 154.

Glyciphila ocularis, Gould, Bds. Austr., fol., vol. IV., pl. 31 (1848); Gadow, Cat. Bds. Brit. Mus., vol. IX., p. 213 (1884); North and Keartl., Rep. Horn Sci. Exp. Centr. Austr., part II., *Zool.*, p. 93 (1896).

Stigmatops ocularis, North, Nests and Eggs Austr. Bds., p. 198 (1889).

Glyciphila (?) subocularis, Gould, Proc. Zool. Soc. (1837), p. 154.

Stigmatops subocularis, Sharpe, Rep. Voy. H.M.S. "Alert," p. 18 (1884); Ramsay, Proc. Linn. Soc. N.S.W., vol. I, 2nd series, p. 1,092 (1886); North, Rep. Horn Sci. Exp. Centr. Austr., part II., Zool., p. 93 (1896).

One adult male and one young male obtained near Derby. The adult male has a bleached appearance, and the head is more greyish than examples from Eastern Australia. A specimen from the same locality obtained by Mr. E. J. Cairn in 1886 cannot be distinguished from birds procured near Sydney. The young male has the cheeks, upper wing-coverts, and edge of the wing distinctly washed with yellow, and is similar in colour and size to young examples from Port Essington, the Gulf District, and Burwood, near Sydney. This is Gould's *S. subocularis*, separated by him from the present species on account of its smaller size and the yellower tint which pervades the plumage. I would here point out, however, that a yellow wash to some of the feathers of several species of the *Meliphagiidae* is a certain indication of youth, and that it is entirely lost when the birds have attained their full adult livery. This may be more particularly observed in *Philemon citreogularis*, *P. sordidus*, *Myzomela pectoralis*, and the present species. With the exception of the adult male in the Calvert Collection previously referred to I can find no difference in adults and young birds of *S. ocularis* from Northern and North-Western Australia with others obtained in the Eastern and South-Western parts of the Continent. One specimen in the mounted collection of the Australian Museum, procured at Port Denison, has an abnormally long bill. The following are the wing measurements of both adults and young from different localities:—

	Wing.	Locality.
(A) Ad. male	2·72 ins.	Dobroyde, Sydney, N.S. Wales
(B) Ad. female	2·72 "	Ashfield, Sydney, N.S. Wales
(C) Ad. male	2·72 "	Port Denison, Queensland
(D) Ad. male	2·65 "	Georgetown, Gulf District, Qu'nd.
(E) Ad. male	2·8 "	Georgetown, Gulf District, Qu'nd.
(F) Ad. male	2·65 "	Port Essington, North Australia
(G) Ad. female	2·7 "	Port Essington, North Australia
(H) Ad. male	2·7 "	Derby, N.W. Australia
(I) Ad. male	2·7 "	Derby, N.W. Australia
(J) Ad. female	2·72 "	Perth, S.W. Australia
(K) Juv. male	2·45 "	Burwood, Sydney, N.S. Wales
(L) Juv. male	2·4 "	Derby, N.W. Australia
(M) Juv. female	2·4 "	Port Essington, North Australia
(N) Juv. male	2·4 "	Port Essington, North Australia

All the young birds are more or less tinged with yellow, especially on the cheeks, upper wing-coverts, and edge of the wing.

[On my arrival at Derby on May 1, I found several kinds of trees in full blossom, and consequently Honey-eaters were plentiful. One of the noisiest for its size was the bird under notice. It showed a decided preference for the blossom of the Ti-tree, but occasionally visited the Eucalyptus. They were seen singly or in pairs.]

No. 39. *Ptilotis flavescens* (Yellow-tinted Honey-eater).

Ptilotis flavescens, Gould, Proc. Zool. Soc. (1839), p. 142; *id.* Bds. Austr., fol., vol. IV., pl. 41 (1848); Gadow, Cat. Bds. Brit. Mus., vol. IX., p. 245 (1884); Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 1,092 (1886).

Five males, two female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. The range of this species extends east to Normanton in the Gulf district. Young birds have the upper surface paler than the adults.

[During the hot days of December and January these birds came to the water-trough at the well near the Telegraph Station in such numbers as to completely line the trough whilst they were drinking and bathing. They seem to be similar in their habits to *P. penicillata*, spending their time in bathing, chasing each other, and seeking insects or blossom amongst the branches of the different trees. The sexes are alike in plumage, and can only be distinguished by dissection. They were just building their nests when we left in March.]

No. 40. *Ptilotis sonora* (Singing Honey-eater).

Ptilotis sonorus, Gould, Proc. Zool. Soc. (1840), p. 160; *id.* Bds. Austr., fol., vol. IV.; pl. 33 (1848).

Ptilotis sonora, Gadow, Cat. Bds. Brit. Mus., vol. IX., p. 234 (1884); Ramsay, Proc. Linn. Soc. N.S.W., vol. I., 2nd series, p. 1,092 (1886).

A young female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. The young of this species may be distinguished from the adult by its paler under surface, and having only narrow shaft-streaks of pale brown on the breast. It is distributed over the greater part of Australia.

[In the scrub near Geraldton these birds were first seen busy amongst such bushes as were in blossom in June, and from that time until my arrival at Derby, they were seen almost daily. Occasionally they were the only birds to be found on the sandhills. Several clutches of their eggs were taken from the Casuarina and Acacia-trees during August.]

No. 41. *Ptilotis keartlandi* (Keartland's Honey-eater).

Ptilotis keartlandi, North, Ibis (1895), p. 340; North and Keartl., Rep. Horn Sci. Exp. Centr. Austr. part II., Zool. p. 93, pl. 6., upp. fig. (1896).

Three adult males, one young male. Obtained in the forest timber, near the Fitzroy River, on the way into Derby. It is interesting to meet with a series of skins of this Honey-eater, which Mr. Keartland first discovered during the visit of the Horn Expedition to Central Australia in 1894. It is also remarkable that Mr. Cairn, or the late Mr. Bowyer-Bower, did not meet with this species during the time they made large collections in the vicinity of Derby in 1886. Two of the adult specimens have the basal portion of the lower mandible yellow; wing, 3 inches, to 3·3. The young male is slightly duller in plumage than the adult, and the patch of yellow feathers below the ear-coverts is not so bright and well-defined; wing, 2·8 inches.

[On October 5 several of these birds were found far in the desert, south of Separation Well, in a small patch of scattered mallee. They were afterwards found at Gilgelly Creek and Derby. Probably the fact that so many of the trees were just out in blossom during the time of our visit at the end of April may account for their presence in such numbers.]

No. 42. STOMIOPERA UNICOLOR (Uniform-coloured Honey-eater).

Ptilotis unicolor, Gould, Proc. Zool. Soc., (1842), p. 136; *id.*, Bds. Austr., fol., vol. IV., pl. 46 (1848); Gadow, Cat. Bds. Brit. Mus., vol. IX., p. 249 (1884); Sharpe, Rep. Voy. Alert., p. 20 (1884).

Stomiopera unicolor, Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 1,092 (1886).

Four adult males. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. Similar to specimens from Northern Australia.

[The loud notes of this bird were only heard amongst the mangroves near the Fitzroy River. They seem to delight in bathing, and when not so engaged may be seen actively searching for insects or honey amongst the dense undergrowth which skirts the river. The sexes are alike in plumage.]

No. 43. PHILEMON SORDIDUS (Northern Friar Bird).

Tropidorhynchus sordidus, Gould, Bds. Austr., fol., vol. I., introd., p. 58 (1848).

Philemon sordidus, Gadow, Cat. Bds. Brit. Mus., vol. IX., p. 277 (1884); Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 1,092 (1886); North, Nests and Eggs Austr. Bds., p. 219, pl. 12, fig. 3 (1889).

Philemon sp. (?) Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 169 (1887).

Philemon juv (sp. ?), Ramsay, op. cit., vol. II., 2nd series, p. 169 (1887).

Philemon occidentalis, Ramsay, top. cit., p. 676 (1887), imm. male.

Four adult females, one immature male. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. Gould separated this species from *P. citreogularis* on account of its smaller admeasurements and larger bill. Five specimens from Port Essington, where the type of *P. sordidus* was obtained by Gilbert, have the bills of the same size as examples of *P. citreogularis*, procured in New South Wales. They are, however, much smaller, the wing measurements varying in length from 4·55 inches to 4·7. The present examples all have the bills larger than in *P. citreogularis*, and the wing measurement nearly alike, varying only from 4·95 inches to 5·05. They are slightly paler-brown above, and whiter on the under-surface, and have that washed-out appearance often seen in birds procured in very hot districts. The specimens obtained by Mr. E. J. Cairn on the Lennard River are slightly larger, and the wing measurement varying from 5·25 inches to 5·45. In the list of references given above it will be seen that I have included Dr. Ramsay's *P. occidentalis* as a synonym of this species. The type of *P. occidentalis* was obtained by the late Mr. T. H. Bowyer-Bower near Derby, and it is in precisely the same stage of plumage as the immature male of *P. sordidus* procured by Mr. Keartland, and from which it cannot be distinguished. Both specimens have all the feathers of the interscapular region edged with ashy-white, the outer webs of the inner primaries margined with greenish-yellow, a conspicuous patch of citron-yellow feathers on the sides of the lower neck, and only a faint tinge of yellow on the silvery-white throat. Immature specimens of *P. citreogularis*, from Eastern and Southern Australia, differ in having a bright citron-yellow throat, and only a few feathers on the sides of the lower throat tipped with citron-yellow.

Adult specimens of *P. sordidus* from North-Western Australia can only be distinguished from *P. citreogularis* by their bleached appearance and larger bill. The latter character is subject to much variation, especially in specimens obtained in different localities. In other respects the two birds are similar.

A nest of this species from which the female was procured was built in the drooping leafy twigs of a Eucalyptus growing near the Fitzroy River. It is cup-shaped in form, and is outwardly constructed of dried grass-stems and long strips of very fine bark-fibre, held together with the indumentum of some composite plant, the inside being lined entirely with dried grasses. Exterior measurements, $3\frac{3}{4}$ inches in diameter, by $5\frac{1}{2}$ inches in depth; interval diameter, $2\frac{1}{4}$ inches, by $3\frac{1}{2}$ inches in depth. An egg belonging to this nest is of a very pale-purplish-red ground colour,

with a few rounded spots and dots of dark-purplish-red on the larger end; while appearing as if beneath the surface of the shell are underlying spots of faint purplish-grey-grey. Length, 1·03 x 0·73 inch. Another specimen has dull-purplish-red blotches uniformly distributed over the surface of shell, except on one side, and the ground-colour almost obscured with numerous streaky markings of faint purplish-grey. Length, 1·12 x 0·77 inch.

[In the neighbourhood of the Fitzroy River, and especially at Derby, these birds were very numerous. They seemed to require water as frequently as Finches and Pigeons, and dearly love a bath. Often whilst watching the different birds arriving and departing from the water-troughs I was annoyed by the visit of one or more of these birds, whose sudden arrival caused the immediate dispersal of all other species from the water. It is very pugnacious, and chases any intruders from the vicinity of its nest. Should an Owl be disturbed during the day he is immediately noticed by the Friar bird, and chased and worried for a great distance during which time many other birds join in the hunt. Many of their nests were found near the river, but only two eggs obtained. The nests were made of coarse grass, cup-shaped, and placed in the drooping foliage of the Eucalypt. When seen from below they bore a strong resemblance to those of the Chestnut-eared Finch. One of the birds was distinguished by its darker plumage and yellow markings on the sides of the neck. Whether another species or simply a variation in plumage with age I was unable to determine. It was being constantly attacked by the Sordid Friar-birds, which were numerous in the locality where it was shot.]

No. 44. MELITHREPTUS LÆTIOR (Yellow-backed Honey-eater).

Melithreptus lætior, Gould, Ann. and Mag. Nat. His., 4th series, vol. XVI., pl. 287 (1875); *id.*, Bds. New Guinea, fol., vol. III., pl. 40 (1875-88); Ramsay, Proc. Linn. Soc., N.S.W., vol. I., 2nd series, p. 1,093 (1886).

Three adult males, one immature male. Camp near the junction of the Fitzroy and Margaret Rivers. Four examples of this beautiful Honey-eater, with its conspicuous bright-yellow hind neck and rump. The immature male has the outer primaries, most of the inner secondaries, and the lateral tail-feathers pale-brown. Wing, 3·3 inches. This very distinct species is also found in the Gulf District, Northern Queensland. In vol. IX. of the Catalogue of Birds in the British Museum its name is erroneously placed as a synonym of *M. gularis*.

[The neighbourhood of the Fitzroy River from Derby to its junction with the Margaret River appears to be the stronghold

of this beatiful Honey-eater. During February they were found in small flocks amongst the Mimosa, Bauhinia, and Eucalyptus saplings. Those seen in May had paired and were nesting.]

No. 45. *MYZOMELA PECTORALIS* (Banded Honey-eater).

Myzomela pectoralis, Gould, Proc. Zool. Soc. (1840), p. 170; *id.*, Bds. Austr., fol., vol. IV., pl. 65 (1848); Gadow, Cat. Bds. Brit. Mus., vol. IX., p. 138 (1884); Ramsay, Proc. Linn. Soc. N.S.W., vol. II., 2nd series, p. 169 (1887).

Three young males. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. The youngest bird has patches of pale buff among the black feathers on the crown of the head, and has the mantle strongly mottled with the same colour; the innermost secondaries are conspicuously edged with white, and the ear-coverts are yellow. The other specimens have the ear-coverts a paler yellow, a few rich buff feathers in the mantle, and one of them some pale buffy-white feathers on the forehead. Adult birds have the ear-coverts pure white like the sides of the neck and the upper parts of the head, mantle and back black.

There is an adult male of this species in the Australian Museum, obtained by Mr. George Masters at Port Denison. Previously it has not been recorded further south in Queensland than Rockingham Bay.

[The trough at the well in the vicinity of our camp at the telegraph station near the Fitzroy River was frequently visited by these birds, and I soon obtained specimens for my collection. They were also found in considerable numbers at Derby in May, where the blossom afforded them an ample supply of food. Though the adult males are decidedly black-and-white, several of those shot appeared to be immature, and had old brown feathers dispersed through the black. I have reason to believe that the young of both sexes are plain dark-brown above and pale-brown or dirty-white beneath. What appeared to be adult females corresponded in plumage with the young ones. A deserted nest of this species bore a strong resemblance to that of *M. nigra*, but was lined with a few bits of horsehair.]

No. 46. *ENTOMOPHILA RUFIGULARIS* (Red-throated Honey-eater).

Entomophila rufigularis, Gould, Proc. Zool. Soc. (1842), p. 137; *id.*, Bds. Austr., fol., vol. IV., pl. 52 (1848); Ramsay, Proc. Linn. Soc. N.S.W., vol. I., 2nd series, p. 1,092 (1886).

Entomophila rufigularis, Gadow, Cat. Bds. Brit. Mus., vol. IX., p. 219 (1884); North, Nests and Eggs Austr. Bds., p. 213 (1889).

Three adult males, one adult female, one not quite full-plumaged male. Camp about five miles from the junction of the

Fitzroy and Margaret Rivers. The wings of adults measure from 2·8 to 3 inches.

A nest of this species taken near the Fitzroy River in February, 1897, is attached on one side to a thin leafy twig of a species of *Bauhinia*, probably *B. Hookeri*, Mr. Fred Turner, F.R.H.S., kindly informs me. It is a deep cup-shaped structure, one side of it being considerably higher than the other, and is outwardly formed of very fine bark fibre, a small quantity of grass, and the outer covering of some composite plant, firmly matted and held together, the inside being neatly lined with fine dried grasses. On one side it measures exteriorly $4\frac{1}{4}$ inches, on the other $2\frac{1}{2}$ inches; inside diameter, 2 inches. The eggs are two or three in number for a sitting, and are extremely variable in size, shape, disposition, and colour of their markings. The most common type is elongate-oval in form, white, with small irregular-shaped spots and dots of rich-red or pinky-red evenly distributed over the entire surface of the shell, and closely resemble the eggs of *Gerygone albicularis*, or *Malurus cyaneus*. Two sets of three each measure as follows:—Length, (A) $0\cdot74 \times 0\cdot5$ inch, (B) $0\cdot76 \times 0\cdot51$, (C) $0\cdot73 \times 0\cdot5$, (D) $0\cdot77 \times 0\cdot54$, (E) $0\cdot68 \times 0\cdot53$, (F) $0\cdot73 \times 0\cdot5$. A set of two are nearly round, and measure (A) $0\cdot63 \times 0\cdot53$, (B) $0\cdot67 \times 0\cdot55$. Another type has a zone on the larger end formed of large confluent dull-red blotches, and resembles some varieties of the eggs of *Malurus lamberti* or *M. longicaudus*. A third has the pure-white ground colour sparingly dotted and spotted with purplish-black, and in some specimens a few large penumbral markings of purplish-red on the larger ends, and resemble the eggs of *Glyciphila modesta* or *Ephthianura albifrons*. A set of two measures, (A) $0\cdot68 \times 0\cdot48$ inch, (B) $0\cdot67 \times 0\cdot47$.

[Near the Fitzroy River these birds were numerous. They were very active, and when seeking for insects amongst the long grass, or in the foliage of the various trees, kept up an incessant chatter, chasing each other or attacking birds of other species which happened to intrude on any bush on which they were feeding. They evince a decided liking for the small black fig, and also to shelter themselves from the sun amongst its foliage. At nesting time, which is immediately after rain in January or February, they become very tame and fearless. On several occasions I stood under a *Bauhinia*-tree, and watched them building their nests within five feet of my face. The nest, which is deep, cup-shaped, is always suspended by one side of the rim to the end of some slender twig, seldom more than six feet high, but on one occasion a pair built fully twenty feet from the ground in a Eucalypt at our camp. The nests were all built so that they could swing with the wind, and were constructed principally of fine grass. The eggs show great variation in colour and mark-

ings. Four clutches, taken from nests built near our camp, which were frequently visited during building and laying, and about which there is not the least doubt, differ thus:—No. 1 Clutch—Heavily freckled with light-red on white ground, elongated oval in shape. No. 2 Clutch—Much smaller than the above, slightly spotted at the larger end with small black spots on white ground, short, swollen, oval in shape. No. 3 Clutch—Sparingly marked with large dark-brown spots on white ground, oval shape. No. 4 Clutch—Heavily marked with dark-red, especially at the larger end, where the ground colour is almost completely obscured. Three eggs form the usual complement, but occasionally birds were found sitting on two.]

No. 47. *CLIMACTERIS MELANURA* (Black-tailed Tree-Creeper).

Climacteris melanura, Gould, Proc. Zool. Soc. (1842), p. 138; *id.*, Bds. Austr., fol., vol. IV., pl. 97 (1848); Gadow, Cat. Bds. Brit. Mus., vol. VIII., p. 334 (1883); Ramsay, Proc. Linn. Soc. N.S.W., vol. II., 2nd series, p. 169 (1887); North, Nests and Eggs Austr. Bds., p. 239 (1889).

Three adult males, two adult females, two immature males. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. Gould's figures of this species in his "Birds of Australia" are those of the male only. The female has the throat white, and the feathers on the lower portion of it broadly edged with chestnut-red. Immature males are brownish-black above and below, with narrow white streaks to the feathers on the throat, and sub-terminal spots of white on the under-tail coverts; the fawn band through the centre of the wing is also of a richer colour than in the adults.

[Near the junction of the Fitzroy and Margaret Rivers these birds were often seen or heard. Their notes and habits closely resemble those of the well-known Brown Tree-creeper. They are very shy and difficult to approach. The adult female is easily distinguished by a white patch on the throat. Why this bird should be named the Black-tailed Tree-creeper is difficult to understand, when the term sooty or Black Tree-creeper would be so much more appropriate.]

No. 48. *PHAPS HISTRIONICA* (Harlequin Bronze-wing).

Columba (Peristra) histrionica, Gould, Proc. Zool. Soc. (1840), p. 114.

Peristera histrionica, Gould, Bds. Austr., fol., vol. V., pl. 66 (1848).

Phaps histrionica, Ramsay, Proc. Linn. Soc. N.S.W., vol. II., 2nd series, p. 171 (1887); North, Nests and Eggs Austr. Bds p. 274 (1889).

Histriophaps histrionica, Salvad., Cat. Bds. Brit. Mus., vol. XXI., p. 529 (1893).

One adult female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers.

[These birds were invariably found in large flocks in the vicinity of the Fitzroy River, where they came to drink towards evening, but as we traversed the open grassy plains south of the St. George Range, great flocks arose from amongst the Flinders grass, on the seeds of which they had been feeding. They are extremely sociable in their habits, always feeding and drinking in company, and wherever one nest is found many others may be looked for in the same neighbourhood.]

No. 49. *LOPHOPHAPS FERRUGINEA* (Rust-coloured Bronze-wing).

Lophophaps ferruginea, Gould, Handbk. Bds. Austr., vol. II. p. 137 (1865); *id.*, Bds. Austr., Suppl., pl. 68 (1869); Ramsay, Proc. Linn. Soc. N.S.W., vol. II., 2nd. series, p. 171 (1887).

Lophophaps plumifera, Salvad. (*nec* Gould), Cat. Bds. Brit. Mus., vol. XXI., p. 533 (1893).

An adult male and female, obtained near Mount Arthur, slightly darker and richer in colour than specimens procured by the late Mr. T. H. Bowyer-Bower near Derby, in October, 1886. The sexes are alike in plumage, but individual variation exists in the depth of the white band on the throat; in some specimens it is crescentic in form, in others it extends in a V-shaped marking down the centre of the throat. Two eggs, taken by Mr. Harris from a slight grass-lined depression in the ground, sheltered by a spinifex tussock, are swollen ellipses in shape, and of a uniform pale-cream colour, the grain of the shell being very fine and its surface slightly glossy. Length, (A) 0·94 x 0·77 inch, (B) 0·9 x 0·77 inch. These are the only authenticated eggs of this species that, as far as I am aware, have yet been found.

Count Salvadori has described this Pigeon in the "Catalogue of the *Columbæ* in the British Museum," under the name of Gould's older species, *L. plumifera*. The latter in his "Handbook to the Birds of Australia" states that "*L. ferruginea* differs from *L. plumifera* . . . in the absence of the broad white pectoral band so conspicuous in the latter." In the "Aves of the Horn Expedition" I pointed out the difference between Gould's and Count Salvadori's descriptions of *L. plumifera*, but, judging from the measurements only, I there concurred that the bird described by Count Salvadori was similar to the one from which Gould had taken his original description of *L. plumifera*. Since the publication of the Report of the Horn Expedition, however, the Australian Museum has been enriched by the addition of the well-known Dobroyde Collection, which contains a fine series of the

Plumed Bronze-wings, and I now feel confident that the specimens from which Count Salvadori took his description of *L. plumifera* are only slightly paler-coloured examples of Gould's *L. ferruginea*, and not his true *L. plumifera*. This is supported by the fact that the talented author in describing *L. ferruginea*, and of which he had Gould's type before him, states that it is "Similar to *L. plumifera*, but the general cinnamon colour of a deeper hue." Moreover, there is now a sufficient number of specimens of Plumed Bronze-wings in the Museum, I believe, to satisfactorily answer the question asked by Gould in his Supplement to the Birds of Australia: "Are there two or three species of these charming little crested Pigeons?"

The last to be described, *L. ferruginea*, is a good and distinct species, which may be easily distinguished from *L. plumifera* by the absence of the white band on the chest, and its uniform cinnamon-coloured breast and abdomen. The habitat of this species appears to be restricted to that portion of West Australia lying between Champion Bay and King Sound. The late Mr. T. H. Bowyer-Bower obtained samples of it near Derby, North-West Australia, and it is from some of his specimens Count Salvadori has taken his description of *L. plumifera*. Gould's figure of *L. ferruginea*, although slightly high-coloured, otherwise accurately represents the distinguishing characters of this species. His original description of *L. plumifera* in the Proceedings of the Zoological Society is apparently taken from a young bird, for the middle of the abdomen is there described as being light-buff. In describing the same species in his Handbook, he states the abdomen is snow-white, which clearly applies to the bird he distinguished later on in his Supplement to the Birds of Australia, under the name of *G. leucogaster*. It was with hesitation that Gould separated the birds from South Australia under the latter name, and one of his principal reasons for so doing was that they were obtained in a locality far removed from the then known habitat of *L. plumifera*. In his Handbook, Gould remarks: "From Gilbert's journal I extract the following passage:—'Lat., 17° 30'. March 6. I was fortunate enough to kill for the first time *Lophophaps plumifera*.' I only saw the specimen I killed." In the "Old Collection" of the Australian Museum is a specimen of *L. plumifera*, which Dr. Ramsay informs me was presented to Mr. John Murphy, one of the members of Dr. Leichhardt's Overland Expedition, and who obtained it during the journey from Moreton Bay to Port Essington. Mr. Murphy, then a lad of 16, was with Gilbert at the time he treacherously met his death at the hands of the natives, and presumably this is the historic specimen referred to by Gilbert in his journal, for there is no record in Dr. Leichhardt's work of any others being obtained,

except two shot by Brown the day before Gilbert secured his specimen, "but they were too much mutilated to make good specimens." Upon comparing a number of these Pigeons with white pectoral bands, and buffy-white or snow-white abdomens, from different parts of the Gulf District with others procured in Central and North-West Australia, I cannot but regard them as all being referable to one species—*L. plumifera*, of which I rank *G. leucogaster* as a synonymn. A pair of *L. plumifera* from the Gulf District have thrived well in the aviary at the Botanic Gardens, Sydney, for the past four years.

[The North-West part of Australia appears to be the home of this species. In habits and appearance at a distance they closely resemble *L. leucogaster* of Central Australia. In some rocky country near Gorda Town we saw these Pigeons for the first time. Several single birds were disturbed as we passed the base of the hills, but soon afterwards large coveys, consisting of about one hundred birds, passed from their feeding ground to the hills. At the homestead of Liverynga Station, I am informed, they are very abundant in the hills close by, and are so tame that as many as a dozen birds may be seen under the verandah seeking shelter from the hot sun, or drinking from a dish of water placed for their convenience. They are also plentiful near the Margaret and Gascoigne Rivers. They deposit their two creamy-white eggs on the ground beneath the shade of a spinifex tussock in a slight depression in the ground, in which a few bits of grass are collected. I am indebted to Mr. Harris, of Fitzroy River, for the clutch in the collection.]

No. 50. OCYPHAPS LOPHOTES (Crested Bronze-wing).

Columba lophotes, Temm., Pl. Col., 142 (1823).

Ocyphaps lophotes, Gould, Bds. Austr., fol. V., pl. 70 (1848); Sturt, Exped. Centr. Austr., vol. II., App., p. 44 (1849); Ramsay, Proc. Linn. Soc. N.S.W., vol. II., 2nd series, p. 171 (1887); North, Nests and Eggs Austr. Bds., p. 277, pl. 4, fig. 10 (1889); Salvad., Cat. Bds. Brit. Mus., vol. XXI., p. 535 (1893); North and Keartl., Rep. Horn Sci. Exp. Centr. Austr., part II., Zool., p. 99 (1896).

One adult female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers.

[These lovely birds had a peculiar interest for our party, as by observing the direction taken by them in the morning Mr. L. A. Wells found water on two occasions. They were present in the greatest numbers near Mount Bates, where they came in immense flocks to drink at a small pool. But wherever water existed throughout the journey they were seen. Being very plump and fleshy, they were often shot for the pot. At the Fitzroy River

several nests containing eggs or young birds were found during our stay.]

No. 51. GEOPELIA HUMERALIS (Barred-shouldered Dove).

Columba humeralis, Temm., Trans. Linn. Soc., vol. XIII., p. 128 (1821).

Geopelia humeralis, Gould, Bds. Austr., fol., vol. V., pl. 72 (1848); Ramsay, Proc. Linn. Soc. N.S.W., vol. II., 2nd series, p. 171 (1887); Salvad., Cat. Bds. Brit. Mus., vol. XXI., p. 455 (1893).

Erythrauchena humeralis, North, Nests and Eggs Austr. Bds., p. 277 (1889).

An adult male and female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. Similar to examples from Eastern Australia.

[Among the dense timber along the banks of the Fitzroy River these birds were very numerous, but they were never seen far from water. They were always found in pairs, and several of their nests containing young were found on the Bauhinia-trees near the river.]

No. 52. GEOPELIA CUNEATA (Little Turtle-dove).

Columba cuneata, Lath., Ind. Orn. Suppl., p. 61 (1801).

Geopelia cuneata, Gould, Bds. Austr., fol., vol. V., pl. 74 (1848); Sturt, Exped. Centr. Austr., vol. II., App., 44 (1849); Salvad., Cat. Bds. Brit. Mus., vol. XXI., p. 462 (1893); North and Keartl., Rep. Horn Sci. Exp. Centr. Austr., part II., Zool., p. 101 (1896).

Stictopelia cuneata, Ramsay, Proc. Linn. Soc. N.S.W., vol. I., 2nd series, p. 1,095 (1886); North, Nests and Eggs Austr. Bds., p. 279 (1889).

One adult male. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. Two eggs taken from a frail nest of twigs are true ellipses in form, pure white, and measure (A) 0·79 x 0·6 inch, (B) 0·78 x 0·6 inch.

[Near Cue a few of these Doves were seen; but, afterwards, in the timbered country beyond Lake Way, they were disturbed in hundreds as the caravan passed along. They were found wherever water existed, and appeared to drink frequently. At the Fitzroy River several nests were found containing eggs or young. The nest, a very frail structure, is usually placed on the horizontal branch of a Bauhinia-tree, and consists of a few small twigs or grass-stems, so loosely thrown together that the eggs may be seen from beneath, and so flat on top that it is a difficult matter to bend the limb without causing the eggs to fall.]

No. 53. *TURNIX VELOX* (Swift-flying Turnix).

Hemipodius velox, Gould, Proc. Zool. Soc. (1840), p. 150; *id.*, Bds. Austr., fol., vol. V., pl. 87 (1848); Ramsay, Proc. Linn. Soc. N.S.W., vol. II., 2nd series, p. 171 (1887).

Turnix velox, North, Nests and Eggs Austr. Bds., p. 286 (1889); Grant, Cat. Bds. Brit. Mus., vol. XXII., p. 553 (1893).

An adult male and female. Camp about five miles from the junction of the Fitzroy and Margaret Rivers. *T. leucogaster*, described by me in the report of the Horn Expedition from a single specimen, may prove to be only a very bleached young bird of this species.

A set of three eggs of *T. velox* are of a pale-brownish-white ground colour, which is almost obscured by numerous minute reddish-brown and violet-grey freckles uniformly distributed over the surface of the shell. In one specimen the ground colour is almost a clear white, rendering the markings very distinct. Length, (A) 0·91 x 0·74 inch, (B) 0·91 x 0·7 inch, (C) 0·88 x 0·71 inch. Another set of two are slightly more pointed at the smaller ends, and have the pale-brownish-white ground colour thickly covered with very small indistinct markings of a slightly-darker hue. These specimens have a washed-out appearance, and look as if they had been exposed to the sun's hot rays for a long time. Length, (A) 0·92 x 0·72 inch, (B) 0·92 x 0·7 inch.

No. 54. *ERYTHROGONYS CINCTUS* (Red-kneed Dotterel).

Erythrogonyx cinctus, Gould, Proc. Zool. Soc., 1837, p. 155; *id.*, Bds. Austr., fol., vol. VI., pl. 21 (1848); Ramsay, Proc. Linn. Soc. N.S.W., vol. II., 2nd series, p. 171 (1887); North, Nests and Eggs Austr. Bds., p. 307, pl. 16, fig. 5 (1889); Sharpe, Cat. Bds. Brit. Mus., vol. XXIV., p. 125 (1896).

Two adult males and two females. Swamp at the rear of the telegraph office, about five miles from the junction of the Fitzroy and Margaret Rivers. The crown of the head of adult females is bronzy-brown, like the back, but it becomes darker as the birds get older, and very old females can hardly be distinguished from the male. This species is represented in the Australian Museum by numerous examples from all parts of the Continent, except Queensland.

[These handsome little waders made their appearance at the swamps near the Fitzroy River immediately after the rainfall. They were found in small flocks, and frequently in company with the Marsh Sandpiper.]

No. 55. *TRINGA ACUMINATA* (Marsh Tringa).

Totanus acuminatus, Horsf., Trans. Linn. Soc., vol. XIII., p. 192 (1821).

Schœniclus australis, Gould, Bds. Austr., fol., vol. VI., pl. 30 (1848); Sturt, Exped. Centr. Austr., vol. II., App., p. 50 (1849).

Limnocincla acuminata, Ramsay, Proc. Linn. Soc. N.S.W., vol. II., 2nd series, p. 171 (1887).

Heteropygia acuminata, Sharpe, Cat. Bds. Brit. Mus., vol. XXIV., p. 566 (1896).

An adult male and female in winter plumage, obtained at a small swamp immediately at the rear of the telegraph office, near the junction of the Fitzroy and Margaret Rivers. Examples are more frequently procured in Eastern Australia during October, November, and December.

[The first pair of these birds was obtained near camp on Creek. The two birds were obtained on different days in August, and were the only ones seen until after the tropical rains fell in January and February at the Fitzroy River, when they were seen wading in the shallow margins of the swamps. They display a peculiar habit of jerking up their tails whilst feeding or when about to fly. On disturbing small flocks of the Red-Kneed Dotterel (*Erythrogonyx cinctus*), a bird of this species was after observed to rise in company with them, as though one of the flock.]

No. 56. GLAREOLA ORIENTALIS (Eastern Pratincole).

Glareola orientalis, Leach, Trans. Linn. Soc. vol. XIII., p. 132, pl. XIII (1820); Gould, Bds. Austr., fol., vol. VI., pl. 23. (1848); Sharpe, Cat. Bds. Brit. Mus., vol. XXIV., p. 58 (1896).

Four adult females, one adult male, two young males. Shot near the camp about five miles from the junction of the Fitzroy and Margaret rivers. Recorded for the first time from North-West Australia. It is worthy of note that the late Mr. T. H. Bowyer-Bower obtained specimens of *G. isabella* (*G. grallaria* Temm.) in the same district. On the eastern coast *G. orientalis*, has been procured as far south as Botany, near Sydney.

[The appearance of this bird is regarded by residents of North-West Australia as an indication of the approach of rain, and it is locally known as the "Little Storm-bird." During January I noticed a flight of strange birds, which afterwards proved to be this Pratincole, about a-quarter of a mile from the telegraph station. I ran for my gun, but was surprised to see the birds rising from the ground like a continuous column of smoke and circling overhead until they spread out so as to almost obscure the sky. I was within one hundred yards of them when the last bird left the ground. After soaring and rising in the air they disappeared in a southerly direction. For about a month afterwards they were seen in large flocks nearly every day coming

from the West, and later in the evening returning in that direction. They came in a similar manner to a flight of Swifts, scattered over a wide area and circling or dashing along in pursuit of insects. Those shot had their gullets filled with beetles and grasshoppers. Owing to their tender skin I found it difficult to obtain specimens. Although a number was shot those which fell any distance were ruined by striking the ground, as the concussion invariably knocked off large pieces of skin. The examples secured were shot whilst skimming over a swamp, from which they were retrieved by a little black urchin about eight years old. The natives were very indignant at my shooting these birds, and a deputation from the blacks' camp explained for my edification that if I killed any more a big rain would come and never stop until it had washed everything away. Although I was responsible for the death of about a score of birds the deluge had not occurred in the district at the time of writing. Perhaps because I left.]

No. 57. *NUMENIUS MINUTUS* (Little Whimbrel).

Numenius minutus, Gould, Proc. Zool. Soc. (1840), p. 176; *id.* Bds. Austr., fol., vol. VI., pl. 44 (1848).

Mesoscolopax minutus, Sharpe, Cat. Bds. Brit. Mus., vol. XXIV., p. 371 (1896).

An adult male, shot in an open plain twenty miles south of Derby. This species breeds in Eastern Siberia and Mongolia, and winters in Australia. During its stay here examples may be obtained in the same month in districts exhibiting the extremes of temperature. Specimens have been procured during March in the Snowy Mountains, New South Wales, at an altitude of 3,700 feet, also on the hot plains of the Northern Territory of South Australia.

[On the open plains, near Derby, these birds were often noticed. Their mode of flight against the wind closely resembles that of the domestic Pigeon. In alighting on the ground they immediately become very active in their search for food, which consists of insects, especially grasshoppers, and a few small seeds.]

No. 58. *TRIBONYX VENTRALIS* (Black-tailed Rail).

Gallinula ventralis, Gould, Proc. Zool. Soc. (1836), p. 85.

Tribonyx ventralis, Gould, Bds. Austr., fol., vol. VI., pi. 72 (1848); Sturt, Exped. Centr. Austr., vol. II., App. p. 53 (1849); Ramsay, Proc. Linn. Soc. N.S.W., vol. II., 2nd series, p. 172 (1887); North, Nests and Eggs Austr. Bds., p. 424, pl. 17, fig. 4 (1889).

Microtribonyx ventralis, Sharpe, Cat. Bds. Brit. Mus., vol. XXIII., p. 165 (1894).

Two adult females. Shot on a small swamp at the rear of the telegraph office, and about five miles from the junction of the Fitzroy and Margaret Rivers. Wing measurement, 8·1, 8·2 inches. Similar to examples from Eastern and Southern Australia.

[As soon as a good rainfall takes place in any part of West Australia this *Tribonyx* makes its appearance. A short time prior to our arrival at Lake Way in July abundance of rain had fallen and formed a fresh-water lake about five miles in circumference, around the margin of which thousands of these birds were seen. They appear just like a number of Bantam fowls running in the scrub and long grass, where they seek their food, often at a considerable distance from water. When disturbed they run rapidly for a short distance and then take wing, but always fly towards or over the water. The footprints of these birds were seen on nearly every dry claypan passed. As soon as the tropical rains formed swamps at the Fitzroy River these birds arrived, and hundreds were to be seen in places where a few days before no trace of them existed.]

No. 59. TADORNA RADJAH (Radjah Sheldrake).

Anas Radjah, Garnot, Voy. Coq. Zool., tom. I., p. 302 (1828).

Tadorna radjah, Gould, Bds. Austr., fol., vol. VII., pl. 8 (1848); Ramsay, Proc. Linn. Soc. N.S.W., vol. I., 2nd series, p. 1,096 (1886); North, Nests and Eggs Austr. Bds., p. 338 (1889); Salvad., Cat. Bds. Brit. Mus., vol. XXVII., p. 175 (1895).

One female. Shot on the Fitzroy River, about seven miles from camp. Some of the feathers in the centre of the chestnut pectoral band are missing, in other respects the bird is in perfect plumage. Wing 11 inches.

[These birds are very local in their habits, and at various places they frequent on the Fitzroy and Margaret Rivers they appear to spend most of the year. If shot and disturbed, they will return to the same spot during the night. In January a pair of adults with eleven newly hatched young ones were seen in the Margaret River. The nest which these birds had occupied was in the hollow spout of a Eucalypt overhanging the water. Although generally found in pairs, flocks of from four to eight are not uncommon. On two occasions single birds were seen in company with a flock of "Black Ducks."]

The eggs of the following species were also obtained :—

No. 60. CACATUA ROSEICAPILLA (Rose-breasted Cockatoo).

Cacatua roseicapilla, Vieill., Nouv. Dict. d' Hist., tom., XVII p. 12 (1817); Ramsay, Proc. Linn. Soc. N.S.W., vol II., 2nd

series, p. 170 (1887); North, Nests and Eggs, Austr. Birds, p. 251 (1889); Salvad., Cat. Bds. Brit. Mus., vol. XX., p. 132 (1891).

Cacatua eos, Gould, Bds. Austr., fol., vol. V., pl. 4 (1848).

Three eggs taken from a hollow branch of a tree near the Fitzroy River. When fresh they are pure white; but these specimens are very much nest-stained, and were apparently incubated. Length (A) 1·52 x 1·2 inch; (B) 1·47 x 1·18 inch; (C) 1·47 x 1·12 inch. These eggs are larger than any I have seen from Eastern Australia.

No. 61. *SAULOPROCTA PICATA* (Pied Fantail).

Rhipidura picata, Gould, Bds. Austr., fol., vol. I., Introd. p. XXXIX. (1848).

Three eggs. They are oval in form, and of a cream-buff ground colour with a band of small dull chestnut-red surface-spots on the thicker end, intermingled with underlying markings of pale bluish-grey. Length, (A) 0·73 x 0·56 inch, (B) 0·75 x 0·56 inch, (C) 0·73 x 0·58 inch.

No. 62. *CINCLORAMPHUS RUFESCENS* (Rufous-rumped Lark).

Anthus rufescens, Vig. and Horsf., Trans. Linn. Soc., vol. XV., p. 230 (1826).

Cincloramphus rufescens, Gould, Bds. Austr., fol., vol. III., pl. 76 (1848); North, Nests and Eggs Austr. Bds., p. 153 (1889); Sharpe, Cat. Bds. Brit. Mus., vol. VII., p. 500 (1883).

Ptenædus rufescens, Ramsay, Proc. Linn. Soc. N.S.W., vol. II., 2nd series, p. 168 (1887).

Two eggs found on the ground. They are of a pale purplish-white ground colour, with freckles, spots, and a few blotches of purplish-red distributed over the entire surface of the shell, the markings being slightly larger and darker on the thicker end. Length, 0·87 x 0·64 inch, (B) 0·91 x 0·7 inch.

No. 63. *SYNÆCUS AUSTRALIS* (Swamp Quail).

Perdix australis, Lath., Ind. Orn. Suppl., p. 4, XII (1801).

Synœcus australis, Gould, Bds. Austr., fol., vol. V., pl. 89 (1848); Ramsay, Proc. Linn. Soc. N.S.W., vol. I., 2nd series, p. 1,099 (1886); North, Nests and Eggs of Austr. Bds., p. 289 (1889).

Synœcus australis, Grant, Cat. Bds. Brit. Mus., vol. XXII., p. 247 (1893).

A set of four are swollen ovals in form, pointed slightly at the end, and are of a uniform dull yellowish-white, except where nest stained. Length, (A) 1·22 x 0·92 inch, (B) 1·13 x 0·93 inch, (C) 1·1 x 0·9 inch, (E) 1·19 x 0·93 inch. Another set has the

yellowish-white ground colour slightly tinged with dull green, and are very finely freckled all over with pin-point markings of yellowish-brown. Length, (A) 1·12 x 0·88 inch, (B) 1·12 x 0·89 inch, (C) 1·12 x 0·87 inch.

I cannot agree with Mr. Ogilvie Grant* in uniting *S. diemenensis*, with this species, the wing-measurement being fully one inch longer than in *S. australis*. Moreover the eggs of *S. diemenensis* are larger, the ground color is a deeper green, and the marking more conspicuous. A set of the latter taken at Boat Harbor, on the North-west coast of Tasmania measure as follows, length, (A) 1·33 x 0·99 inch, (B) 1·3 x 0·97 inch, (C) 1·33 x 1 inch, (D) 1·33 x 0·98 inch, (E) 1·32 x 0·98 inch, 1·31 x 0·96 inch. Eggs of *S. australis* taken in Tasmania are similar in colour and size to those of continental birds of this species.

No. 64. LOBIVANELLUS MILES (Masked Plover).

Tringa miles, Bodd. Tabl. Pl. Enl. p. 51 (1783).

Lobivanellus personatus, Gould, Bds. Austr., fol., vol., VI., pl. 10 (1848).

Lobivanellus miles, Ramsay, Proc. Linn. Soc. N.S.W., vol. I., 2nd series, p. 1,099 (1886); North, Nests and Eggs Austr. Bds., p. 301 (1889); Sharpe, Cat. Bds. Brit. Mus., vol. XXIV. p. 140 (1896).

Two eggs, taken on the 8th of March, 1897, from the margin of a swamp about five miles from the junction of the Fitzroy and Margaret Rivers. They are rounded ovals in form, and of a yellowish-stone ground colour, slightly tinted with olive, with freckles, spots, and larger irregular-shaped markings of olive-brown and blackish-brown distributed over the entire surface of the shell, together with a few superimposed spots of dull bluish-black. Length, (A) 0·68 x 0·3 inch, (B) 0·63 x 0·31 inch.

No. 65. HYPOTENIDIA PHILIPPENSIS (Land Rail).

Rallus philippensis, Linn., Syst. Nat. tom. I., p. 263 (1766).

Rallus pectoralis, Gould, Bds. Austr., vol. VI., pl. 76 (1848).

Hypotanidia philippensis, North, Nests and Eggs of Austr. Bds., p. 328 (1889); Sharpe, Cat. Bds. Brit. Mus., vol. XXVIII., p. 39 (1894).

Three eggs, taken in February, 1897. They are a pale cream-buff ground colour, with rounded spots and a few blotches of chestnut-red and dark bluish-grey, the latter colour appearing as if beneath the surface of the shell. Length, (A) 1·32 x 1·03 inch, (B) 1·33 x 1·03 inch, (C) 1·37 x 1·03 inch.

* Grant, Cat. Bds. Brit. Mus. vol. XXII, p. 247 (1893).

The following notes by Mr. G. A. Keartland refer to birds observed during the expedition, and were either amongst the skins abandoned in the desert, or were shot for food :—

No. 1. *CIRCUS GOULDI* (Gould Harrier).

This species was only noted in the vicinity of the large fresh-water swamps at Lake Way and near the Fitzroy River. Beyond recognising its presence, and the fact that lizards, snakes, and grasshoppers form its chief food no information was obtained.

No. 2. *ASTUR CINEREUS* (Grey-backed Goshawk).

A single example of this species was shot near the telegraph station on the Fitzroy River.

No. 3. *ASTUR APPROXIMANS* (Australian Goshawk).

Wherever surface water was found these birds were met with. Whilst duck-shooting in August, I saw one attacking a *Tribonyx*. It made several swoops at its intended victim, and would, no doubt, soon have killed it. They are very courageous. I saw one make several attempts to seize a half-grown fowl, notwithstanding the fact that a dog kept barking at it, and our black boy drove it away twice. A cartridge ended the trouble. At Johanna Springs I shot a fine female, and was surprised to find it so far in the desert. Amongst those killed were a female in adult plumage, whilst her mate still retained his immature garb. I had observed these birds building their nest near a creek, and if time had permitted I should probably have obtained their eggs. All the settlers wage war against the Goshawks on account of their depredations amongst the poultry. At a spring in lat. 22°23', long. 124°0', one was seen devouring a Crested Bronzewing Pigeon (*Ocyphaps lophotes*), which it had, no doubt, seized whilst drinking.

No. 4. *ACCIPITER CIRRHOCEPHALUS* (Collared Sparrow-hawk).

Along the Fitzroy and Margaret Rivers, and their branches, these bold little birds were met with. Near our camp in January I was surprised to see a small male bird attacking a pair of Rose-breasted Cockatoos. The Cockatoos had selected the hollow branch of a tree for their nest, and whilst they were trimming the entrance to their future domicile the hawk made frequent swoops at them, knocking out bunches of feathers and causing the Cockatoos, which were more than twice his weight, to cry out with pain. This battle was continued for some time, and was eventually terminated with a cartridge, as I hoped to have the chance of robbing the cockatoos' nest myself.

No. 5. *Aquila audax* (Wedge-tailed Eagle).

Although in other parts of Australia these Eagles are found of various shades of colour—from very light brown to nearly black, I never saw a light-coloured one throughout our journey. In crossing the desert they were frequently seen pursuing the little wallabies so common on the sandhills. They generally hunted in couples. Soaring overhead, until their keen eyes detected their victim, they descended with unerring aim upon it. Several of their nests were seen in the desert gums on the sandhills, not more than 20 feet from the ground.

No. 6. *Haliaetus leucogaster* (White-billed Sea Eagle).

Along the North-West Coast, and on the rivers, these noble birds were seen. They are not at all as particular in their diet as many suppose, but will devour wallabies, ducks, or lizards as readily as they do fish. Mr. T. Carter informed me that he had taken their eggs, near Point Cloates, from a nest in which the remains of several wallabies were found.

No. 7. *Haliastur girrenera* (Red-backed Fish Eagle).

Several of these birds were seen along the course of the Fitzroy and Margaret Rivers, but owing to their shyness I was unable to obtain specimens. They were invariably found perched on high trees overhanging the water.

No. 8. *Haliastur spheurus* (Whistling Eagle).

Greatly to my surprise, these birds were very rare. At Quanbun Station, on the Fitzroy River, two of them kept up a constant attack on the Rosebreasted and other Cockatoos which came to drink at the swamp. Along the rivers a few more were seen.

No. 9. *Milvus affinis* (Allied Kite).

These tropical scavengers were not seen until the Fitzroy River was approached early in November, but on our arrival at the telegraph station at the Crossing they were very numerous. All along the road from Derby to the Margaret River they may be seen in hundreds. During the heat of the day they seek shelter from the sun amongst the branches of the various trees, but both morning and evening they are either on the wing soaring overhead or seeking food on the ground. Nothing in the shape of carrion seems to come amiss to them. They are very tame, and are useful in clearing away the offal when cattle are slaughtered. They seldom attack poultry, and consequently are not molested. Grasshoppers form the chief portion of their food. They build their loose stick nests in the Baobab-trees during March and April.

No. 10. *LOPHOICTINA ISURA* (Square-tailed Kite).

A few of these Kites were noted in the early part of our trip. At one of our camps near Lake Augusta in July I found a nest containing one young bird fully fledged. It was situated in a Cork-bark-tree, about 15 feet from the ground. The old birds were very shy and difficult to approach.

No. 11. *GYPOICTINIA MELANOSTERNON* (Black-breasted Kite).

Many of these birds were observed on the flats near the Fitzroy River. As our caravan passed along, they kept rising from the ground, and only flew a short distance before they again settled. They were never seen to perch. Two old nests were found, but neither contained eggs.

No. 12. *FALCO HYPOLEUCUS* (Grey Falcon).

Several of these beautiful Falcons were observed near Mount Campbell, and also at Mount Arthur, but successfully evaded capture.

No. 13. *FALCO SUBNIGER* (Black Falcon).

Many splendid specimens of this Falcon were noted between the Fitzroy and Margaret Rivers. Two nests examined were just ready for eggs. In structure they closely resemble those of *Hieracidea berigora*, and were placed in the highest trees in the neighbourhood.

No. 14. *FALCO TUNUTATUS* (White-fronted Falcon).

This ubiquitous bird was found wherever water exists. As an instance of its daring, I may mention that whilst camped at dépôt in August a flock of Cockatoo-Parrots perched on a dead tree close to the waterhole, but before I could pick up my gun, a White-fronted Falcon dashed at them, causing the flock to scatter in all directions. In an instant it seized one in its flight, and was making off, when I fired at him, knocking out feathers. The Falcon dropped its prey, but secured it again before it reached the ground. A second shot at long range caused him to again let the Parrot fall; but it was quite dead. The White-fronted Falcon is probably one of the most courageous of the *Falconidæ*, and is able to attack with success young ducks and teal, which it will carry off, though much heavier than itself. Its marvellous power of flight enables it to travel a great distance in search of prey.

No. 15. *HIERACIDEA ORIENTALIS* (Brown Hawk).

These birds were found in great numbers in the early and latter parts of our journey, but very few were seen in the desert. In August several nests containing young were found,

and our party were interested in watching the assiduity with which the old birds carried out their paternal duty. From before daybreak until long after dark at night their cries might be heard as they flew over our camp, carrying lizards, &c., to their clamoring broods. Near the Fitzroy River they were found building their nests in March.

No. 16. *HIERACIDEA BERIGORA* (Western Brown Hawk).

In the early part of our trip these birds were frequently noted in the mulga scrubs and forest country. Owing to their size, I regret I was unable to collect a series of skins to illustrate the variation in their plumage. Their habits and courage closely resemble those of the foregoing species.

No. 17. *TINNUNCULUS CENCHROIDES* (Nankeen Kestrel).

This Kestrel was found during the early portion of our journey. Its habits are well known, and show no variation in the different parts of the Continent. Unlike any of the foregoing members of the order, the Kestrel frequently makes its nest in the hollow spout of a dead tree. On 28th August I took four eggs from a tree near our camp, and was surprised to find the nest lined with pellets of camel dung. This is probably the first time this material has been used for nest-lining.

No. 18. *PANDION LEUCOCEPHALUS* (White-headed Osprey).

These birds are very numerous all along the North-West Coast and the course of the Margaret, Fitzroy, Gascoigne, Ashburton, and Oakover Rivers. They seldom venture far from water, and their nests are usually placed in trees on the margin of the streams mentioned.

No. 19. *NINOX BOOBOK* (Boobook Owl).

One of the most familiar sounds to be heard during the night, wherever timber was large enough to afford sufficient shelter, was the note of the Boobook. These birds were heard, and seen, near Lake Way and they were also numerous throughout the course of the rivers and creeks. Early in August a pair flew from the hollow branch of a large tree on the margin of a creek where we were shooting ducks. As I thought they had their nest there, the late Mr. Jones obliged by chopping out the limb, with the result that we found the nest just ready for eggs. During the day the birds are frequently seen amongst the foliage of the trees.

No. 20. *CACATUA LEADBEATERI* (Leadbeater's Cockatoo.)

These birds were only found in the desert, where morning and evening they were noted in their journeys to and from water or feeding on the bushes and ground.. They were usually in pairs,

and when camped near the native wells we seldom missed seeing them. They were very shy, and flew around several times to see that all was safe before alighting.

No. 21. *CACATUA ROSEICAPPELLA* (Rose-breasted Cockatoo).

Near Lake Way these birds were first noted on July 13, but a few days later Mr. Jones discovered two of their nests, from which he dislodged the birds. Subsequently, in crossing the desert, a number of other nests were found, and on October 15 Mr. Wells took three fledged young ones from a hollow tree on a sandhill. During February and March several nests, containing either eggs or young, were found near the Fitzroy River. It will thus be seen that these birds have not only a wide range in the North-West, but that their breeding-time is equally extensive. The birds were found in great flocks at all waters, and were so tame that no difficulty was experienced in shooting a number for the pot, five or six frequently falling to one shot. When well stewed, they form a very palatable dish.

No. 22. *CACATUA SANGUINEA* (Blood-stained Cockatoo).

This species was first noted between Mullawa and Cue, but at Lake Way the first nice specimen was obtained. They were not seen again until we reached the lagoons near the Fitzroy River, where they were in countless numbers. At one spot about six acres of ground was perfectly white with them. They were always seen in the vicinity of water, and spend a great portion of their time on the ground. Unfortunately when I had the opportunity of preserving them they were all so dirty or in such ragged feathers that I did not procure a good skin. During November the natives secured an immense number of nestlings, which they regard as excellent food. August and September are their usual laying months. After the young ones have left the nest, they keep up their incessant cry for food for some months.

No. 23. *CALOPSITTACUS NOVÆ HOLLANDIÆ* (Cockatoo Parrot).

Wherever surface water exists in North-West Australia the Cockatoo Parrots are seen as they arrive in large flocks to drink both morning and evening. Their food consists of various grass seeds, which they seek in the coolest parts of the day, but when the sun becomes hot they shelter under the densest foliage they can find, and at such times they will remain so still that the natives can approach to within a few yards and knock the birds down with their throwing sticks. Nestlings were plentiful at the Fitzroy River during January.

No. 24. *TRICHOGLOSSUS RUBRITORQUIS* (Red-collared Parrakeet).

On approaching Derby several pairs of these birds crossed our line of march, but I was unable to secure specimens. However, the

fact that they breed in that neighbourhood was established by Dr. House, Government Resident, who showed me a beautiful pair of young birds in captivity which had been taken from a nest in the vicinity by a native. They were very tame, and appeared to stand confinement well in the large aviary in which they were kept. Dr. House also showed me several skins he had preserved from birds shot in his paddock.

No. 25. *PLATYCERCUS ZONARIUS* (Port Lincoln Parrakeet).

From the commencement of our journey these birds continue to be fairly abundant until reaching Separation Well, after which they were not observed. Near the waterholes they might be seen in pairs or small flocks feeding on the ground or devouring the green shoots of several small plants. With the exception of a solitary pair of the Yellow-collared Parakeet, this was the only representative of the genus found in West Australia during the trip.

No. 26. *PLATYCERCUS SEMITORQUATUS* (Yellow-collared Parrakeet).

Although these birds are numerous in places between Albany and Fremantle, they seem to avoid the tropics. A single pair was found south of Lake Augusta in the end of July, but, judging from their poor condition, I concluded that they were out of their latitude. Mr. Wells shot them at a waterhole, and although the morning was well advanced, their stomachs contained very little food.

No. 27. *PSEPHOTUS MULTICOLOR* (Varied Grass Parrakeet).

These birds were frequently seen between Cue and Lake Augusta, but were not found further north. They were always seen singly or in pairs. They are of an affectionate disposition, and when one bird was shot and left where it fell for a few minutes, its mate invariably returned and perched near for a short time, and then approached the dead one to try and coax it away. They were generally found near water, and prefer mulga or mallee country.

No. 28. *MELOPSITTACUS UNDULATUS* (Warbling Grass Parrakeet).

Throughout the whole of the country traversed these birds were noted. They were breeding in July and August, and numbers of eggs and young birds were seen. On July 26 Mr. Jones took young birds fully fledged from a hollow limb, in which he found four nests. Two of the latter contained fresh eggs. Other nestlings were seen on August 26. As these birds require to drink frequently, their presence was always noted, and their course watched. They travel immense distances to feed, and in

the vicinity of Johanna Springs flocks of several thousands were seen going to some favorite feeding-place soon after sunrise. On three occasions I saw a beautiful yellow bird flying in the flock. These abnormal birds were as richly coloured as a Norwich canary.

No. 29. *GEOPSIITTACUS OCCIDENTALIS* (Western Ground Parrakeet).

Although the feathers of these birds were often found in the nests of various small birds or amongst the spinifex, where they had no doubt fallen victims to the hungry dingoes, I only saw one bird, which was disturbed by Mr. Wells' camel in passing through some spinifex on a stony rise on which scattered mulga trees were rather too numerous. Mr. Chas. F. Wells pointed out the spot where it had settled; but after a short search, it was flushed some distance away, showing that it had travelled fully fifty yards. Owing to the erratic flight of the bird through the scrub, I was unable to shoot it. I afterwards ascertained from the natives that these Parrakeets lay four eggs in a loosely-made cup nest under the shade of the spinifex. They are nocturnal in their habits, feeding and drinking at night, and hide during the day beneath the shelter of the tussocks, from which they only emerge when disturbed, and then they fly off like a quail, giving a short sharp note several times as they go.

No. 30. *CUCULUS PALLIDUS* (Pallid Cuckoo).

These well-known birds were found throughout the trip, and were seen from Mullawa in June to the Fitzroy River in March.

No. 31. *CACOMANTIS FLABELLIFORMIS* (Fantailed Cockatoo).

Several of these birds were noted on the Fitzroy River, and in the vicinity of the telegraph office, during February.

No. 32. *LAMPROCOCCYX BASALIS* (Narrow-billed Bronze Cuckoo).

These birds were frequently seen, and several shot during the early stage of our journey. At the Fitzroy River, Mr. Wells took an egg of this Cuckoo from the nest of *Malurus cruentatus*.

No. 33. *DACELO GIGAS* (Great Brown Kingfisher).

Whilst camped at Mullawa, I heard the well-known notes of these birds, and found a few of them always near our quarters. They were also noted between Fremantle and Perth, but were not found north of Cue.

No. 34. *ÆGOTHETES NOVÆ HOLLANDIAE* (Owlet Nightjar).

Throughout the course of our journey I frequently saw these birds fly about our camp at night. As the caravan passed through the forests the unusual noise disturbed the Nightjars

from their retreats in the hollow branches of the dead trees. Whilst in pursuit of ducks with Mr. C. F. Wells on 8th August, he called my attention to one of these birds perched within a few feet of my head. It was nearly black, but whilst changing my cartridge it disappeared across the creek, and could not again be found. Subsequently others were seen. They frequently came under the verandah at the telegraph station at night in pursuit of insects, flying in and out like Welcome Swallows.

No. 34. *HIRUNDO NEOXENA* (Welcome Swallow).

These well-known birds were only seen near Geraldton at the start of the expedition. They are by no means common in West Australia.

No. 36. *LAGENOPLASTES ARIEL* (Fairy Martin).

Near Cue and at Fitzroy River I saw numbers of these birds, and was informed that their well-known bottle-shaped mud nests are frequently seen among the rocks of the St. George Range.

No. 37. *CHERAMOECA LEUCOSTERNUM* (White-breasted Swallow).

Numbers of these pretty birds were seen tunnelling in the sandy crown of a hill near Cue on June 28, whilst others were examining crevices in the rocks. Mr. Jones, who was with me, kindly climbed to several places from which we saw the birds emerge, but found the nests were unfinished. These swallows were subsequently seen as we entered the desert, and on September 29 I obtained specimens of young birds just able to fly, in addition to adults of both sexes. A few were soaring overhead at Fitzroy River during January and the two following months.

No. 38. *ARTAMUS PERSONATUS* (Masked Wood Swallow).

Early in August we passed through an immense flock of these birds in a mulga scrub. They appeared to be migrating, and to have simply stopped to satisfy the cravings of hunger, as they were soon busy amongst the grasshoppers. We camped for lunch, but, before resuming our journey, they had made a start. On several subsequent occasions they were noted, and near our camel dépôt on August 25 they were found in company with *A. melanops* and *A. superciliosus*. As we approached the northern border of the desert we saw numerous flocks, whose welcome chirp was the only sound that disturbed the silence of the journey.

No. 39. *ARTAMUS SUPERCILIOSUS* (White-eyebrowed Wood Swallow).

These birds were only seen on one or two occasions. Near the camel dépôt on August 25 a number were noted, but, although I

visited the same locality frequently during the month I spent there, I only saw them once. On one or two mornings they were noted in the desert.

No. 40. *PARDALOTUS ORNATUS* (Striated Diamond-bird).

This bird was seen and shot near the Fitzroy River in January, but was in bad feather owing to heavy moult. It was observed amongst the top branches of a stunted gum-tree.

No. 41. *GYMNORHINA TIBICEN* (Piping Crow Shrike).

Three of these birds were seen near Lake Way on July 12, and a few days later others were noted. Although I made diligent search and inquiries, I could find no trace of them so far north as the Fitzroy River.

No. 42. *GYMNORHINA LEUCONOTA* (White-backed Crow Shrike).

Whilst in the train between Fremantle and Perth Mr. Jones drew my attention to these birds on several occasions as they perched on the trees near the railway line, or flew off on the approach of the train. No trace could be found of their presence further north.

No. 43. *CRACTICUS ROBUSTUS* (Black-throated Crow Shrike).

The merry carols of these birds were frequently heard along the creeks before reaching Mount Bates, and specimens obtained. They appeared to watch for, and secure, their prey whilst the victim was drinking. One bird was shot whilst in the act of killing a Chestnut-eared Finch on the margin of a pool in creek. They were not seen further north.

No. 44. *PACHYCEPHALA RUFIVENTRIS* (Rufous-breasted Thick-head).

These birds were numerous in the scrub along the course of the Fitzroy River, but were not noted elsewhere.

No. 45. *SPHENOSTOMA CRISTATA* (Crested Wedgebill).

This bird appears to have a very wide range in West Australia. Along the Cue road its notes were frequently heard, and birds were plentiful near Lake Way. At our camel dépôt on Creek during August I obtained a number of specimens, and on several occasions killed the pair at one shot. In three cases, males in immature plumage, with horn-colored bills, were found mated to adult females; whilst at other times the sexes could not be distinguished without dissection. The Wedgebill delights in open country in which low bushes of dense foliage exist. Their nests are usually placed in the latter, about 3 feet or less from the ground, and are built of fine twigs, cup-

shaped, and lined with soft grass. Like *Oreoica cristata*, the Wedgebill is a most accomplished ventriloquist.

No. 46. **GRAUCALUS MELANOPS** (Black-faced Graucalus).

This bird was noted on many occasions throughout the trip, but appears to be most plentiful in the large timber near the creeks and rivers.

No. 47. **GRALLINA PICATA** (Pied Grallina).

As might be expected, these well-known birds were found near all surface waters passed. During January and February many of their nests were observed around the swamps near the Fitzroy River, and in March the natives brought several young ones to our camp. As the bird is so well known, skins were not preserved.

No. 48. **RHIPIDURA ALBISCAPA** (White-shafted Fantail).

These birds, or what I thought to be them, were noted several times in the mangroves near the Fitzroy River, but as I was in pursuit of other birds, and did not care to shoot them, I cannot be certain as to their identity.

No. 49. **SAULOPROCTA MOTACILLOIDES** (Black and White Fantail).

This well-known flycatcher was found throughout the journey. Near the camel dépôt during the month of August Mr. C. F. Wells called my attention to a nest containing three eggs of this species. They were much more highly coloured than usual, being rich yellowish-brown with bluish-black markings. They were quite fresh. At the telegraph station at Fitzroy River a pair of these birds were constantly hopping about the kitchen door, and often went inside in pursuit of flies.

No. 50. **SEISURA INQUIETA** (Restless Flycatcher).

The harsh grating notes of these birds were only heard near the Fitzroy River, where the birds were numerous. Instead of hopping along the ground like the Black Fantail, the Flycatcher was invariably noted in the tops of the tallest trees, where its restless habits rendered it conspicuous.

No. 51. **MICRŒCA FASCINANS** (Brown Flycatcher).

These birds were only noted near the Fitzroy River during March and the two following months.

No. 52. **PETRŒCA GOODENOVII** (Red-Capped Robin).

In the early part of our journey these birds were very numerous, being noted frequently from Cue to Separation Well, but further north the country appeared to be too dry and the climate

too hot. Although I was assured they occasionally frequent the Fitzroy River and its vicinity, I never saw them there.

No. 53. *Melanodryas bicolor* (Hooded Robin).

These birds were seen throughout the trip, being particularly numerous at Creek in August. On October 26 I found a nest of this Robin containing two eggs. It was placed on the horizontal branch of a desert gum-tree, about six feet from the ground. It was a cup-shaped structure, built of strips of bark, cobwebs, and fine grass. Although the rope holding our tarpaulin was tied to the branch, the birds visited and sat on the nest several times during the day. The eggs were dark-olive-green, with a reddish-brown tinge at the larger end. Other birds of this species were subsequently seen near the Fitzroy River.

No. 54. *Malurus Lamberti* (Lambert's Superb Warbler).

The first specimen of this species was obtained near Lake Augusta, but others were afterwards seen in considerable numbers, and frequently in company with *M. leucopterus* in the saltbush and samphire near Creek. At Separation Well several of their nests were seen in the low bushes near our camp, but the young birds had all taken wing prior to our arrival there on October 9.

Malurus leucopterus (White-winged Wren).

Several of these beautiful little warblers were seen near the camel dépôt on Creek, and the late Mr. C. F. Wells shot some capital specimens, which were, unfortunately, abandoned in the desert. The male birds are very shy, except at breeding-time, when they become pugnacious, fighting and chasing each other away from the bushes where they purpose building their nests. On one occasion two males were so intent on their battle that I killed both at one shot from about 15 paces. The White-winged Wrens generally frequent the saltbush and samphire flats, but are also found in any low dense bushes and undergrowth. Three of their nests, containing fresh eggs, were found during September.

No. 55. *Malurus leuconotus* (White-backed Superb Warbler).

This shy little warbler was first noted in the saltbush near Lake Way, where several specimens of both sexes were obtained. They were afterwards noted at various places right across the desert, to within 50 miles north of Johanna Springs, but were not seen near the river. In the pursuit of these birds I found the homely-clad females very tame and easy to approach, whilst the males in full plumage were extremely shy. When heard or seen out of range the male would immediately either fly off or drop

into the thick undergrowth, and then hop away unobserved. As soon as he was at a safe distance, the females and young birds followed.

No. 56. *AMYTIS STRIATUS* (Striated Desert Wren).

Although frequently seen as we travelled over the spinifex flats, I did not secure specimens of this bird until 6th October, about 40 miles south of Separation Well, where eight specimens (four of each sex) revealed the fact that there is no sexual difference in plumage. During August Messrs. L. A. Wells and Jones found several nests containing eggs belonging to this species, and subsequently a number of others were obtained. The nests were always placed on top of a spinifex tussock, and built of soft grass, with a large opening near the top. The eggs (two in number) were either finely or heavily spotted with light brown on a white ground.

No. 57. *AMYTIS TEXTILIS* (Quoy's Desert Wren).

Amongst the saltbush near Lake Way, and also on the samphire flats or scrub-covered sandhills near our camel dépôt on Creek, I obtained over a dozen specimens of this bird, and in August secured a pair of young ones unable to fly. I found no variation in colour or structure in either sex or stage, adult or young. They all possessed the same stout bill and fleshy thighs. The sexes could not be distinguished without dissection. These birds keep close to the ground under some dense bush until disturbed, when they fly or run with great rapidity to the nearest shelter. Occasionally at mating-time they may be seen on a low bush, but seldom more than 2 feet from the ground. Wounded, it is almost impossible to secure them, as they run to shelter and hide like mice.

No. 58. *STIPITURUS MALACURUS* (Emu Wren).

When approaching Separation Well we were surprised to find a species of small bird hiding in the spinifex. Numbers were seen, but, owing to their agility in concealing themselves, and their disinclination to fly, it was difficult work to secure them. The first one obtained was caught by Messrs. L. A. Wells and G. L. Jones by simply throwing a waterproof sheet over the tussock in which it secreted itself, and then removing the grass by degrees until the bird was caught. It proved to be an immature female. At the well I succeeded in obtaining three more (two males and one female). Thus in the arid desert and in hot weather we found birds that have hitherto been associated in our minds with moist localities. The males were extremely brilliant in colour, the throat being a very bright lavender-blue. These were all shot in a low acacia bush on a sandhill. Three of their

nests were found in the spinifex, but the young ones had all taken flight. These nests closely resembled those of the *maluri*, but had rather large side openings. It was extremely unfortunate that these skins were lost, as, although entered on my notes as Emu Wren, I am strongly of opinion that it is a separate species, as the tail feathers were very close in texture, and the throat of the male much more highly coloured than in any specimen of *Stipiturus malacurus* I had previously seen.

No. 59. *ACANTHIZA APICALIS* (Western Acanthiza).

Amongst the samphire bushes near the camel dépôt on Creek the musical note of this little *Acanthiza* was frequently heard, and numbers of their nests found. The latter is a pretty dome-shaped structure with a small opening at the side. It is built of soft grass and cobwebs, and decorated all over with white cocoons, which gave it a very pretty appearance. The eggs (three in number) are fleshy-white, freckled or blotched with red. All the nests discovered were within about 2 feet of the ground.

No. 60. *EPHTHIANURA TRICOLOR* (Crimson-fronted Ephthianura).

These gorgeous little birds were constantly met with throughout the trip, but were most numerous in the saltbush country. They appear to be quite indifferent to the proximity of water. They were first noted near Cue, were numerous near Lake Way, and odd birds were found in the driest parts of the desert. Sometimes they were in large flocks, but frequently single birds were seen.

No. 61. *EPHTHIANURA AURIFRONS* (Orange-fronted Ephthianura).

Unlike the preceding species, these birds were always found at the fresh waters seen in the early stages of our journey. At Lake Way they were particularly numerous, clinging to twigs and rushes projecting above the surface of the water. They mingled with the Dotterel on the damp sandy flats, and were also found in the saltbush and samphire near camp. They were not seen again until after the tropical rains in February, when they appeared at the "bluebush" swamps near the junction of the Fitzroy and Margaret Rivers.

No. 62. *PYRRHOLEMUS BRUNNEUS* (Brown Red-throat).

Before reaching Cue this lovely little songster made his presence known. They seem to delight in saltbush and country thickly studded with low dense bushes, and although their sweet notes are frequently heard, the birds themselves retire to the thick foliage on the approach of man. When undisturbed, they may be seen hopping amongst the grass. Specimens were

secured on several occasions between Cue and Separation Well, but they were not found further north. During the flying trip taken by Messrs. L. A. Wells and G. L. Jones in August they found a beautiful clutch of three eggs of this species. The nest was in a thick bush about 3 feet from the ground.

No. 63. *CALAMANTHUS CAMPESTRIS* (Field Calamanthus).

Although the Field Calamanthus is generally found amongst coarse grass, heath, and scrub, in moist localities, it seems to thrive equally well in the dry sandy parts of West Australia. They were frequently disturbed amongst the samphire, saltbush, and grass near the camel dépôt, and morning and evening enlivened our camp with their songs, as perched on some elevated spot one would pour forth its daily carol. Several nests were found during August, two of them being discovered lying on small patches of bare ground, in such exposed positions as to convey the idea that they had been cast away by some passing oologist Mr. Chas. F. Wells found another beneath the shelter of a low saltbush. All the eggs taken were of the usual colour and character.

No. 64. *XEROPHILA LEUCOPSIS* (White-faced Xerophila).

In the mulga scrubs between Mullawa and Lake Way these birds were frequently seen, either singly or in small flocks. They are very active, either on the ground or amongst the scrub. Their bulky nests are usually located amongst drooping foliage of the casuarina or acacia; but on one occasion Mr. Jones pointed out a hollow log about 8 feet high into which he had noticed a small bird disappear, and on splitting it open we were surprised to find a Xerophila's nest, containing three fresh eggs, at the bottom of the spout. A few days afterwards another was found in a similar position. The Xerophila was not found further north than Lake Augusta.

No. 65. *CINCLORAMPHUS CRURALIS* (Brown Cincloramphus).

At the camel dépôt on Creek these birds were first noted. Their well-known habit of singing loudly as they fly from tree to tree or rise from the ground, giving a final chirp on perching, was frequently noticed. The specimens shot appeared to be identical with those found in other parts of Australia. They were also seen at the Fitzroy River.

No. 66. *CINCLORAMPHUS RUFESCENS* (Rufous-tinted
Cincloramphus).

These birds were particularly plentiful amongst the long kangaroo grass along the creeks between Cue and Lake Augusta,

and also near the Fitzroy River. Their habits are too well known to require further comment.

No. 67. *POMATOSTOMUS SUPERCILIOSUS* (White-eyebrowed Pomatostomus).

These birds were found in several places between Mullawa and Lake Augusta, and afterwards at Fitzroy River and along the Nerrima and Jilgelly Creeks, their noisy chatter and sprightly antics frequently causing much amusement. They were breeding near Cue in June and at Fitzroy River in February. On two occasions they were seen in company with *P. rubeculus*.

No. 68. *POEPHILA MIRABILIS* (Crimson-headed Finch).

Although I only obtained an immature live bird, caught at Derby, Mr. Wells brought evidence in the shape of a cageful of adults that they are plentiful in that locality. I was also informed that they are numerous at Wyndham, a fact which shows that they range across the northern portion of the continent from east to west.

No. 69. *TÆNEOPYGIA CASTANOTIS* (Chesnut-eared Finch).

These little birds had a peculiar share in our interest, as their presence in numbers is a pretty good indication of the proximity of water. Wherever rockholes or wells containing water were found immense flocks of these birds were seen. They seem to possess an insatiable thirst, and will alight in flocks to drink close to where men are working. When we were baling water for the camels they frequently perched on the sides of the dishes to drink. I am strongly of opinion that they possess the ability to scent water, as on several occasions during the hot days of April flocks perched on the trees under which we were enjoying the midday halt, and were not easily scared, but kept hopping on the water casks and near the pannikins containing hot tea. Although constantly chased by my dog, they simply evaded the attack, and as soon as allowed drank from a tin of water placed for them. At one rockhole passed soon after leaving Lake Way they were in such numbers as to pollute the water with their droppings. They were found from Mullawa to the Fitzroy River. In some cases three or four nests containing fresh eggs were found on one bush. They build in all sorts of places, nests being found in the tall desert gums, in holes in hollow logs, on low bushes, or on the ground under the low-spreading saltbush. They often start laying as soon as the foundation of the nest is placed in position, and kept on building and laying until both operations were finished. The material used is invariably dry grass stems. The birds seek the shelter of their nests at night, even after their broods are hatched. Notwithstanding that one

pair, which built their nest in our bough shade, were frequently handled by our Afghans at the camel dépôt, they remained there, laid the full clutch of bluish-white eggs, and reared their brood. Mr. Wells found a Wedgebill's nest near our camp which had been appropriated by a pair of these Finches. It contained one egg when first discovered, but before the clutch was completed the birds had finished roofing it over.

No. 70. *CINCLOSOMA CASTANEONOTUM* (Chesnut-backed Thrush).

About 40 miles south of Separation Well several of these birds were shot. They were very shy, and when disturbed from one bush soon sought shelter under another. The specimens secured were moulting at the time (September).

No. 71. *CINCLOSOMA CINNAMOMEUM* (Cinnamon-colored Thrush).

These birds delight in rough stony country, and were numerous around our camp at the camel dépôt. They lie concealed under low bushes until approached within a few yards, when they fly off to other shelter. They were never seen to perch. Several of their nests were found on the ground under low bushes. In each case the bird had scraped a slight hollow, and lined it with a few acacia leaves. The nest was so loosely made that it fell to pieces on being lifted. The clutch consisted of two eggs of a dirty-white ground colour, heavily blotched with umber-brown and slatey-grey.

No. 72. *CORVUS CORONOIDES* (Hazel-eyed Crow).

During the early part of our journey these birds were frequently observed, but as the hot weather set in in October they became scarce, and were afterwards found only in the vicinity of water, so that, to us at least, they ceased to be birds of evil omen. In December and the first week of January they were very numerous around our camp, and united with the Kites (*Milvus affinis*) in performing the duty of scavengers. During the heat of the day they might be seen either perched or flying with their bills wide open, showing that they too suffered from the scorching sun. As the rain-time approached, and the Channelbill (*Scythrops*) made his appearance, we often witnessed twenty or thirty Crows indulging in an attack on the latter, until they had chased him for over a mile. Two birds generally approached the *Scythrops* simultaneously, as they appeared to have a wholesome dread of his formidable bill. As soon as the rain came the Crows all cleared off, and were not seen again before we left, on 16th March.

No. 73. *Ptilotis penicillata* (White-Plumed Honeyeater).

Between Lake Way and Lake Augusta these birds were plentiful wherever water existed, and several nests containing young ones were noted on 3rd July. Near our camel dépôt on Creek three clutches of eggs were taken in the latter part of August. All the eggs were remarkable for the whiteness of the ground colour and the very dark spots with which they were marked. The fondness of the White-Plumed Honey-eaters for bathing may account for the fact that they were never seen far from water. They were not observed further north than Lake Augusta, but on the Fitzroy River give place to *P. flavescens*.

No. 74. *Certhionyx leucomeles* (Pied Honeyeater).

This rare honeyeater was first obtained in some scattered mallee some distance south of Separation Well, on 25th September. At that time they were in poor plumage. Several of the male birds shot had brown feathers scattered through the black, indicating, probably, that they were immature birds, and that the young of both sexes are of the same colour as the female, which closely resembles *Anthus australis* in colour and markings. Towards the end of October flocks of these birds frequently passed us going north. On 22nd October I found a nest of this bird. It was built of short grass-stems, woven together with spider's web, and suspended by the rim in a cork-bark tree. Both birds were at the nest, and I shot the male, which proved to be a beautiful specimen. The solitary egg which the nest contained bore a strong resemblance to that of the Sordid Wood Swallow, the ground colour being a dirty-white, finely spotted, especially at the large end, with brownish-black and slate colour. Although these birds had all been very easily approached to within twenty yards, others seen near the Fitzroy River in January were very wary, and I was unable to secure them.

No. 75. *Acanthogenys rufigularis* (Spiny-cheeked Honeyeater).

From Mullawa to near Separation Well these birds were frequently met with, and in the mulga scrubs they were to be seen in numbers. They were never noted further north than Separation Well.

No. 76. *Anthochæra carunculata* (Wattled Honeyeater).

Whilst in camp at Mullawa a number of these honeyeaters were frequently seen and heard. A specimen shot presented no features of difference from those obtained in the southern portions of the continent. They were not seen afterwards.

They are said to be plentiful between Fremantle and Albany, and are locally known as "gill birds."

No. 77. *MYZOMELA NIGRA* (Black Honeyeater).

About 70 miles north of Mount Bates I noticed several of these little honeyeaters on the Grevillea trees, which were in full blossom, and on 2nd October Mr. C. F. Wells found a nest, from which the bird flew as he passed the bush. It was very small, cup-shaped, built of the soft outer stripings of dead grass, bound together with cobwebs, and suspended by the rim in a ti-tree bush. It contained one pale-buff egg, somewhat darker at the larger end, sparingly spotted with brown. The birds were again seen at the junction of the Fitzroy and Margaret Rivers during December.

No. 78. *MYZANTHA FLAVIGULA* (Yellow-throated Miner).

Between Lake Way and Separation Well these birds were frequently noted, and several shot, and isolated pairs were occasionally found in the sandhills until nearing the river. Mr. Jones secured a clutch of three eggs during August a short distance north of Lake Augusta.

No. 79. *ZOSTEROPS GOULDI* (Green-backed Zosterops).

Near the Fitzroy River these birds were found in considerable numbers. They are similar in habits to their eastern and southern representative (*Zosterops cœrulescens*), and at the time of my visit were confined to the dense scrub on the margin of the river.

No. 80. *DICÆUM HIRUNDINACEUM* (Swallow Dieœum).

These beautiful little birds were found throughout the journey, and probably their presence may account for the great number of trees on which the various kinds of mistletoe were found. All the adult males seen were remarkable for the brilliancy of their plumage.

No. 81. *CLIMACTERIS SUPERCILIOSA* (White-eyebrowed Tree Creeper).

Two of these birds were shot near Lake Augusta. They proved to be of opposite sexes. They were found in company, and on splitting the log open from which one of them flew, we found a nest nearly ready for eggs.

No. 82. *CLIMACTERIS ERYTHROPS* (Red-eyebrowed Tree Creeper).

Two of these birds were shot soon after leaving Cue. They were found in mulga scrub, ascending the stems of the trees in a series of short hops, and seeking the insects in crevices which

they passed. On reaching the top of the tree, they immediately flew off to the base of the next, where the operation was repeated.

No. 83. *SITTELLA PILEATA* (Black-capped Sittella).

Flocks of these birds were noted near Lake Augusta during the months of August and September, and also at the Fitzroy River in January. They seemed to confine their attention to the smaller trees in the scrub, whereas the Oraage-winged Sittella delights in running up and down the tallest box-trees.

No. 84. *PHAPS CHALCOPTERA* (Bronzewing Pigeon).

During our stay at the camel dépôt on Creek I found these birds in considerable numbers in the open scrub. They came out to feed and drink morning and evening, but during the heat of the day sought the shade of some low bush. At such times they proved very wary; but when they came to water in the evening they often alighted on the ground within 10 feet of where I sat. At Johanna Springs they were especially numerous, as many as thirty being counted on a bare patch of ground at one time. As from three to four usually fell to a shot, they formed a welcome addition to our larder. Whenever this bird is observed at sunset, it is almost certain to be going to drink; but as their power of flight is wonderful, they travel a great distance in a short space of time. Although many hundreds of these birds were seen during the trip, I never noticed one perch on a tree. They were all either flying or on the ground.

No. 85. *GEOPELIA TRANQUILLA* (Peaceful Dove).

These birds were only found near to the Fitzroy River and in the neighbourhood of Derby. They were generally seen singly or in pairs, their low plaintive note revealing their presence.

No. 86. *LEIPOA OCCELLATA* (Ocellated Leipoa).

The presence of this bird in the mulga scrubs between Cue and Separation Well was established by the finding of their mounds, feathers, and footprints; but as they are extremely shy, they retired on the approach of the caravan, and sought shelter in the scrub.

No. 87. *SYNOICUS AUSTRALIS* (Swamp Quail).

Amongst the tall kangaroo grass between Lake Way and the camel dépôt numbers of these birds were seen, and several shot. One female killed on 20th August contained a perfect egg in the oviduct. Others were seen near Mount Arthur in April, and several clutches of their eggs were picked up as we crossed a

level plain covered with Flinders grass. The eggs were scattered, as though they had been washed from the nests by recent tropical rains. Both birds and eggs were identical with those found in Victoria.

No. 88. *TURNIX VELOX* (Swift Flying Turnix).

These birds are found in North-West Australia throughout the year, frequenting alike the Flinders and Mitchell grass plains, the spinifex of the desert, and the tall kangaroo grass along the creek flats, but are most numerous near the junction of the Fitzroy and Margaret Rivers. At the latter place they get the credit of eating off the young plants in the gardens of the settlers as soon as they show above ground. Whether the charge is a just one I cannot say, but I was taken into the garden by Mr. Harris to see some young melon and cucumber plants that had just come up. On approaching the cucumber bed, three of these birds flew away, and we found that nearly all the plants had been eaten off. The bird may be driven to this practice by the scarcity of green food, which they take in conjunction with seeds and insects. After rain falls they become extremely numerous in the green grass which immediately springs up. As these birds are only occasional visitors to the southern portions of the continent, it is highly probable they are driven south by protracted drought. They seem to breed nearly all through the year, four eggs being the usual complement.

TURNIX LEUCOGASTER (White-breasted Turnix).

Throughout the whole of the journey from Cue to Derby these birds were noted. Whether we traversed the dense kangaroo grass near the creeks, the scattered herbage in the timbered country, or the arid spinifex flats between the sandhills, they rose beside our track nearly every day. In some places they were so numerous that they were flushed every fifty yards. On one occasion, soon after daybreak, I counted no less than fifteen birds all in sight at one time feeding on a patch of very short spinifex. Their eggs or young were frequently found from early in July until March. They were often found at a great distance from water; on several occasions, however, I disturbed them whilst drinking.

No. 89. *DROMAIUS IRRORATUS* (Spotted Emu).

These birds were very plentiful in the vicinity of Lake Way, and their tracks were frequently noticed wherever water or Quondong-trees existed. The fruit of the latter appears to be a favourite food of the Emu, as from twenty to thirty nuts were frequently seen in the bird's droppings. Several nests, in which

the brood had recently been hatched, were passed, and the chicks themselves noted during July. The nests were usually found in the open spinifex flats between the sandhills. Although no adult specimens were secured, the birds were often seen, and feathers obtained in places where the Emu had fallen a victim to either the natives or dingoes.

No. 90. *CHARIOTIS AUSTRALIS* (Australian Bustard).

During the early and latter parts of our journey these birds were seen in great numbers, but they avoid much of the desert. Near the Fitzroy River Mr. Ferris found a fresh egg on the 11th November, and several young birds were seen a few weeks later. On two occasions female birds with their single chicks were noticed walking to water, and on attempting to approach them we found the young ones suddenly disappear. In each case they had forced themselves into the hole formed by a horse's hoof in the dry mud. Near Mount Campbell I counted eighteen bustards all in view at once. Whilst travelling near the Nerrima Creek, on 1st April, I bagged a brace of bustards, which were in capital condition, and must have weighed nearly 20 lb. each. One bird furnished four meals for three men and a dog, whilst the five natives in camp made two meals off the other. These birds were in heavy moult; but the fact that the grasshoppers had been very plentiful no doubt accounted for their condition.

No. 91. *ŒDICNEMUS GRALLARIUS* (Southern Stone Plover).

Several of these birds were seen on the stony ground near our camel dépôt during the month of August. They were extremely shy, and difficult to approach. Although these birds are nocturnal in their habits, they commenced to run before I was within 150 yards of them, and defied all attempts to capture or shoot them. As we approached the Fitzroy River, before day-break of 6th November, the weird notes of the Southern Stone Plover were amongst the delightful music that greeted our ears, as it is well known that although this bird spends the day in the forest or open plain, it always resorts to water at night.

No. 92. *LOBIVANELLUS MILES* (Masked Plover).

Near the Fitzroy River many of these birds were seen, but when the rains fell they scattered to the numerous swamps which were then formed. Their habits are precisely similar to those of *L. lobatus*. Unfortunately the birds all disappeared before I had the opportunity of preserving specimens. I am indebted to Mr. Jas. Livingstone for a pair of eggs of this bird, which he obtained near the river. They were taken from a slight hollow in the ground, and were of a dull olive-yellow, heavily blotched with brownish-black markings.

No. 93. *EUDROMIAS AUSTRALIS* (Australian Dotterel).

At the first lagoon we passed on approaching the Fitzroy River a number of these birds were seen running near the margin of the water. When alarmed, they rose quickly, their long pointed wings enabling them to travel a great distance in a very short time. Although on several occasions three or four birds were disturbed near together, each went off by itself, either on to the open plain or some other part of the lagoon. On our return along the course of the river to Derby they were frequently disturbed some distance from water. They were never seen in flocks.

No. 94. *ÆGIALITIS MELANOPS* (Black-fronted Dotterel).

At all creeks or pools passed between Mullawa and the Fitzroy River this active little Dotterel was found, either singly or in pairs, running along the margin of the water in search of small aquatic insects. During August several young birds, just able to fly, were shot at the camel dépôt, and one fresh egg was picked up beside a pool. On 7th November I found several pairs of newly-hatched young ones on the sandy bed of the Fitzroy River. Although probably not more than a day or two old, they ran very quickly for some distance before being caught. When one was captured it invariably proved that the other had escaped during the chase. When newly hatched, the Black-fronted Dotterel is probably the most handsome of all Australian birds at that age.

No. 95. *ÆGIALITIS RUFICAPILLUS* (Red-capped Dotterel).

Large numbers of these birds were found at the fresh-water swamp near Lake Way. They congregated on the sandy margin in great flocks, and ran over the moist ground with surprising rapidity in search of food; but when their wants were satisfied they again assembled in groups, and remained in one position for over an hour, if undisturbed.

No. 96. *GLAREOLA ISABELLA* (Australian Pratincole).

Single examples of this species were frequently seen on the open plains within a few miles of Derby and at the swamps near the Fitzroy River. I was informed that they breed in considerable numbers on the stony rises near the Margaret River.

No. 97. *RECURVIROSTRA NOVÆ-HOLLANDIÆ* (Red-necked Avocet).

This well-known wader was frequently observed in the shallow swamps near the Fitzroy River. Running amongst the weeds in the shallow swamp, the Avocet dexterously secures a supply of minute aquatic insects by the aid of its peculiar awl-like bill. They were often seen in company with the White-headed Stilts.

No. 98. *HIMANTOPUS LEUCOCEPHALUS* (White-headed Stilt).

At the large fresh water lagoon near Lake Way these birds were found in great numbers. On 14th July a few were shot for the pot, and amongst those secured young birds predominated. After the rains fell in January large flocks of Stilts visited the pools along the Fitzroy River, where their peculiar croaking notes often betrayed their presence amongst the coarse grass tussocks growing in the water. When disturbed, their manner of extending their long legs behind whilst flying gave them a very grotesque appearance.

No. 99. *CLADORHYNCHUS PECTORALIS* (Banded Stilt).

Several of these birds visited the swamps near the Fitzroy River during our stay in that locality. They were observed feeding in company with Avocets and White-headed Stilts.

No. 100. *GALLINAGO AUSTRALIS* (New Holland Snipe).

During February a number of Snipe were seen along the course of the creek running from the telegraph station to the Fitzroy River, and also on many of the marshes formed by the heavy rain. They were very wild, and frequently rose far out of range.

No. 101. *RHYNCHÆA AUSTRALIS* (Australian Rhynchæa).

On 14th August a fine bird of this species was shot by Said Aimeer as it was wading in the shallow water of the creek at the camel dépôt. It proved to be a female, well developed, and would soon have laid. The peculiar formation of its trachea proved a matter of great interest to our Afghan, who was never tired of asking questions concerning it.

No. 102. *GRONTICUS SPINICOLLIS* (Straw-necked Ibis).

These birds were numerous along the course of the Fitzroy River, and they were found wading in many of the swamps on its margin. Occasionally large flocks were observed perched on the dead trees we passed. As an instance of the tenacity of life in the Ibis, I may mention that one shot by Mr. Wells flew nearly a quarter of a mile after a Winchester bullet had passed through its body in an oblique direction.

No. 103. *THRESKIORNIS STRICTIPENNIS* (White Ibis).

A few of these birds were seen at the lagoons near the Fitzroy River, but they were rare in comparison with the straw-necked species.

No. 104. *PLATIBIS FLAVIPES* (Yellow-legged Spoonbill).

Many of the lagoons on the southern side of the Fitzroy River are resorted to by the Spoonbill. They were also seen on the sandy flats of the river.

No. 105. GRUS AUSTRALIANUS (Native Companion).

These birds were generally met with in pairs until April, when they were seen in large flocks. They were found in the river bed and on the open plains, but seem to prefer the timbered country. Their loud notes often betrayed their presence some time before the birds themselves were seen.

No. 106. XENORHYNCHUS AUSTRALIS (Australian Jabiru).

These birds were observed on several occasions near the junction of the Fitzroy and Margaret Rivers, and one of their old nests on the latter stream was pointed out to me. It consisted of a large mass of sticks, and, viewed from beneath, somewhat resembled the nest of *Aquila audax*, though a trifle smaller. The natives occasionally secure the young birds.

No. 107. ARDEA PACIFICA (Pacific Heron).

These birds were first noted soon after leaving Cue, and were afterwards found at all surface waters passed; but as soon as rain fell, they were seen in great numbers at the swamps near the Fitzroy River. Their strange habit of standing motionless in the swamps or on trees near the water, rendered their long white necks a marked feature in the locality. Their food consisted of water beetles, frogs, and small fresh-water snails.

No. 108. ARDEA NOVÆ-HOLLANDIÆ (White-fronted Heron).

This well-known Heron was frequently met with during the early part of our journey, but they were more numerous in the vicinity of the Fitzroy River. Although generally found singly, they were occasionally seen in flocks, varying from three to a dozen.

No. 109. NYCTICORAX CALEDONICUS (Nankeen Heron).

In searching amongst the dense timber on the banks of the Fitzroy River, I disturbed many hundreds of these birds. Although nocturnal in their habits, they are very wary, and not easily surprised during the day. They breed in great numbers amongst the tall mangroves, and the young birds form an important item in the *menu* of the natives.

No. 110. PORPHYRIO BELLUS (Azure-breasted Porphyrio).

Several of these birds were found near the junction of the Fitzroy and Margaret Rivers, where they were seen wading in the shallow swamps, or perched on trees growing in the water. Their habits are identical with those of the well-known Black-backed Porphyrio.

No. 111. *HYPOTENIDIA PHILLIPPENSIS* (Pectoral Rail).

A few of these birds were flushed near the camel dépôt on Brockman Creek, and also near the junction of the Fitzroy and Margaret Rivers. At the latter place two clutches of hard-set eggs were taken during February.

No. 112. *FULICA AUSTRALIS* (Australian Coot).

Large flocks of these birds were seen at the lagoons passed on the south side of the Fitzroy River. When disturbed, they simply flew a short distance, and settled on the water like a flock of ducks.

No. 113. *HERODIAS ALBA* (Australian Egret).

These birds form a prominent feature in the avi-fauna of the vicinity of the Fitzroy River. Scarcely a lagoon or stretch of water in the river was passed without seeing one or more of these birds solemnly wading in the shallows in quest of prey, or sleeping on one leg. Although slow in its movements, the Egret is very shy, and considerable care is required to approach it within shot. A second species of White Egret, much smaller than the above, was seen, but at too great a distance to identify.

No. 114. *CEREOPSIS NOVÆ-HOLLANDIÆ* (Cereopsis Goose).

Several of these birds were observed flying from islands to the mainland, as the "Australind" steamed down the west coast to the Australian Bight; and I was informed by Mr. T. Carter, a fellow-passenger, that they are occasionally shot near Carnarvon.

No. 115. *ANSERANAS MELANOLEUCA* (Senipalmated Goose).

A small flock of these birds was observed at a lagoon about 100 miles south-east of Derby. I was informed that they are more numerous further east.

No. 116. *CHLAMYDOCHEN JUBATA* (Maned Goose).

These birds were not by any means numerous, a few being seen near Lake Way, and a pair were shot at a fresh-water creek, near Lake Augusta. They were also found in small flocks at several lagoons along the course of the Fitzroy River.

No. 117. *NETTAPUS PULCELLUS* (Pygmy Goose).

Several flocks of these little Geese were seen on the south side of the Fitzroy River. They were very shy, and difficult to approach. When disturbed, they arose quickly, and flew near the surface of the water, making a peculiar whistling noise all the time they were on the wing. I was informed that several of their nests are generally found near together, but they were not breeding at the time of my visit.

No. 118. *CASARCA TADORNOIDES* (Chestnut-coloured Sheldrake).

Near Lake Way a pair of these Ducks passed our camp just out of range, and others were seen at three places near the Fitzroy River, either singly or in pairs.

No. 119. *DENDROCYGNA VAGANS* (Whistling Duck).

These birds were found in large flocks on the margin of the pools near the Fitzroy River. During the day they sleep under the shade of the bushes around the water, but at night travel out on to the open plains to feed. Whilst on the wing they keep up an incessant whistling noise, from which they derive their name. They deposit their eggs amongst the spinifex and cane-grass some distance from water.

No. 120. *DENDROCYGNA EYTONI* (Eyton's Tree Duck).

The open plains near the Fitzroy River appear to be the stronghold of this species. Whilst travelling at night near Noon-koombah we frequently disturbed them in thousands as they were feeding amongst the dry grass, probably on the seed. Towards morning they return to the water, and after a short bath repair to the shelter of the bushes on the margin. These birds lie so close together when sleeping that seven or eight are often secured at one discharge. On several occasions I killed birds of the two species (*Eytoni* and *vagans*) at the one shot. Both species breed very freely in the coarse grass near Mount Campbell, and the natives in that neighbourhood make sad havoc amongst their eggs.

No. 121. *ANAS SUPERCILIOSA* (Australian Wild Duck).

A few pairs of these birds were found at most of the surface waters seen. At a large claypan east of Cue we saw old birds swimming with their young broods as early as June 29, and during August several immature birds were shot. In the neighbourhood of the Fitzroy River fresh eggs were taken during January and February, thus showing that the breeding season is largely influenced by the rainfall. On several occasions single birds of this species were seen flying in company with a flock of common Teal (*Anas gibberifrons*), and at one pool I shot one in company with *Nyroca australis*. Both birds were adults, and arrived at the water together. This habit of different species mingling together was noted on a much larger scale at some of the pools near the Fitzroy River.

No. 122. *ANAS GIBBERIFRONS* (Slender Teal).

Until reaching the Fitzroy River this Teal proved to be by far the most plentiful species of Duck. They were found at all claypans and creeks passed, and frequently proved an acceptable

adjunct to our larder. On several occasions flocks comprised of about equal proportions of Teal and White-eyed Ducks were seen swimming or flying together. On our arrival at the camel dépôt on August 10 I killed a young bird of each species at the one shot. They were unable to fly, and were the only birds on the creek at the time. Fresh eggs of the Teal were taken from hollow trees at the Fitzroy River during January and February.

No. 123. *MALACORHYNCHUS MEMBRANACEUS* (Pink-eared Duck).

A few of these birds were seen on a swamp near the telegraph station on the Fitzroy River during February, but they are not plentiful in any known part of West Australia.

No. 124. *NYROCA AUSTRALIS* (White-eyed Duck).

These birds were found scattered all over West Australia wherever fresh-water pools existed. Near Lake Way and the Fitzroy River they were particularly numerous, and many were shot for food. They were generally seen in flocks, but occasionally singly or in pairs. Owing to the density of their plumage, rapid flight, and dexterity in diving, they tax the skill of the sportsman in pursuit of them. The *Nyroca* is often found in company with Ducks of other species, particularly Teal.

No. 125. *PODICEPS CRISTATUS* (Australian Tippet Grebe).

Several birds of this species were seen at the Fitzroy River and also at some of the large claypans passed near Lake Way.

No. 126. *PODICEPS NESTOR* (Hoary-headed Grebe).

On a large claypan about 20 miles east of Cue adult and young birds of this species were noted on June 29th. Others were afterwards observed on several pools near the Fitzroy River.

No. 127. *PODICEPS NOVÆ HOLLANDIÆ* (Black-throated Grebe).

A few isolated birds had been previously noted, but large numbers of them were seen near Lake Way, and at the dépôt Mr. L. A. Wells killed one on firing into a flock of Teal. These Grebes were also found at many of the swamps formed by the heavy rains near the Fitzroy River.

No. 128. *HYDROCHELIDON HYBRIDA* (Marsh Tern).

On November 6th we found several birds of this species at a large lagoon near the Fitzroy River, but after the tropical rains they became more numerous, and were seen at the swamps along the course of the river until within a few miles of Derby.

No. 129. *STERNA ANGLICA* (Long-legged Tern).

Several flocks of these Terns passed over our camp at the Fitzroy River, and I was informed that they were plentiful at several large swamps between the river and the Barrier Range. They were seen during April at a swamp within six miles of Derby.

No. 130. *GRACULUS STICTOCEPHALUS* (Little Black Cormorant).

Although not by any means so numerous as the preceding species, these birds are found under similar conditions in the same locality.

No. 131. *GRACULUS MELANOLEUCUS* (Little Black and White Cormorant).

It is impossible to walk 100 yards amongst the dense timber on the margin of the Fitzroy River without disturbing numbers of these birds. After satisfying their hunger in the early morning, they resort to the shelter of the foliage of the Leichardt Pines and mangroves, where they remain motionless for hours. In many places the ground is perfectly white with their droppings.

No. 132. *GRACULUS NOVÆ HOLLANDIÆ* (Black Cormorant).

Several birds believed to belong to this species were seen in the distance; but the first to come within shot was obtained at the camel dépôt, where it came into the creek in quest of frogs, which were numerous there. These Cormorants were afterwards seen at the Fitzroy River.

No. 133. *PELICANUS CONSPICILLATUS* (Australian Pelican).

Along the course of the Fitzroy River large flocks of these birds are found. During the day they may be seen standing in groups on the sandy flats perfectly motionless, in such a manner as to suggest the idea of a small graveyard in the distance. They are so sluggish that the natives frequently kill them with their waddies, which they throw with surprising accuracy of aim.



A NOTE ON THE NEST AND EGGS OF PORZANA FLUMINEA.

By A. M. MORGAN, M.D.

As the eggs of this bird are rare in collections, and as I am unable to find a description of them in any scientific writings, I take this opportunity of describing a clutch sent to me by Mr. Malcolm Murray, of Wirrabara. Mr. Murray writes :—"The Crake's nest was composed of grass, dry and green intermixed, placed above water level, in a bush growing in the water of a lake or swamp near Farina, on Myrtle Spring's Run." The eggs are five in number, and were taken on August 18, 1898. The ground colour is of a light olive-brown, with dark reddish-brown spots, more plentiful at the larger end, but not forming a distinct ring, some of the marking appear as if beneath the surface. At the larger end there are, in each egg, a few round almost black spots. Measurements :—(A) $1\frac{1}{4}$ in. x $\frac{15}{16}$ in., (B) $1\frac{1}{4}$ in. x $\frac{15}{16}$ in., (C) $1\frac{3}{16}$ in. x $\frac{15}{16}$ in., (D) $1\frac{5}{16}$ in. x $\frac{15}{16}$ in., (E) $1\frac{1}{4}$ in. x $\frac{15}{16}$ in. The eggs were accompanied by the bird shot from the nest.



ON DEEP-SEATED EOCENE STRATA IN THE
CROYDON AND OTHER BORES.

By PROFESSOR RALPH TATE.

[Read September 6, 1898.]

I. CROYDON BORE (No. 2).

In the Trans. Roy. Soc., S. Aust., XIII., p. 188, 1890, I have given an account of the strata passed through in the Croydon-bore, which attained a depth of 800 feet below the surface. Therein the chief point of interest was the recognition of the Pliocene beds of the Dry Creek-bore, the fossiliferous development of which extended from 395 to 605 feet. At the time of the publication of my paper the boring was abandoned; subsequently a second bore-hole was commenced alongside the first, and was finally abandoned, 17/6/93, after attaining a depth of 2,296 feet. The geological conditions revealed in the additional 1,496 feet have not yet been described; though the Conservator of Water has furnished details of thickness and description of strata to accompany the Engineer-in-Chief's report for the year ending June 30, 1893. Mr. Jones has obligingly placed to my use, for the present object, all the bore material preserved in his department.

OLDER PLIOCENE.

At from 470-475 in the Croydon-bores (No. 1 and No. 2) the assemblage of fossils was the same as in the Dry Creek-bore at about 400 feet, though the actual number of species was relatively small.

Fossils were again met with at 603-606 and at 705-715; the assemblage consisting of the larger species, which also occur at the highest level in the Croydon and Dry Creek-bores, and if viewed by themselves would have been pronounced Miocene. However, as they occur in association with an undoubted Pliocene fauna, they must be regarded as survivals from Miocene times.

A list of the determined species from the lowest levels is as follows:—

	603-60 feet.	705-715 feet.
Lampusia armata...	...	— * *
Natica balteatella	...	— *
Spondylus arenicola	...	* *
Pectunculus convexus	...	— *
Cucullæa Corioensis	...	* *
Crassatella oblonga	...	* *
Divaricella Cumingi	...	* *
Chione Cainozoica	...	* *
Hemimactra Howchiniana	...	* *
Corbula ephamilla	...	— *

Below the depth of 715 feet no fossils appear till 778 feet, but the nature of the fossils there encountered do not permit of a decisive determination as to age, and this also applies to other occurrences. It is not until the fossiliferous bed at 970-1,000 feet is reached that undoubted evidence of Eocene age is forthcoming, which continues to 1,681 feet, the greatest depth yielding fossils.

EOCENE.

- 763—808. Calcareous silt, with much polyzoal debris, chiefly *Celleporæ* at 778 feet.
- 810—880. Fine yellow sands (polyzoal and echinodermal debris at 820—835).
- 880—928. Fine yellow calciferous sands (polyzoal and echinodermal debris at 905—910).
- 928—931. Yellow sandy clay with fragments of *Eupatagus* sp.
- 931—970. Fine yellow calciferous sand.
- 970—980. Fine yellow calciferous sand; polyzoal and echinodermal debris, *Fibularia gregata* abundant.
- 1,060—1,090 Calciferous sandstone with some glauconitic coloration. *Pecten* sp. and polyzoa at 1,085.
- 1,126. Calcareous sand with shell-debris; grey and bluish calciferous sandstone, more or less chalcedonic, and sand-rock. *Corbula pyxidata*.
- 1,200—1,230. Calcareous sand-rock.
- 1,282. Bluish friable calcareous sand-rock with shell-debris chiefly echinodermal and polyzoal). *Magasella lunata*.
- 1,376. Bituminous clay and black sand. *Turritella Aldingæ*.
- 1,681. Bituminous shale; casts of Gasteropods in chalcedony, calcite, and iron-pyrites, some shell-matter. *Turritella Aldingæ*, *Mesalia stylacris*, *Fibularia gregata*, *Cellepora*.
- 2,155. Brownish sandy clay. No fossils.

2,175. Brownish sandy clay with included fragments of fine-grained sandstone. No fossils.

2,262—2,296. "Fragments of sandstone, chloritic slate, and limestone of primary age." Report by the Government Geologist.

LIST OF EOCENE FOSSILS

From the Croydon-bore (No. 2) at various depths between 970 and 1,681.

Turritella Aldingæ, Tate.

Mesalia stylacris, Tate.

Dentalium Mantelli, Zittel.

Dentalium subfissura, Tate.

Dimya dissimilis, Tate.

Lima Bassi, T. Woods.

Pecten Eyrei, Tate.

Pecten Flindersi, Tate.

Pecten Hochstetteri, Zittel.

Terebratulina catinuliformis, Tate.

Magasella lunata, n. sp.

Magellania Garibaldiana, Davidson.

Fibularia gregata, Tate.

Scutella marsupiata, n. sp.

Echinolampas Murrayanus, Lambe.

Pentacrinus and Antedon, spp.

Graphularia senescens, Tate.

SUMMARY OF STRATA IN CROYDON-BORE (No. 2).

				Thickness.
Mammaliferous Drift	...	...	...	395
Older Pliocene (marine),	395—715	...	...	320
Eocene ? (marine),	715—760 = 45			
Eocene (marine),	760—1,681 = 921			
Eocene (unfossiliferous),	1,681—2,262 = 581	...	...	1,547
				2,262

General Remarks :—The sequence of deposits in the Croydon-bore compared with that as illustrated in the Kent Town-bore and immediate vicinity* reveals several disparities, when it is remembered that a distance of only about four miles separate the two areas.

The disparities between them are :—In the Croydon-bore, 320 feet of Marine Pliocene, absence of typical Miocene, a thousand feet of sandy beds with a paucity of Eocene marine fossils. In the Kent Town section, no marine Pliocene, a typical develop-

*Tate, Trans. Roy. Soc., S. Aust., v., p. 40. 1883.

ment of Miocene, 149 feet of argillaceous and calcareous strata containing a typical Eocene molluscan fauna, and an infra-Eocene series of more or less carbonaceous beds 142 feet thick.

Professor David and Mr. Howchin* have sought to explain the stratigraphical relationships of these two dissimilar series of beds by the introduction of a north and south fault, ranging along the buried scarped front of the Archæan rocks, on which the Eocene and Miocene of the Adelaide plateau repose. This conjecture disregards the probability that physical conditions of varying character may have been the contributing cause of the lithological and organisational disparities.

If the position of the Eocene in the Croydon-bore be due to a downthrow fault, then it might be reasonably expected that the very distinctive Eocene series of the Kent Town-bore would be repeated in the Croydon-bore; but as such is not the case, I am of opinion that there is no direct evidence of a fault, and that the Kent Town series belong to a later period, and are more littoral in their organic contents.

The series of events that these sections teach us may be summarised as follows:—The Post-Cretaceous sea laved the base of the now subterranean escarpment of over 2,000 feet in vertical height, and at that measure the land stood relatively higher. Deposition and depression were synchronous over the submerged plain; coincident therewith, wholly or in part, lacustrine and paludinal accumulations, preserved in the carbonaceous beds of the Kent Town-bore, were formed on the higher ground. Finally depression submerged the terrestrial surfaces at Kent Town, and a more littoral life prevailed there in comparison with the earlier Eocene deposits. The Miocene deposition followed, succeeded by the extensive denudation of the Miocene and higher levels of the Eocene, and the removal of about 800 feet of the Eocene series, constituting the Adelaide Plain. Over this plain of marine denudation, Pliocene marine beds were accumulated, these of a more or less shallow-water origin, and over an area of depression; finally to be converted into a vast lacustrine area, in which land-drifts of about 400 feet have been accumulated.

II. TINTINARA BORE.

Eocene-sands at a depth of 244-253 have yielded on the examination of further material the following list of species, which indicate a correlation to the lower series of the Aldingian beds, those in common marked with an asterisk.

**Marginella* sub-Wentworthi

**Drillia, sp.*

- *Mesalia stylacris
- *Natica Aldingensis
- *Turritella Aldingæ
 - Cyclostrema, *sp.*
 - Calliostoma, *sp.*
- *Actæon evanescens
 - Bullinella, *sp.* aff. cuneopsis
- *Cylichnella callosa
- *Dentalium Mantelli
 - Cadulus, *sp.*
- *Lima Bassi
- *Nucula Tenisoni
- *Nuculana planiuscula
- *Nuculana Huttoni
- *Nuculana leptorhyncha
- *Nuculana apiculata
 - Barbatia, *n. sp.*, aff. equidens
- *Limopsis insolita
 - Verticordia *n. sp.*
- *Cardita lattissima
- *Carditella lamellata
- *Carditella rugosa
 - Carditella, *n. sp.*
 - Trigonia semiundulata ?
- *Chione Cainozoica
- *Meretrix tenuis
- *Tellina porrecta
 - Tellina, *n. sp.*
- *Myodora lamellata
- *Corbula pyxidata
- *Terebratulina catinuliformis
 - Magasella, *sp.*
 - Ditrupa, *sp.*

III. REVISED LIST OF FOSSILS FROM KI-KI BORE.

Eocene sands at a depth of 380-424 feet. (Supplementary to Trans. Roy. Soc., S.A., 1896, p. 115).

- *Trophon hypsellus
- *Tritonidea, aff. apicilirata
- *Marginella submicula
- *Ancillaria ligata
- *Clathurella apicilirata, *n. sp.*
- *Trivia ovulatella
- *Scalaria Marie
- *Turritella Aldingæ
- *Ataxocerithium concatenatum

- Newtoniella, 5 spp.
Triforis, spp.
*Triforis, sp.
*Eulima, sp.
Turbonilla, sp.
Siliquaria occlusa ?
Rissoia, 3 spp.
Strebloramphus, n. sp.
Liotia Roblini
Leptothyra parvula
Leptothyra, sp.
Phasianella, sp.
*Calliostoma, sp.
*Euchelus, sp.
Patella, sp.
Puncturella psila, n. sp.
*Dentalium Mantelli
*Arca pseudonavicicularis
Arca, sp.
*Limopsis multiradiata
Carditella, n.sp., as at Tintanara
*Crassatella communis, var
*Chione Cainozoica
*Meretrix tenuis
-
- *Terebratulina Scouleri ?
Polyzoa, many spp.
Pentacrinius, sp.
Cidaris, sp.
Balanus, sp,
*Amphelia striata

DESCRIPTIONS OF NEW MICRO-LEPIDOPTERA
FROM QUEENSLAND.

By A. JEFFERIS TURNER, M.D.

[Read October 4, 1898.]

PLUTELLIDÆ.

I deal here only with the forms generally known as *Hyponomentidæ* and *Glyphipterygidæ*, which are included with the *Plutellidæ* by Mr. Meyrick in his recent work on British Lepidoptera. But few species are as yet known from this part of Australia, and I have but small addition to make to our knowledge. The genus *Glyphipteryx*, in particular, is much better represented in the southern part of the Continent.

HYPONOMENTA, Latreille.

I have two species referable to this genus, a definition of which may be found in Mr. Meyrick's work mentioned above. One with grey forewings bears the manuscript name of *H. paurocentera*, Meyr., the second I describe as new.

HYPONOMENTA PAUROCENTERA, Meyr. (MS.).

Brisbane and Warwick, Queensland.

HYPONOMENTA MYRIOSEMA, n. sp.

Male, 22-28 mm. Head white. Palpi white; apex of second and middle of terminal joint annulated with black. Antennæ white, becoming dark-grey towards apex. Thorax white, with two black dots before middle and one at posterior apex; patagia white, with a small black dot on anterior margin. Abdomen dark-fuscous; apices of segments and tuft white. Legs white, with black annulations round apices of tarsal joints and tibiae; anterior femora and tibiae black on internal surface; black dots on middle and base of external surface of anterior and middle tibiae; and on apex of middle femora. Forewings elongate slightly dilated posteriorly, costa moderately arched, apex rounded, hindmargin straight, slightly oblique; snow-white, with numerous black dots; one at base; six on basal two-fifths of costa; three to five beneath, but not on apical portion of costa; two rows in disc beneath centre of four to six each, that over anal angle slightly larger; two to five along hindmargin, sometimes partly fused; cilia snow-white, sometimes partly fuscous

on centre of hindmargin. Hindwings pale-grey, towards base whitish; cilia white, sometimes grey around apex.

Brisbane; three specimens, one of which was taken in August, the others undated.

ATTEVA, *Walker.*

British Mus. Cat., II., 526.

This genus has not yet been properly defined. It may be distinguished from *Hyponomena* by the presence of vein 4 in hindwings. Walker's name can only be adopted by courtesy. I have not been able to refer to Zeller's definition of his genus *Oeta*.

ATTEVA NIVEIGUTTELLA, *Walk.*

Brit. Mus. Cat., II., 526.

This and the following are handsome insects, the forewings being orange-fuscous, with numerous white spots. In the present species the apical half of hindwings is dark-grey, in the following the hindwings are orange.

Brisbane; also from India.

ATTEVA IMPARIGUTTELLA, *Z.*

Oeta impariguttella, Zeller, Horae Ent. Soc. Ross., XIII., 224.
Atteva impariguttella, Moore, Lepid. Ceylon. Plate.

Brisbane and Cookstown, Queensland; also from Ceylon.

POLYNESA, *n. g.*

Head smooth. Tongue well-developed. Antennæ three-fourths, in male filiform, moderately ciliated (one to one-half); basal joint without pecten. Labial palpi moderate, curved, ascending, second joint with appressed scales, terminal joint almost as long as second, rather stout, acute. Maxillary palpi rudimentary. Forewings vein 2 from three-fourths, 6 and 7 stalked, 7 to hindmargin, 11 from middle. Hindwings ovate, broader than forewings, cilia one-third, veins 2 and 4 stalked, 5 present, 6 and 7 approximated at base. Posterior tibiæ smooth-scaled.

POLYNESA MACULOSA, *n.sp.*

Male, 16 mm. Head white. Palpi white, base of second and apex of terminal joint dark-fuscous. Antennæ white, annulated with fuscous. Thorax white, with a black dot on base of each patagium. Abdomen ochreous-whitish. Legs white; anterior and middle pair broadly annulated with dark-fuscous. Forewings elongate-oblong, not dilated, costa gently arched, apex rounded, hindmargin obliquely rounded; white, with many large black dots, three at base, four on costa, three in a line above middle of disc, one in disc beneath the last of these, two on fold, one on inner-margin at three-fifths, three near and parallel to hind-

margin, the lowest touching it; a few black scales on hindmargin; cilia white, on apex and opposite last dot black, and with three black dots between these two. Hindwings whitish; cilia whitish, with a fuscous dot at apex, and traces of a medium fuscous line.

Brisbane; one specimen.

HYPERTROPHA, Meyrick.

HYPERTROPHA TORTRICIFORMIS, Gn.

Brisbane, Queensland; also from Ballandean, Queensland, and Tenterfield, New South Wales, in February.

HYPERTROPHA AMETALLA, n. sp.

Male, 17 mm. Head, face, and palpi dark-fuscous, irrorated with whitish scales. Antennæ dark-fuscous, towards base obscurely annulated with whitish. Thorax dark-fuscous. Abdomen fuscous. Legs whitish-ochreous, irrorated with dark-fuscous, tarsi annulated with fuscous; posterior tibia yellowish. Forewings oblong, posteriorly dilated, costa rather strongly arched, apex pointed, hindmargin markedly sinuate, slightly oblique; fuscous, irrorated with whitish, reddish-fuscous, and blackish scales; an obscure outwardly curved transverse blackish line from costa at one-third, not reaching inner-margin; indications of two fainter similar lines between this and base, and of five very faint parallel lines from costa beyond one-third, all lost in disc; an ill-defined blackish spot in costal portion of disc beyond middle; cilia fuscous, with metallic lustre; traces of metallic lustre are also visible in parts of disc by oblique light, and tend to form lines. Hindwings pale-yellow, with a broad fuscous line along hind- and inner-margins; cilia fuscous.

Closely allied to the preceding, but different, especially in the scanty development of metallic markings.

Armidale (3,500 ft.), New South Wales; one specimen.

SIMÆTHIS, Leach.

Besides those given below, Mr. Lower has described two species from Queensland (Proc. Roy. Soc. S.A., 1896, p. 167).

SIMÆTHIS SYCOPOLA, Meyr.

Brisbane.

SIMÆTHIS METALLICA, n. sp.

Female, 11 mm. Head, thorax, and abdomen fuscous, irrorated with dull orange scales. Palpi ochreous, annulated with fuscous. Antennæ fuscous with whitish annulations. Legs ochreous-whitish, with fuscous annulations. Forewings strongly dilated, costa rather strongly arched, apex rounded, hindmargin

oblique, slightly sinuate; dark-fuscous irrorated with dull orange-ochreous, a transverse, slightly wavy, bluish-metallic line from costa at one-fourth to inner margin at one-third; an irregularly curved bluish-metallic line from costa at three-fifths obliquely outwards, describing a U curve in apical part of disc, and joining a short outwardly oblique similarly coloured line in middle of disc at five-sixths; a straight erect metallic line from inner-margin at two-thirds not reaching middle of disc; around this line is a dark-fuscous blotch; several fuscous and ochreous-orange areas in disc; cilia fuscous, apices whitish. Hindwings dark-fuscous; disc irregularly blotched and irrorated with dull-orange; cilia fuscous, with a pale basal line, and whitish apices.

Brisbane; one specimen.

CHORENTIS, *Hübner*.

Chorentis bjerkandrella, Thunberg.

Brisbane; sometimes abundant.

EUPSELIA, *Meyrick*.

EUPSELIA CARPOCAPSELLA, *Walk.*

Brisbane; two specimens in September.

EUPSELIA BEATELLA, *Walk.*

Female, 14 mm. Head, palpi, and thorax fuscous, finely irrorated with whitish scales. Antennae fuscous. Abdomen dark-fuscous, irrorated with yellow scales, forming obscure annulations. Legs pale-fuscous, reddish-tinged; posterior pair yellowish. Forewings oblong, posteriorly dilated; costa gently arched; apex rounded; hindmargin obliquely rounded; fuscous irrorated with whitish scales, which tend to be arranged in transverse lines; the absence of these leaves a fuscous blotch on middle of inner-margin, sharply defined anteriorly, suffused posteriorly; a much larger, more ill-defined blotch, roundish, reaching from costa at three-fourths to anal angle; between the two blotches three incomplete fine transverse metallic lines are visible on oblique illumination; two small metallic spots between second blotch and apex; four or five black dots on lower half of hindmargin; cilia fuscous with a metallic basal line. Hindwings deep yellow, with a broad dark-fuscous hindmarginal band, produced along inner-margin to base; cilia fuscous with paler basal and median lines.

I have redescribed this species, Walker's description being insufficient and inaccurate. Unfortunately Meyrick was misled thereby into describing *E. carpocapsella* as this species (*Proc. Linn. Soc. N.S.W.*, vol. V., p. 219). This is rectified in an appendix (*ibid.*, vol VII., p. 184). From *E. carpocapsella* it is distinguishable by the absence of transverse lines from costa, the

inner-marginal blotch is common to both. In the former the hindmarginal band of the hindwings is also much thicker at the apex.

Brisbane ; one specimen in April.

EUPSELIA SATRAPELLA, Meyr.

Brisbane, in September ; Ballandean, Queensland, in February.

EUPSELIA THEORELLA, Meyr.

Brisbane ; two specimens in September.

EUPSELIA MELANOSTREPTA, Meyr.

Oxenford, near Brisbane ; one specimen in November. Tenterfield (3,000 feet), New South Wales ; one specimen in February

EUPSELIA ANOMMATA, n. sp.

Female, 14 mm. Head, face, and palpi ochreous-whitish. Antennæ pale-fuscous with blackish annulations. Thorax dark-purple fuscous, with a conspicuous anterior and posterior ochreous-whitish spot. Abdomen fuscous, tuft ochreous-tinged. Legs fuscous, posterior pair ochreous. Forewings moderate, somewhat dilated posteriorly, costa moderately arched, apex rounded, hindmargin obliquely rounded ; purple-fuscous, with violet metallic lustre ; a whitish blotch on inner-margin from one-fifth to three-fifths, not quite reaching costa ; a narrow whitish fascia from costa at two-thirds, two before anal angle, constricted in disc ; cilia dark-fuscous with a pale basal line, and pale apices. Hindwings fuscous, ochreous-tinged, especially towards base ; cilia fuscous with a pale basal line.

This handsome species differs from other members of the genus in the absence of hindmarginal dots.

Brisbane ; one specimen in September.

GLYPHIPTERYX, Hübner.

GLYPHIPTERYX ATRISTRIELLA, Z.

Zeller, Hor., Ross. (1877), p. 398, Meyr., l.c., p. 229. *Glyphipteryx chrysolithella*, Meyr., l.c., p. 230.

There can, I think, be little doubt of the identity of these two species. Brisbane specimens agree closely with specimens from Blackheath, New South Wales, having the hindwings golden-yellow, with broad blackish hindmarginal band. This constitutes the variety *chrysolithella*. On the other hand I have received a South Australian specimen from Mr. Lower in which the forewings are essentially similar, but the hindwings are fuscous, towards base mixed with yellowish, as in Zeller's description of his type, which was from Tasmania.

GLYPHIPTERYX IOMETALLA, *Meyr.*

Brisbane; very abundant in grassy places from August to October, flying near the ground and difficult to see.

GLYPHIPTERYX METEORA, *Meyr.*

Brisbane.

GLYPHIPTERYX CHRYSOPLANETIS, *Meyr.*

Brisbane and Ballandean, Queensland.

GLYPHIPTERYX PALÆOMORPHA, *Meyr.*

Recorded from Brisbane by Meyrick.

ECOPHORIDÆ.

At some future date I hope to publish a revision of this family. The present instalment is confined mainly to descriptions of new species.

AGLAODES, *n. g.*

Head with appressed scales, sidetufts small. Antennæ, basal joints moderate, without pecten (?); ciliations in male (unknown). Palpi long; second joint very long, much exceeding base of antennæ, with appressed scales slightly dilated at apex; terminal joint short (one-third of second), slender, acute. Thorax with a small posterior crest (?). Forewings with costa strongly arched. Hindwings narrower than forewings and much shorter, ovate; cilia two-thirds. Anterior tibiæ clothed with long hairs. Forewings with vein 7 to apex. Hindwings normal.

Although the generic characters cannot be fully determined from the single female specimen, its distinctness can hardly be doubted. The palpi and shape of wings are peculiar. It appears to come nearest *Epipyga*, Meyr.

AGLAODES CHIONOMA, *n. sp.*

Female, 11 mm. Head whitish. Palpi whitish; second joint tinged with reddish externally towards apex. Thorax (rubbed). Abdomen ochreous. Legs whitish; anterior tibiæ with long reddish hairs, anterior tarsi reddish. Forewings strongly dilated posteriorly, costa strongly arched, apex obtusely rectangular, hindmargin slightly oblique, straight; fuscous irrorated with whitish and bright-red scales; a broad snow-white streak along basal third of costa; a red blotch on inner-margin before middle, containing a central yellow spot; a narrow red line along costa from one-third to two-thirds, thence in a strongly arched line to hindmargin above anal angle; beyond this, apical portion of disc is bright-yellow; cilia yellow, at anal angle fuscous, with a

few red scales. Hindwings much shorter than forewings, apex very obtusely rounded ; grey ; cilia grey.

This little moth is surpassed by none in its gaudy colouring, the contrast of bright-red, bright-yellow, and snow-white, on a fuscous background, being most striking.

Brisbane ; one specimen, in February.

EULECHRIA SILVICOLA, n. sp.

Male and female, 11-13 mm. Head, face, and palpi pale-brownish-ochreous. Antennæ fuscous. Thorax and abdomen pale-brownish-ochreous. Legs ochreous whitish ; anterior pair infuscated. Forewings oblong, costa slightly arched, apex rounded, hindmargin obliquely rounded ; pale-brownish-ochreous ; a minute fuscous dot in disc at one-third ; a larger dot in disc at two-thirds, prolonged by a transverse fuscous suffusion to before anal angle ; some fuscous scales in apical portion of disc, with traces of an outwardly curved line from costa to four-fifths to anal angle often obsolete ; cilia pale-brownish-ochreous. Hindwings and cilia pale-grey.

This small and inconspicuous species belongs to the group of *E. convictella*, from which it is distinguished by the absence of second discal dot, and the transverse mark formed by union of posterior dot with inner-margin.

Mount Tambourine, near Brisbane ; six specimens in November among dense tropical forest. I sent one to Mr. Meyrick, who pronounced it new.

EULECHRIA CONCOLOR, n. sp.

Male and female, 17-19 mm. Head, face, thorax, and abdomen pale-ochreous-brown. Palpi ochreous-brown, apex of terminal joint fuscous, external aspect of second joint sometimes fuscous. Antennæ fuscous. Legs fuscous ; posterior pair ochreous-whitish. Forewings elongate, not dilated ; costa moderately arched, apex rounded, hindmargin very obliquely rounded ; pale-ochreous-brown, without markings ; costal edge at base fuscous ; cilia pale-ochreous-brown. Hindwings ochreous-brown, very slightly darker than forewings ; cilia ochreous-brownish.

In Meyrick's tabulation this would come next to *E. alopecistis*, being distinguished by the absence of reddish tinge.

Common at Ballandean, Queensland, in February. I sent specimens to Mr. Meyrick, who pronounced it new.

EULECHRIA CANDIDA, n. sp.

Male and female, 17-23 mm. Head and thorax white. Palpi fuscous ; second joint white posteriorly and at apex. Abdomen fuscous, apices of segments whitish, tuft ochreous-whitish. Legs

whitish, anterior pair infuscated. Forewings elongate, not dilated, costa moderately arched, apex round-pointed, hindmargin very obliquely rounded; white without markings; cilia white. Hindwings pale or dark-grey; cilia whitish with a faintly-marked grey basal line. (Cilia about half.)

Variety. Forewings, head, and thorax suffused with greyish.

In Meyrick's tabulation this falls under the same heading as *E. cycnoptera* (Meyr.); but Mr. Meyrick informs me that it is not this species, from which it differs, by broader hindwings (in *cycnoptera* these hardly equal cilia), longer palpi, and larger size.

Ballandean (2,500 ft.), Queensland; Tenterfield (3,000 ft.), and Armidale (3,500 ft.), New South Wales; taken commonly in February.

EULECHRIA CHRYSERES, n. sp.

Male, 15 mm. Head blackish; sidetufts and face orange. Palpi orange; second joint with a few blackish scales; terminal joint wholly black. Antennæ blackish, annulated with ochreous; basal joint orange, with a few black scales. Thorax orange; anterior margin and a posterior dot blackish. Abdomen dark-fuscous. Legs dark-fuscous, annulated with ochreous. Forewings narrow; costa slightly arched; apex rounded; hindmargin extremely oblique; scarcely rounded; bright-orange with black markings; costal edge black, except for short spaces at two-fifths and four-fifths; inner-margin black throughout; a basal patch not touching costa, extending to middle of inner-margin; a transverse fascia from costa at three-fifths to inner-margin before anal angle; dilated on both margins, and connected in disc with basal patch; a broad band along apex and hindmargin, with a few orange scales at apex; cilia black. Hindwings and cilia grey.

Very distinct. In Meyrick's tabulation it falls under the same heading as *E. malacoptera*, Meyr., and *E. beliodora*, Meyr., being distinguished from both by the black markings.

Sandgate, near Brisbane; one specimen on a tree-trunk in July.

EULECHRIA DIAPHANES, n. sp.

Male, 14 mm. Head and thorax pale-yellowish, irrorated with dark-fuscous scales. Palpi pale-yellowish; second joint irrorated with dark-fuscous; terminal joint with a broad median dark-fuscous ring. Antennæ pale-yellowish, annulated with dark-fuscous. Abdomen ochreous-whitish. Legs ochreous-whitish, irrorated and annulated with fuscous. Forewings moderate, scarcely dilated, costa moderately arched, apex round-pointed, hindmargin oblique, slightly rounded in lower half; whitish, faintly yellow-tinged, very distinctly yellowish along costa;

rather thickly irrorated with dark-fuscous scales ; the absence of these leaves a whitish dot in disc above middle at one-third, and a second before two-thirds ; also an inwardly oblique triangular mark on costa at four-fifths, from which a curved line proceeds to anal angle ; cilia whitish, yellowish-tinged, with a few scattered dark-fuscous scales. Hindwings whitish, thinly scaled, semi-transparent ; a few pale-fuscous scales at apex and along hindmargin ; cilia ochreous-whitish.

Very distinct from any other species by the yellowish forewings with fuscous irroration, and the semi-transparent hindwings.

Mount Tambourine, near Brisbane; one specimen in November.

LINOSTICHA POLIOCHROA, n. sp.

Male and female, 12-13 mm. Head white, finely irrorated with fuscous. Palpi white ; second joint fuscous at base, and with a fuscous subapical ring ; terminal joint with a fuscous basal and subapical ring. Antennæ pale-fuscous ; ciliations in male 3. Thorax white, finely irrorated with fuscous. Abdomen whitish ochreous. Legs whitish. Forewings narrow, elongate, costa almost straight, apex round-pointed ; hindmargin very obliquely rounded, white, finely irrorated with fuscous, and with darker-fuscous dots ; a raised patch of scales in middle of disc at one-third and two-thirds, with a dark-fuscous dot beyond each ; a third dot on fold obliquely below first ; a fourth on inner-margin before anal angle ; traces of short lines from base of costa along fold, and from costa at one-third to first dot ; a dot on costa at one-half, and another at two-thirds ; from the latter is a series of five or six dots parallel to hindmargin ; cilia white, with a few fuscous scales. Hindwings and cilia whitish-grey.

In Meyrick's tabulation this would fall next to *L. helictis*, Meyr., distinguished by absence of inner-marginal blotch. It is, however, a much smaller insect, more resembling *L. anarcha*, Meyr., but without ochreous tinge. The raised scales are a peculiar character.

Mount Tambourine ; two specimens in November.

PHILOBOTA RHODOPLEURA, n. sp.

Male, 21-22 mm. Head grey. Palpi grey ; middle third of second joint, base, and apex of terminal joint dark-fuscous. Antennæ grey. Thorax and abdomen grey. Legs grey ; anterior tarsi dark-fuscous, annulated with whitish ; posterior tibiæ and tarsi whitish. Forewings moderate, oblong, costa moderately arched, apex obtusely rectangular, hindmargin slightly oblique, rounded beneath ; grey ; costal edge blackish at base, thence

pale-rosy to four-fifths; a blackish dot in disc at one-third, a second before two-thirds, a third on fold obliquely beyond first; a few scattered blackish scales in disc; a partially obsolete blackish line from costa beyond middle, sharply angulated in disc at five-sixths, and continued thence to anal angle; a row of blackish dots along apical one-fifth of costa and hindmargin; cilia grey. Hindwings grey, slightly infuscated in apical portion; cilia grey.

This species has all the appearance of *Heliocasta*, but the presence of a pecten removes it from that genus. Among the described forms of *Philobota* it is conspicuously distinct in the uniform grey-colouring, with pink-costal edge of forewings.

Brisbane; two specimens. Also one specimen at Stradbroke Island in October.

PHILOBOTA MELICRODES, n. sp.

Male and female, 15-16 mm. Head whitish-grey, without yellow tinge. Palpi fuscous; second joint pale-yellowish internally, second and terminal joints whitish posteriorly. Antennæ fuscous. Thorax pale-whitish-yellow. Abdomen grey. Legs fuscous; posterior pair ochreous-whitish. Forewings pale-whitish-yellow without markings; extreme base of costal edge fuscous; cilia grey, on costa whitish-yellow. Hindwings and cilia dark-grey.

Near *P. melirrhoa*, Meyr., but distinguished by the grey head and abdomen.

Brisbane; two specimens taken in October.

PHILOBOTA COSMIA, n. sp.

Female, 18 mm. Head white. Palpi white; basal third of second joint dark-fuscous. Antennæ dark-fuscous, sharply annulated with whitish. Thorax dark-fuscous; centre of anterior margin and a posterior dot white. Abdomen dark-fuscous. Legs ochreous; anterior pair infuscated. Forewings posteriorly dilated, costa gently arched, apex round-pointed, hindmargin nearly straight; oblique; white, markings fuscous, ferruginous-tinged; a narrow basal fascia; a streak along costa to middle; a broad transverse fascia before middle; a third fascia from costa at two-thirds to anal angle, broad in disc, and containing a few white scales; a narrow band along apex and hindmargin, not reaching anal angle; cilia dark-fuscous, on costa and middle of hindmargin ochreous-whitish. Hindwings fuscous; cilia fuscous, with a paler basal line.

In Meyrick's tabulation falls with *P. lysizona* and *P. pruinosa*, from which it is readily distinguishable by the transverse fasciæ.

Brisbane; one specimen in October; and I have seen others of both sexes.

PHILOBOTA SORORIA, n. sp.

Female, 16 mm. Head snow-white. Palpi white, base of second joint dark-fuscous. Antennæ blackish. Thorax dark-fuscous, middle of anterior margin broadly white. Abdomen grey. Legs ochreous-whitish, anterior pair infuscated. Forewings somewhat dilated, costa slightly arched, apex round-pointed, hindmargin nearly straight, oblique; white, the greater part of disc suffused or irrorated with fuscous; a fuscous streak along basal third of costa, its anterior extremity prolonged to inner-margin; on inner-margin near base is a large roundish snow-white blotch; some irregular white areas on costa, inner, and hindmargin; two discal dots faintly indicated; cilia dark-fuscous, at apex and above anal angle whitish. Hindwings and cilia grey.

The male is not known, but it appears closely allied to the preceding, the fasciæ being lost in a general fuscous suffusion. It is certainly distinct.

Brisbane; one specimen.

PELTOPHORA IDIOCOSMA, n. sp.

Male, 19 mm. Head (rubbed), palpi, and antennæ ochreous-whitish. Thorax pale-ochreous-whitish. Forewings dilated, costa slightly arched, apex tolerably acute, hindmargin very oblique, slightly sinuate; pale-pinkish-ochreous, markings ochreous-fuscous; an oblique line from base to inner-margin at one-fourth; two oblique fasciæ parallel to this, first from costa near base to middle of inner-margin, second from costa at one-fourth to anal angle; all three lines partly obsolete and suffusedly connected on inner-margin; a fourth line from costa at two-fifths, dilated above anal angle, where it is confluent with second fascia, from thence it is bent upwards and continued to apex; a triangular blotch on costa before apex; cilia pale-ochreous, at apex fuscous. Hindwings ochreous-whitish; cilia pale-ochreous.

Very peculiarly marked, and not like any other species.

Mount Tambourine, near Brisbane; one specimen in November.

PELTOPHORA OSTEOCHROA, n. sp.

Male, 16-18 mm. Head, thorax, palpi, and antennæ whitish, faintly ochreous-tinged. Abdomen ochreous-whitish. Legs ochreous-whitish; anterior pair infuscated. Forewings elongate-oblong, not dilated, costa strongly arched at base, thence straight, apex round-pointed, hindmargin obliquely rounded; whitish, faintly ochreous-tinged; a dark-fuscous dot in disc before middle, a second beyond middle, and a third on fold obliquely beyond first; sometimes a fourth dot at anal angle tending to be united by a

fine line with second dot ; cilia whitish. Hindwings whitish-grey ; cilia whitish.

A simply-marked species, falling in Meyrick's tabulation with *P. amenena*, Meyr., from New Zealand, but distinguished.

Mount Tambourine near Brisbane, two specimens in November.

PELTOPHORA AUREOLA, n. sp.

Female, 16 mm. Head and thorax orange-yellow. Palpi yellow, second joint with a dark-fuscous dot on external surface at base and another before apex. Antennæ orange-yellow. Abdomen ochreous. Legs ochreous-whitish ; anterior pair somewhat infuscated. Forewings moderate, somewhat dilated, costa moderately arched, apex round-pointed, hindmargin obliquely rounded ; bright-orange-yellow, deeper towards hindmargin ; markings blackish ; a dot in disc before middle, a second beyond middle, and a third on fold obliquely beyond first ; a fine line of dots from costa at four-fifths, outwardly curved in disc to anal angle ; cilia deep-orange-yellow. Hindwings and cilia yellowish-whitish.

The orange-yellow forewings, together with the very simple markings, distinguish this species from any other. In Meyrick's tabulation it would fall next *P. conictia* (Meyr.), from which it is separated by the blackish markings.

Mount Tambourine, near Brisbane ; one specimen, in November.

SAROPLA PSAMMODES, n. sp.

Female, 15 mm. Head, thorax, and antennæ pale-ochreous. Palpi pale-ochreous ; basal two-thirds of external surface of second joint fuscous. Abdomen pale-ochreous-fuscous. Legs dark-fuscous ; posterior tibiae and tarsi ochreous-whitish. Forewings moderate, scarcely dilated, costa moderately arched, apex tolerably acute, hindmargin oblique, scarcely sinuate ; very pale-brownish-ochreous, irrorated sparsely with brownish scales, which form a suffused fascia from costa before apex to anal angle ; a blackish dot in disc before middle, a second above middle, a third on fold obliquely below first, and two more almost confluent in disc beyond middle ; cilia very pale-brownish-ochreous, at anal angle fuscous. Hindwings and cilia whitish-grey.

The colour of the forewings distinguishes it from other described species. The long terminal joint of palpi, almost as long as second joint, is another point worth noticing.

Brisbane ; one specimen in August.

COESYRA IODETA, n. sp.

Female, 14 mm. Head dark-fuscous, face whitish. Palpi whitish. Antennæ whitish, with a few fuscous dots on upper

surface near base. Thorax bright-yellow, anterior margin and posterior extremity dark-fuscous; patagia wholly yellow. Abdomen fuscous. Legs whitish; anterior pair infuscated. Forewings moderate, costa moderately arched, apex round-pointed, hindmargin obliquely rounded; bright golden-yellow; a basal fascia from base of costa along inner-margin to one-sixth; an erect purple-fuscous mark from anal angle, reaching two-thirds across disc; a subterminal and a hindmarginal band of reddish-violet, containing a few scattered purple-fuscous scales; cilia yellow, at anal angle reddish-violet, with fuscous apices. Hindwings dark-grey; cilia grey.

A distinct species. In Meyrick's tabulation it falls with *C. philoxena*, Meyr., being distinguished from this by the absence of costal streak, and from most other species by the dark-fuscous sidetuffs of head.

Brisbane; one specimen in October.

CROSSOPHORA NEPHELELLA, n. sp.

Male, 13 mm. Head and thorax whitish. Palpi whitish, terminal joint sparsely irrorated with blackish scales. Antennæ whitish. Abdomen ochreous-whitish. Legs whitish; anterior pair somewhat infuscated. Forewings narrow-elongate, costa moderately arched, apex rounded, hindmargin very obliquely rounded; whitish, very sparsely irrorated with isolated blackish scales, especially towards margins; discal dots obscurely indicated by clusters of these scales, the first two often completely obsolete; cilia white. Hindwings and cilia whitish.

An inconspicuous little species easily overlooked. It comes nearest *C. thetias*, Meyr., but may be distinguished by the general irroration and obolescence of the discal dots.

Sandgate near Brisbane; three specimens beaten from *Melaleuca leucodendron* in August.

PSECADIA, Hübner.

Head with appressed scales, side tufts small. Tongue developed. Antennæ three-fourths, in male thickened, sometimes serrate, with very short ciliations (one-fifth), pecten absent or represented by a few fugitive scales. Labial palpi moderate or rather short (sometimes long, Meyrick), second joint with appressed scales, terminal shorter. Forewings with 7 and 8 stalked, 7 to costa or apex. Hindwings rather broader than forewings, elongate-ovate, cilia less than one-fourth, 3 and 4 connate, 5 approximated to 6, 6 and 7 parallel. Posterior tibiæ hairy.

This genus was omitted from Meyrick's descriptions of Australian Oecophoridae, but will be found defined in his work on

British Lepidoptera. I have three species referable to it. Two are here described; the third has white forewings, and resembles nearly examples I have received with the name *Psecadia postica*, Z., of which I have not yet seen the description.

PSECADIA HILARELLA. Walk.

Azinis hilarella (Walker, Brit. Mus. Cat., XXVIII., p. 542; Moore, Lepid. Ceylon, III., p. 506, plate 209, fig. 3).

Male and female, 25-35 mm. Head whitish-grey, with two black dots posteriorly. Palpi whitish-grey, with black annulations, second joint with a basal and subapical, terminal with a basal and apical ring. Antennæ grey, with a black dot on basal joint; towards apex dark-fuscous. Thorax slaty-grey, with two pairs of black dots. Abdomen deep-orange with a central black dot on first six segments. Legs grey, with black annulations; posterior femora orange. Forewings elongate, not dilated, costa moderately arched, apex rounded, hindmargin straight, scarcely oblique; slaty-grey with black dots; one at base of costa and of inner-margin, two just beyond these, one on costa at one-fifth, one on fold, two near inner-margin at one-fifth and two-fifths, two in a line beneath costa, and two in a line below middle of disc; five arranged in a circle beneath apex; a line of about ten on hindmargin; cilia dark-grey, apices paler. Hindwings golden-orange, with a triangular blackish blotch at apex; cilia dark-fuscous at apex, thence orange.

A large and handsome species, which must have an extensive geographical distribution. The antennæ in the male are somewhat serrate, but its close relationship to the following species shows that it must be referred to this genus.

Brisbane; also from Ceylon.

PSECADIA HEPTASEMA, n. sp.

Male and female, 18-20 mm. Head whitish-grey. Palpi whitish-grey, terminal joint blackish. Thorax grey, with two black dots on anterior margin; patagia whitish-grey, apex black. Abdomen pale-ochreous. Legs grey, with blackish annulations; posterior femora pale-ochreous. Forewings elongate, not dilated, costa moderately arched, apex rounded, hindmargin straight, slightly oblique; grey, with black dots; a black spot at base, with whitish-grey centre; a black dot on fold, a second beneath costa at one-fifth, a third in a line with second, two in centre of disc at about middle and three-fourths, and two more beneath apex; a row of four dots along hindmargin; cilia grey. Hindwings grey, towards inner-margin ochreous-whitish; cilia grey at apex, gradually becoming ochreous-whitish towards anal angle.

Brisbane.

CERATOPHYSETIS, *Meyrick.*CERATOPHYSETIS SPHÆROSTICHA, *Meyr.*

Proc. Linn. Soc. N.S.W. (1886), p. 1,045.

I have seen two specimens, the type in the Queensland Museum, and another, also male, in Mr. Dodd's collection. In the latter the anterior edge, which is twisted uppermost of the laterally compressed antennæ, is clothed with a brush of long whitish hairs ; in the type these seem to be denuded. The posterior tibiæ are shortly rough-haired.

The genus must be referred to the immediate neighbourhood of *Psecadia*, Hb., from which it is only distinguished by the extraordinary antennæ of the male.

DEFINITIONS OF SEVEN NEW SPECIES OF
SOUTH AUSTRALIAN POLYPLACOPHORÆ.

By W. G. TORR, LL.D., and EDWIN ASHBY.

[Read October 4, 1898.]

Plates VI. and VII.

In the Proceedings of the Malacological Society of London, vol. II., part 4, April, 1897, appeared a very excellent paper by Mr. W. T. Bednall on the Polyplacophora of South Australia.

This painstaking article has paved the way for all future workers in this field, and the South Australian rocks are furnishing excellent opportunities for original research.

New species are constantly being discovered. Unfortunately, in several instances only one specimen of a species has been found.

The deep dredging operations of Dr. J. C. Verco has helped us very considerably, and has introduced several species not found near the coast.

To Mr. E. H. Matthews, of Yorke's Peninsula, we are deeply indebted for helping us to classify our specimens.

To Mr. M. M. Maughan and Dr. J. C. Verco our thanks are due for specimens supplied, and to Professor Ralph Tate for his kind advice and encouragement in preparing our work for the printer and engraver.

1. *Chiton Verconis*, n. sp. Pl. 6, fig. 1.

General Appearance.—Shell oblong, much elevated, carinated, side slopes slightly curved and steep. Colour.—Flesh-coloured, variegated with creamy-white flecks. Third valve with more white than others; a broad blackish band running all medial areas.

Anterior Valve.—Ten riblets ornamented with strong elongated longitudinal tubercles. Teeth, eight slits.

Posterior Valve.—Mucro median, prominent. Ornamented with nine or ten riblets, composed of tubercles similar to anterior valve. Sinus moderately broad.

Median Valve.—Lateral areas ornamented with 12 to 14 pairs of strong elongated longitudinal tubercles, divided into two rows by a deep sulcus. The tubercles vary from opposite to alternate, the anterior being shorter than the posterior. Pleural areas covered with 14 to 16 longitudinal riblets, sometimes continued

into the dorsal area. Dorsal area smooth. The median valves each have one slit. The teeth under the microscope are pectenated; sinus broad and shallow. Inside colour creamy-white with bluish patches.

Girdle.—Clothed with imbricating scales, apices sub-erect, giving the girdle a rasp-like appearance. Scales pyramidal, apices smooth, base ornamented with eight to ten vertical riblets.

Measurement.—Length, 24 mm.; breadth, 12 mm.

Habitat.—Dredged in St. Vincent's Gulf, South Australia, by Dr. Verco and W. D. Reed. Aldinga, by W. Kimber.

Remarks.—It can easily be distinguished from allied species by the strongly raised longitudinal tubercles in the lateral areas.

2. *Acanthochites crocodilus*, n. sp. Pl. 6., fig. 2.

General Appearance.—Shell elongated, rounded, very broad in proportion to the girdle. Side slope curved. Colour pale-olive-green.

Anterior Valve.—Strongly radially ribbed with five ribs. Interspaces covered with more or less straight transverse rows of squamose pustules. Two slits only discoverable in broken specimen.

Posterior Valve.—Mucro median distinctly beaked; valve divided into dorsal and pleural areas; dorsal smooth and raised—pinnatifid—and pleural similar to corresponding area in median valves. Four slits. Sinus broad,

Median Valves.—Lateral areas distinctly raised. Anterior margin forming a strongly elevated diagonal rib, clothed with irregular raised squamose pustules, having a confluent tendency. Pleural area has a somewhat concave appearance, owing to the raised character of lateral and dorsal areas. The whole covered with triangular-shaped scales, which become very flat and large as they approach the anterior margin. Pustules and triangular scales are placed in longitudinal rows, continued through lateral and pleural areas. *Dorsal Areas*.—Triangular, smooth, each margin deeply notched with three to eight notches, prominently beaked. Teeth, 1-1.

Girdle.—Brown leathery, spongy, having on each side seven and on anterior valve four tufts of short brownish spicules. Microscopically mottled with white, and densely clothed with minute, irregular, opaque scales, which give it a rough appearance.

Measurements.—Length, 17 mm.; breadth, 8 mm.—in dried specimen.

Habitat.—Marino, South Australia; discovered by Dr. Torr.

Remarks.—Remarkable for strongly raised diagonal rib, and for its very coarse shagreening; some of the scales being fully half mm. across, and are microscopically striated.

3. Acanthochites cornutus, n. sp. Pl. 6, fig. 3.

General Appearance.—Shell elongated, narrow, decidedly carinated, side slopes very slightly curved. Colour light-yellowish-brown, mottled with white. Dorsal area whitish-brown.

Anterior Valve.—Radially ribbed with five ribs, the whole area being closely packed with bead-like granules.

Posterior Valve.—Very diminutive. Mucro post-median. Valve divided into dorsal and pleural area. Dorsal similar to same area in median valves. Pleural area covered with concentric rows of bead-like granules. The deep sulcations of the dorsal area are present on anterior margin to the outer edge of valve.

Median Valves.—Lateral area much raised, and thickly studded with imbricating granules. Pleural areas decorated with eight to ten longitudinal rows of distinctly raised pustules, considerably larger than the granules of the lateral area.

Dorsal Area.—Triangular, microscopically pinnatifid, which appearance is caused by three or more deep sulcations, continued into the pleural areas.

Girdle.—Narrow, having on each side seven sutural horny protuberances, covered with microscopic glossy granules. Whole girdle clothed with closely-packed microscopic imbricating semi-transparent scales. General colour yellowish, with splashes of brown.

Measurement.—Dried specimen : Width, 3 mm.; length, 8 mm.

Habitat.—Marino, South Australia; low tide. Discovered by E. Ashby. Only one specimen (not dissected).

Remarks.—The horny protuberances, absence of spicules, and transparent, closely-packed scales make this a very distinct species.

4. Acanthochites Verconis, n. sp. Pl. 7, fig. 4.

General Appearance.—Shell distinctly elongated carinated. Exposed portion of valves one-third total width in live specimen. Valves elevated. Posterior margin concave, prominently beaked.

Colour of valves, pearly white, distinctly mottled with pink deepening to rose-pink at posterior margin.

Anterior Valve.—Clothed with somewhat flattened pustules, separated, oval, very distinct, smaller towards the apex, and arranged alternately. Teeth, five slits, with rays leading to apex.

Posterior Valve.—Mucro central, covered with flattened pustules rather longer and flatter than anterior valve. Dorsal area distinct and smooth. Sinus wide. Eight slits at irregular distances.

Median Valve.—Pleural area covered with ten to eleven diagonal rows of squamose pustules. Dorsal area raised, striated

showing distinct hastate to pinnatifid outline (pustulose under high magnifying power); one slit. Inside colour creamy-white to deep-pink.

Girdle.—Cream to deep-rose-pink, leathery, and encroaching on the sutures, destitute of tufts, covered with minute hairs.

Measurements.—Length, 10 mm.; breadth, 4 mm.

Habitat.—Dredged by Dr. Verco in St. Vincent's Gulf, South Australia, and taken at Aldinga Rocks by Dr. Torr.

Remarks.—This species is allied to *A. scutiger* of Reeve; his description is very incomplete. The girdle in *A. Verconis* is smooth and not densely bristled as in *scutiger*.

5. *Acanthochites Maughani*, n. sp. Pl. 7, fig. 5.

General Appearance.—Shell elongated oblong, carinated, side slope curved. Colour light-brown, with patches of yellowish-brown.

Anterior Valves.—Covered with concentric rows of pustules, large at base, and growing smaller towards apex.

Posterior Valve.—Muero slightly post-median. Five concentric rows of pustules.

Median Valves.—Lateral and pleural areas, except that the former is yellower; both areas ornamented with six slightly radiating longitudinal rows of exceptionally elongated tubercles, inclined diagonally acutely backwards, touching the tegmentum almost the whole length, giving the appearance of riblets serrated on one side. Some tubercles are much bent over at the tip. Tubercles rough with microscopical granules.

Dorsal Area.—Linear raised granulose, intermittently covered with blackish specks. Longitudinally and transversely striate under the microscope. Apex of sixth valve black.

Girdle.—Light-brown, little darker than valves; leathery, loosely clothed with minute scales. Sutural tufts of short brownish spicules, and four tufts on anterior valve.

Measurement.—Length, 8 mm.; breadth, 4 mm.—dried specimens.

Habitat.—Port Victor, S. Australia; discovered by M. M. Maughan, Esq. Aldinga, by Kimber.

Remarks.—Easily distinguished from its allies by its narrow raised and granulose dorsal area and its exceedingly elongated appressed tubercles.

6. *Acanthochites exilis*, n. sp. Pl. 7, fig. 6.

General Appearance.—Colour porcelain-white, slightly mottled with very pale-brown. Dorsal area on third valve bright-red, oblong, rather broad, strongly carinated, side slope straight, beaked,

Anterior Valve.—Radially ribbed with five ribs, the whole closely covered with glossy pustules on a brownish ground.

Posterior Valve.—Mucro anterior. Pustules as in anterior valve; very small.

Median Valves.—Lateral areas raised, closely covered with slightly diagonal rows of highly polished pustules. Continued through pleural areas, but considerably larger and more raised, in some cases so closely packed as to suggest longitudinal riblets. Some rows are confluent.

Dorsal Area.—Triangular, broad; uniformly covered with somewhat distant, evenly distributed, slightly raised pustules, arranged in some valves in longitudinal rows. Tegmentum longitudinally striated. Ground colour of third valve deep rose-red; pustules less highly coloured. In valves 2, 4, 5, 6, 7 the dorsal area is often mottled with pink.

Girdle.—Spotted with cream and pale-brown. Very much crumpled in dried specimen. Covered with irregular scales. At the sutures prominent rough tubercles, from the centre of which a bundle of white or brown spicules is produced. Size, dried specimen: Length, 3 mm.; breadth, 1 mm.

Habitat.—Dredged by Dr. Verco in Spencer's Gulf and Investigators' Strait, South Australia, in 10 to 15 fathoms of water.

7. *Acanthochites Tatei*, n. sp. Pl. 7, fig. 7.

General Appearance.—Greenish-brown, spotted with pale-grey. Dorsal areas buff colour, with tinge of salmon-pink, in third valve dark-green. Girdle, mossy-green. Shape, oblong carinated, side slopes straight.

Anterior Valve.—Three very indistinct radial ribs closely covered with slightly elliptical pale-brown scales gradually decreasing in size to the apex. Ground dark-horn colour. Apex smooth transversely striated.

Posterior Valve.—Mucro post-median. Dorsal area triangular. The buff or salmon-pink colour extending over two-thirds of valve. Median area dark-brown, closely covered with elliptical irregular whitish scales.

Median Valves.—No distinction between lateral and pleural areas. Ground colour, ornamented with six or seven irregular radiating diagonal rows of whitish spatulate scales, which increase in size as they near the posterior margin.

Dorsal Areas.—Triangular, raised, beaked, smooth, decorated with transverse wavy markings, microscopically longitudinally and transversely striated. Third valve moss-green, and remainder buff with tinge of salmon-pink.

Girdle.—Olive-green, one-third of area. Mossy, owing to its being covered with short yellowish-white spicules, larger at margin, forming a dense fringe. Tufts, seven each side at intersection on valves. Four on anterior valves. Sutural tufts coarse and spear-shaped, closely appressed towards the apex of the valves. Specimen in formalin. Length, 6 mm. ; breadth, $2\frac{1}{2}$ mm.

Habitat.—Middleton, Encounter Bay, South Australia ; one specimen only on rocks discovered by Dr. Torr.

EXPLANATION OF PLATES VI and VII.

- a. Dorsal view of entire shell.
- b. Anterior valve.
- c. Median valve.
- d. Posterior valve
- e. Lateral view of posterior valve.
- f. Portion of girdle magnified.
- g. Life size, lateral view.

Fig.

- 1. Chiton Verconis, n. sp.
- 2. Acanthochites crocodilus, n. sp.
- 3. " cornutus, n. sp.
- 4. " Verconis, n. sp.
- 5. " Maughani, n. sp.
- 6. " exilis, n. sp.
- 7. " Tatei, n. sp.



FURTHER NOTES ON AUSTRALIAN COLEOPTERA,
WITH DESCRIPTION OF NEW GENERA AND
SPECIES.

By the Rev. T. BLACKBURN, B.A.

[Read October 4, 1898.]

XXIV.

PALPICORNES.

NEOHYDROBIUS (gen. nov. *Hydrobiidaram*).

Mentum antice emarginatum ; palpi graciles, labialibus brevibus, maxillaribus valde elongatis (quam caput prothoraxque conjuncti haud brevioribus), articulis ultimis 3 gradatim brevioribus ; mandibulae ad apicem bifidae ; labrum transversum antice late subemarginatum ; clypeus antice emarginatus ; oculi modici minus convexi ; antennae 9-articulatae (articulis 1° magno, 2° sat elongato, 3°-5° brevibus, 6° majori 7^{mm} amplectenti, 7°-9° clavam formantibus) ; prothorax transversus ; scutellum modicum triangulare ; elytra ovalia nullo modo striata ; pedes modici ; tibiæ ad apicem bicalcaratae, tibiarum anticarum calcaribus permagnis ; tarsi modici ; unguiculi maris antici inæquales valde arcuati et subtus ad basin lamina muniti ; mesosternum postice carina brevi armatum.

Type (*Philhydrus burundiensis*). Blackb.

Since I described this insect (Proc. L. S., N.S.W., 1889, p. 447) I have obtained more specimens, including the male, and I find that its tarsal characters,—together with some other characters noted above,—are inconsistent with a place in *Philhydrus*. The original specimens were taken in the Northern Territory, but those received later are from N. Queensland.

PSEUDOHYDROBIUS (vide infra).

The remarkable insect for which I propose this name and which I have placed below (at the end of the *Palpicornes*), might on account of its tarsal characters be considered more naturally placed near *Neohydrobius*. It is therefore well to mention it in both places.

BEROSUS.

The known Australian species of this genus are now so numerous that it seems desirable to place a statement of their characters in a tabular form. I am doubtful whether the species

might not justifiably be divided into two genera, but as in that case the genera would both have to be regarded as distinct from *Berosus*, and as moreover they both completely resemble *Berosus* superficially I prefer to avoid the creation of these new genera. In the first of these groups the elytral sculpture resembles that of the European *B. affinis*, Brul., in having a short stria (not nearly reaching the middle of the elytra) between the 1st and 2nd complete striae, but the structure of the mesosternum is quite different from that of *B. affinis* that segment being traversed merely by a fine elevated longitudinal line; while in the second group the stria between the 1st and 2nd complete striae reaches more or less beyond the middle of the length of the elytra, but the mesosternal structure is identical with that of the European *B. affinis*.

I think I have before me examples of all the described Australian *Berosi* except *B. approximans*, Fairm., which is a very small species (Long., $1\frac{1}{2}$ l.) from Queensland of which the most notable character appears to be that the interstices of the elytral striae are transversely wrinkled; it is possibly identical with *B. (Hygrotrrophus) involutus*, Macl. Of the described species, however, one (*B. pallidulus*, Fairm.) seems to be identical with *Hygrotrrophus nutans*, Macl., and therefore if *Hygrotrrophus* is to stand (as I think it may) must be removed from *Berosus*. On the other hand *Hygrotrrophus involutus*, Macl., as noted below seems to me to appertain to *Berosus*, and when these corrections have been made and two new species (described below) added there are 18 names that have been applied to Australian *Berosi*. One of these however (*B. externespinosus*, Fairm.) I regard as probably a synonym (of *Australiae*, Muls.). One species as noted above (*B. approximans*, Fairm.) being unknown to me, the number to be dealt with in the following tabulation is 16.

- A. Mesosternal carina not prominent in front of the intermediate coxae; 2nd stria of elytra not nearly reaching the middle of the length of the elytra.
- B. Elytra spinose at apex.
- C. Apical spines of elytra comparatively short.
- D. Puncturation of elytral interstices equal or nearly so.
- E. Puncturation of disc of prothorax comparatively close and striation and seriate punctures of elytra comparatively strong.
- F. Base of the posterior 4 femora black or dark-fuscous.
- G. Head very elongate (size of insect about 4 l.) *gravis*, Blackb.
- GG. Head notably less elongate (size of insect about 3 l.) *Australiae*, Muls.
- FF. Legs entirely clear testaceous ... *majusculus*, Blackb.
- EE. Puncturation of disc of prothorax notably more sparse, and striation and seriate punctures of elytra evidently finer *decipiens*, Blackb.

- DD. Elytral interstices in front nitid and finely and sparsely punctured, behind opaque with close asperate punctures
 CC. External spine at apex of elytra very long and slender (much longer than the scutellum) macumbensis, Blackb.
- BB. Elytra unarmed at apex.
 C. Head testaceous or brown.
 D. Striae and seriate punctures of elytra strong (about as in *Australiae*, Muls.) ... sticticus, Fairm.
 DD. Striae and seriate punctures of elytra fine debilipennis, Blackb.
- CC. Head black or metallic.
 D. Punctures of disc of prothorax very close (about as in *B. affinis*, Brul.) Flindersi, Blackb.
- DD. Punctures of disc of prothorax evidently less close.
 E. Clypeus extremely closely (almost confluent) punctured discolor, Blackb.
 EE. Clypeus notably less closely punctured.
 F. Lateral striae very much narrower than their interstices.
 G. Interstice on either side of the short second stria bears a single row of well-defined punctures stigmaticollis, Fairm.
- GG. Interstice on either side of the short second stria with confused and faint punctuation auriceps, Blackb.
- FF. Lateral striae about same width as their interstices ovipennis, Fairm.
- AA. Mesosternal carina prominent in front of intermediate coxae (as in *affinis*, Brul.); second stria of elytra reaching at least to middle of length of elytra.
 B. Punctures of prothorax very coarse (notably more coarse than in *affinis*, Brul.) queenslandicus, Blackb.
 BB. Punctures of prothorax much less coarse.
 C. Size comparatively large (about 3 l.) duplopunctatus, Blackb.
 CC. Size very small (at most 2 l.) involutus, Macl.

B. majusculus, Blackb. In Tr. Roy. Soc. S.A. 1892, p. 207, I expressed a doubt as to whether this species is really distinct from *B. externespinosus*, Fairm., and stated that I was unable to specify any structural characters to separate the two. I had not at the time examined a male of the latter, but having now seen a male I am able to say that *majusculus* is a valid species as the penultimate ventral segment in the male of Fairmaire's insect is even, having no trace of the dentation of outline that is so conspicuous in *B. majusculus*.

B. Australiae, Muls. I think *B. externespinosus*, Fairm., may be regarded as identical with this insect. M. Fairemaire says that the latter is very near his species, but differs in the terminal spines of its elytra being of equal size and less widely separated; I can definitely assert, however, that there is quite as much variation as this expression indicates in the terminal spines

of specimens of *Berosus* taken in company and evidently conspecific. In all other respects the description of *Australiae* fits M. Fairmaire's insect very well unless it be with regard to the striae 4-6 of the elytra which Mulsant says are "postice lăviores." I take this to mean that the punctures of those striae are less conspicuous than of the others in the hinder part, and certainly this seems to be the case (at any rate from points of view) in several species (including *externespinosus*) although it is not so strongly marked in any species known to me that I should be inclined to attach much importance to it.

B. sticticus, Fairm. I have examples (from Queensland) of a *Berosus* which I refer doubtfully to this species. Their discrepancy with the description consists in the markings of the elytra (which are not constant), since I cannot find that in any of my specimens those markings fall in any distinct manner into the form of a semicircle. Whether or not, however, I am right in my identification *B. sticticus* is rightly placed in the tabulation as all the characters I have relied upon in placing it are characters mentioned in M. Fairmaire's description.

B. debilipennis, sp. nov. Elongato-ovalis; testaceus, capite prothoraceque fusco-adumbratis, elytrorum striis puncturis maculisque nonnullis obsoletis et corpore subtus fuscescentibus; clypeo subtiliter sparsissime capite postice crebrius subfortiter, prothorace sat fortiter nec crebre (hoc antice sat angustato), punctulatis; elytris subtiliter striatis, stria 2^a longe ante medium desinenti, striis subtiliter punctulatis, interstitiis subseriatim (antice quam striae haud magis subtiliter) punctulatis, elytris postice inermibus; mesosterni carina ante coxas intermedias haud prominenti. Long., 2½ l.; lat., 1½ l.

My unique example of this insect has unfortunately lost its front tarsi and therefore its sex cannot be determined. Its elytra simple at the apex and its testaceous head, in combination, distinguish it from all the other described Australian *Berosi* except *B. sticticus*, from which it may be at once separated by its larger size, and by the much finer punctulate striae of its elytra (which resemble those of *B. decipiens*, Blackb.). If my identification of *B. sticticus* be right it also differs from that species by its prothorax more narrowed in front.

Tropical Queensland (sent by Mr. Cowley).

B. auriceps, Blackb. In a "N.B." under this heading in Proc. Linn. Soc. N.S.W. 1889, p. 449, I drew attention to a specimen which I considered a possible var. of *auriceps*. The study of some *Berosi* recently received from Queensland has satisfied me that the specimen in question appertains to a species quite distinct from *auriceps* and which is *B. ovipennis*, Fairm.

B. queenslandicus, sp. nov. Ovatus; minus elongatus; obscure brunneus, capite et prothoracis disco nigris vix viridescens, elytris plus minusve piceo-vel nigro-adumbratis, antennis palpis pedibusque dilutioribus; capite prothoraceque aequaliter crebre sat grosse punctulatis; prothorace antice parum angustato; elytris fortiter striatis, stria 2^a longe ultra medium elytrorum continua, striis fortiter (versus latera grosse, sicut interstitia quam puncturae haud latiora sunt) punctulatis, interstitiis sublaevibus, elytris postice inermibus; mesosterni carina ante coxas intermedias prominenti (ut *B. affinis*, Brul.).

I have seen only females of this very distinct species, which is of notably darker colour than any other Australian *Berosus* known to me and is easily recognizable *inter alia* by the very coarse puncturation of its head and prothorax.

Queensland.

HYGROTROPHUS.

I have received from Mr. Lea some specimens which he tells me that he has ascertained by comparison to be *H. involutus*, Macl. I cannot see any ground for regarding them as congeneric with *H. nutans*, Macl., or for separating them from *Berosus*. They seem, however, to be distinct from any other described *Berosus*.

H. DeVisi, sp. nov. Ovalis, sat elongatus; nitidus; supra pubescens; testaceus, capite et prothoracis disco (hoc varie) viridibus vel cupreis, elytris varie plus minusve manifeste fusco-maculatis, corpore subtus plus minusve infuscato; capite prothoraceque (hoc antice leviter angustato) minus crebre minus fortiter punctulatis; elytris crebre subtilius subsquamose punctulatis, vix perspicue striatis vel seriatim punctulatis, postice inermibus; mesosterni carina ante coxas intermedias haud prominenti.

Maris segmento ventrali penultimo simplici. Long., 1½—2 l.; lat., $\frac{3}{5}$ — $\frac{4}{5}$ l.

Evidently congeneric with *H. nutans*, Macl., but very much smaller, with the head and disc of prothorax metallic-green or coppery.

Queensland; sent by Mr. DeVis, Mr. Cowley, &c.

AMPHIOPS (?)

It is not without hesitation that I refer the following two species to this genus, as I have not seen an authentic type of it. It appears to have been unknown, except by description, to M. Lacordaire. In all important respects, however, the specimens before me agree very well with Erickson's diagnosis,

the only discrepancies being that the scutellum, although of the elongate triangular form described, cannot be called "small," and that the hairs on the intermediate tibiae are scarcely "long." I have not been able to examine the mandibles, and therefore cannot say whether they are as described. The principal character of *Amphiops* seems to be its having four eyes—two above and two below the head—and this is the case with the insects before me, as the ocular canthus is carried along the exterior margin of the eyes quite widely, thus dividing each eye into two parts. The extreme convexity of these insects is such that (viewed from the side) the height of the elytra is as great as their length.

A (?) australicus, sp. nov. Breviter ovalis, valde convexus, ad latera compressus; nitidus; niger vel nigro-piceus, antennis palpis corpore subtus pedibusque plus minusve rufescentibus; capite (hoc permagno) crebre dupliciter, prothorace sparsim inaequaliter, elytris fortiter (in disco sparsim confuse, ad latera crebre seriatim) punctulatis; prothorace fortiter transverso, antice fortiter bisinuato, ad latera et ad basin rotundato; elytris nullo modo striatis. Long., $1\frac{4}{5}$ l.; lat. 1 l.

This species looks to a casual glance as if it might very well be congeneric with the species I described as *Volvulus punctatus*, but its eye structure is quite different. In respect of puncturation moreover it is very different especially on the elytra where the punctures are very much coarser. In *punctatus* the elytral punctures are not much less fine than in *Cyclonotum Mastersi*, MacL.

Tropical Australia; Northern Territory (Dr. Bovill; also Mr. J. J. Walker).

A (?) duplopunctulatus, sp. nov. Breviter ovalis, valde convexus, ad latera compressus; nitidus; niger vel piceus, antennis palpis pedibusque rufescentibus; capite (hoc permagno) crebre dupliciter, prothorace dupliciter vix crebre, elytris dupliciter crebre (puncturis plurimis seriatim dispositis) punctulatis; prothorace fortiter transverso, antice fortiter bisinuato, ad latera et ad basin rotundato; elytris vix manifeste striatis. Long., $1\frac{4}{5}$ l.; lat. 1 l.

Differs from the preceding chiefly in respect of the elytral sculpture. In the present species the whole surface of the elytra is covered with comparatively close fine puncturation with which coarser punctures are thickly intermingled, the coarser punctures having a seriate arrangement (in scarcely defined striae) on both the discal and lateral parts of the elytra as well as being mixed with the fine punctures all over the interstices. In *A. (?) australicus* the fine puncturation of the elytra is so fine and sparse as to need looking for, and in the sutural region (especially on the front

half of the elytra) the larger punctures also are very sparse and without seriate arrangement.

Queensland; sent by Mr. DeVis.

HYDROCHUS.

The description of the Australian members of this genus are so scattered through the literature of widely separated countries that it seems desirable to furnish some notes showing their relation to each other. I have therefore attempted to place their characters intelligibly in a tabular form, adding some remarks on some of them, and giving a detailed description of a new species. There is, however, one species that I have been unable to identify, viz., *H. obscuræneus*, Fairm. I should judge from the description that it is near *H. Horni*, Blackb., but it may be at once distinguished from that insect by its having a fovea in the middle of the head between the eyes as well as by the well-defined sculpture of its prothorax and the implication that the alternate interstices of its elytra are not more elevated than the rest. I have before me a specimen which Mr. Lea tells me that he has ascertained by comparison with the type to be *H. parallelus*, Macl.

- A. General colour dull-brown, pitchy, or obscurely æneous.
- B. Head not trisulcate between the eyes.
- C. Seriate punctures of the elytra so coarse as to leave no continuously defined interstices between some of the rows *Adelaide*, Blackb.
- *CC. Interstices between the rows of elytral punctures not obscured by the coarseness of the punctures.
- D. Alternate elytral interstices strongly carinate, in strong contrast to the others *Victoriæ*, Blackb.
- DD. Alternate elytral interstices not, or only feebly, more elevated than the others.
- E. Prothorax at base with four well-defined impressions separated by well-defined ridges *regularis*, Blackb.
- EE. Base of prothorax not having four well-defined impressions.
- F. Clypeus much more nitid and less coarsely punctured than the rest of the head (size comparatively large) *diversiceps*, Blackb.
- FF. Clypeus punctured like the rest of the head (size very small)... *Horni*, Blackb.
- BB. Head distinctly trisulcate between the eyes.

* In *H. Victoriæ* some of the interstices are ill defined, but it is on account of rugosity of sculpture, the punctures not being particularly large.

- C. Interstices between the rows of elytral punctures all well defined.
 - D. The alternate elytral interstices scarcely more elevated than the others (size moderate).
 - E. Prothorax narrow and strongly narrowed at base
 - EE. Prothorax wider, subquadrate, not much narrowed at base
 - DD. The alternate elytral interstices conspicuously elevated (size very small)
 - CC. Seriate punctures of elytra so coarse as to leave no continuously defined interstices between some of the rows ...
 - AA. General colour bright-grass-green, with the legs yellow
- H. diversiceps*, sp. nov. Elongatus; brunneus, obscure cupreus, clypeo suturaque viridescentibus, genubus tarsisque plus minusve piceo-notatis; clypeo subtiliter punctulato; capite postice indeterminate inaequali, rugulose punctulato; prothorace leviter transverso, postice sat angustato, indeterminate inaequali, sat grosse subrugulose punctulato, lateribus leviter sinuatis minus arcuatis; elytris suturam lateraque versus striatis, seriatim punctulatis (serierum subsuturalium puncturis quam ceterarum minoribus), interstitiis internis vix (externis manifeste) elevatis. Long., $1\frac{3}{4}$ l.; lat., $\frac{3}{5}$ l.

On each elytron the punctures of the two rows nearest to the suture are in indistinct striae, and are smaller than the punctures of the other rows. The next two rows of punctures do not run in striae; but the rest of the rows are in striae. The seriate punctures (except those of the subsutural series) are about the same size as those of the European *H. angustatus*, Müll., and are larger than those of *H. parallelus*, Macl., and smaller than those of *H. Adelaidæ*, Blackb. The external interstices, beginning with that between the fourth and fifth rows of punctures, are somewhat elevated, especially near the apex.

Queensland; sent by Mr. DeVis.

H. interioris, Blackb. In re-studying this insect for the purpose of tabulation, I find with regret that the type was covered with some kind of exudation (probably the normal condition of the insect), which I overlooked; and the exudation now having, with considerable difficulty and some damage to the specimen, been removed, it appears that my description (Report of the Horn Expedition, II., p. 260) erred in respect of the sculpture, for the head, instead of being as I called it "aequalis," is trisulcate between the eyes, and the elytra should be described as "having all the alternate interstices a little more elevated than the rest, especially the fifth behind and the ninth in the middle," instead of (as is implied in my description) "only the fifth behind and the ninth in the middle more elevated than the rest."

OCHTHEBIUS.

O. brisbanensis, sp. nov. Minus latus; minus nitidus; piceo-niger, vix ænescens, pedibus antennisque rufescens; capite prothoraceque valde inæqualibus, vix perspicue punctulatis; hoc transversim quadrato (in disco sulco longitudinali mediano, sulco oblique in parte postica utrinque posita, et utrinque fovea antica, impresso), parte explanata laterali quam disci dimidium vix angustiori, lateribus fere rectis; elytris minus perspicue striatis, seriatim sat fortiter punctulatis, intersticiis sat planis, sutura elevata. Long., $\frac{4}{5}$ l.; lat., $\frac{2}{5}$ l. (vix).

The previously described Australian *Ochthebius* are *australis*, Blackb., and *novicius*, Blackb. The latter is a much larger species of considerably wider form. The former is of about the same size as the present insect, but more nitid, of a reddish-piceous colour and of somewhat wider build. Moreover the sculpture of its head is entirely different. Looked at obliquely from the front the head (excluding the clypeus) in *australis* is seen as divided into 5 elevations (2 ridges on either side placed one behind the other and a central tubercle); while the corresponding piece in the present species from the same point of view is seen as an area bearing a large deep fovea on either side of the middle the space between the foveæ being comparatively narrow and elevated like an obtuse ridge.

Queensland; near Brisbane; sent by Mr. DeVis.

HYDRÆNA.

H. evanescens, sp. nov. Ovalis; subnitida; obscure rufo-brunnea, capite nigricanti, prothoracis lateribus (nonnullorum exemplorum) pedibusque testaceis; capite vix perspicue, prothorace crebrius subtiliter, elytris subtiliter seriatim, punctulatis; prothorace leviter transverso, antice parum angustato, basin versus transversim (et prope angulum anticum subrotundatim) impresso; elytris postice obtusis, subtiliter seriatim punctulatis. Long., $\frac{3}{5}$ l.; lat., $\frac{1}{4}$ l.

This pigmy is distinguished from all the other described Australian *Hydræna* by its minute size. From *Torrensi*, Blackb., and *acutipennis*, Fairm., it also differs by its elytra being blunt at the apex; and from *luridipennis*, Macl., and *simplicicollis*, Blackb., by the much finer puncturation of its prothorax.

Queensland; sent by Mr. DeVis.

CYCLONOTUM.

C. Cowleyi, sp. nov. Late ovale; minus convexum; modice nitidum; rufum, elytris piceo-nigris; supra æqualiter confertim subtiliter punctulatum, sed elytris puncturis minus

subtilibus seriatim impressis; prothorace quam longiori ut $2\frac{1}{2}$ ad 1 latiori, antice angustato, margine antico fortiter bisinuato; elytris haud striatis, stria subsuturali etiam carenti. Long., 3 l.; lat., $1\frac{4}{5}$ l.

This species is very much more finely and closely punctulate than *C. Mastersi*, MacL. The absence of a subsutural elytral stria distinguishes it from all the other described Australian *Cyclonota*.

Queensland (Cairns); sent by Mr. Cowley.

NOTOCERCYON (gen. nov. *Sphaeridiidarum*).

Palpi labiales breves; palpi maxillares modici, articulis 2° dilatato, 3° 4° que gracilibus inter se sat æqualibus; labrum vix perspicuum; oculi modici; antennæ ut *Cercyonis*; scutellum modicum triangulare; elytra pedesque ut *Ceryconis*; prosternum ut *Cercyonis*; mesosternum sat late lanciforme planum; corpus supra parce pubescens.

This genus differs from *Cercyon* chiefly by the form of the mesosternum which is flat as in *Megasternum*, though not quite so wide as in that genus and much longer. It differs from *Megasternum* in having the prosternum and tibiae as in *Cercyon*.

N. ornatum, sp. nov. Ovale, postice acuminatum; convexum; parce pubescens; rufobrunneum, prothorace rufo, elytris testaceis (striis nigris, interstitiis interrupte nigro-maculatis, maculis fascias duas indeterminatas formantibus), antennarum clava nigra; capite prothoraceque subtiliter sat sparsim punctulatis; hoc fortiter transverso; elytris fortiter striatis, striis minus perspicue punctulatis, interstitiis subtiliter punctulatis (puncturis singulis capillas singulas ferentibus) convexis; metasterni mesosternique parte mediana planata sparsim punctulata. Long., $\frac{4}{5}$ l.; lat., $\frac{3}{10}$ l.

I met with two specimens of this insect, which are similarly coloured. The species differs from the following in its form acuminate behind, the evidently finer and sparser puncturation of its prothorax, and the much less close puncturation of the flattened surface of its meta- and mesosterna.

Victoria; Black Spur.

N. (Cercyon) dorsale, Er. I met with several specimens near Hobart of an insect which agrees very well with Erichson's description of this species, and I have it also from several localities in the Victorian Mountains. It is evidently congeneric with the species for which I have proposed the generic name *Notocercyon*. In colouring it presents considerable variety, the typical form (with which one of my Tasmanian examples agrees), has the piceous colour on the elytra in the form of a common

triangle with its base on the base of the elytra, but in most examples the piceous colour is more extended (leaving only the hinder part of the lateral margins and the apex testaceous) till in one of my Victorian specimens the whole elytra are of dark colour with only the apex somewhat lighter than the general surface. The most marked character distinguishing this species from the preceding consists in the close puncturation of the flattened portion of its sterna.

CERCYON.

Up to the present time two genuine species of *Cercyon* have been recorded as Australian, viz., *C. fossum*, Blackb., and (the doubtless imported) *C. flavipes*, Fab. I have now to record the following :—

C. quisquilium, Linn. I have an example of a *Cercyon* (taken to the best of my recollection near Melbourne) which seems to me to be this species. Compared with the specimen in my European collection the elytral interstices certainly seem to be a little less finely punctulate, but I can find no other difference, and have little doubt the insect has been imported into Australia.

PSEUDOHYDROBIUS (gen. nov. *Palpicornium*).

Palpi labiales breves graciles, articulo ultimo ovali quam præcedens sublongiori; palpi maxillares minus elongati, quam capitidis (inter oculos) latitudo vix longiores, articulis ultimis 2 longitudine sat æqualibus; mentum quadratum; labrum brevissimum sub clypeo fere abditum; caput sat parvum; oculi modici quam *Hydrobii* minus leviter granulati; antennæ 9-articulatæ, quam palpi maxillares sesquiloniores, articulis 1° quam 11^{us} sublongiori subcylindrico, 2° quam 1^{us} triplo breviori, 3-6 gracilibus gradatim brevioribus (his conjunctis quam 1^{us} 2^{us} que conjuncti vix brevioribus), 7-9 clavam formantibus (7° 8° que inter se æqualibus, his conjunctis quam 11^{us} paullo longioribus); prothorax transversus; scutellum modicum; elytra ovalia; pedes modici sat graciles; femora compressa; tibiæ breviter ciliatae; tarsi modice elongati, articulis 1° perbrevi, 2° 5° que elongatis inter se æqualibus; unguiculi simplices; mesosternum æquale (*i.e.*, nec carinatum nec tuberculatum); corpus glabrum.

This genus is certainly, I think, allied to *Cyclonotum*, but it has the tarsi of *Hydrobius*, nine-jointed antennæ, and the mesosternum non-carinate. Its habits, moreover, associate it with *Cyclonotum* rather than with the true *Hydrophilides*. Probably M. Lacordaire would have treated it as a distinct tribe of *Palpicornes*.

P. floricola, sp. nov. Sat late ovalis; sat convexus; nitidus; supra brunneo-testaceus, capite prothoraceque in disco, et elytris præsertim latera versus, varie infuscatis; corpore subtus pedibusque rufo-brunneis; capite crebre minus subtiliter, prothorace minus crebre magis subtiliter, elytris (striis neglectis) fere ut caput sed minus crebre, punctulatis; elytris striatis, striarum (his apicem versus multo magis fortiter impressis) puncturis quam interstitionum sat majoribus. Long., $2\frac{1}{2}$ — $2\frac{4}{5}$ l.; lat., $1\frac{3}{5}$ l.

Victoria; on flowers near Fernshaw (Black Spur).

PHYTOPHAGA.

I have recently sent examples of a considerable number of the *Phytophaga* that I have described to the eminent specialist Mr. M. Jacoby, of the London Entomological Society, with the request that he would favour me with information regarding any of my determinations that he might consider incorrect. He has courteously responded to this request and has pointed out the following errors (which it seems desirable to place on record) in my work.

TERILLUS.

T. micans, Blackb. Mr. Jacoby informs me that this species is identical with *Alittus foveolatus*, Chp., and adds the information that he also regarded it as a *Terillus* and that it is the species he described as *T. porosus*. I have no doubt Mr. Jacoby has conclusive reasons for this determination (probably he has seen Chapuis' type) but it should be noted that Chapuis in his tabulation of the *Iphimeites* indicates as a leading character of *Alittus* that the lateral margins of the pronotum are perfectly straight ("tout à fait droits") which they are most emphatically not in this insect, and in the specific description says that the tibiae are the same colour "*flavo ferruginiae*" as the antennæ which they are not in any of the somewhat numerous specimens that I have seen of this insect. No doubt Dr. Chapuis incorrectly described his insect.

HALTICODES.

This genus (charactised by me Tr. Roy. Soc., S.A., 1896, p. 69) Mr. Jacoby says does not appear to him to differ from *Lacticita* Dr. Chapuis gives as one of the main distinctions of the *Lacticites* the presence of a deep transversal prothoracic furrow "*limitè de chaque côté*." In *Halticodes* the prothoracic furrow terminates laterally by arching round to the base; whereas I understood the expression "*limitè de chaque côté*" to indicate that the transversal furrow is cut off on either side by a longitudinal furrow at right angles to it (as in *Crepidodera*). I presume however that this is not the case, and in that event I do not know

any character on which *Halticodes* should be excluded from the *Lacticites*—or separated from *Lactica*. My *H. disparipes* is very distinct specifically from the only other *Lactica* yet described as Australian (*L. australis*, Duviv.).

AULACOPHORA.

A. Palmerstoni, Blackb. Mr. Jacoby informs me that this is not distinct from *A. abdominalis*, Fab.

MONOLEPTA.

M. alpina, Blackb. Mr. Jacoby states that this is identical with *M. minima*, Allard, which is, I think, the only *Galerucid* hitherto attributed to Australia of which I have not been able to see the description.

USE OF THE WEDGE BY THE NATIVES OF THE GREAT BARRIER PLAIN.

By JOHN HARRIS BROWNE.

[Read October 4, 1898.]

In the years 1844 and '5 the great plain west of the Barrier Ranges, and extending northwards to the latitude of the Grey Ranges, had on it large patches of the *Acacia homolophylla*, the *Brigalow* of Western Queensland. These patches were often many square miles in area. The trees were from 8 to 12 feet in the stem, 5 to 8 inches in diameter, and sufficiently wide apart to enable a man to ride amongst them easily, although at a distance they appeared to form a thick impervious scrub. They were of great value to the natives. First, their seeds were an important article of food. For this purpose, when the seeds were nearly ripe, branches were torn off the trees and piled up in heaps on patches of bare ground, and when quite dry were thrashed with sticks. The seeds were then collected, winnowed on a rug, ground between two stones with water into a paste about the consistence of thick gruel, and eaten from the grinding-stone with the bent forefinger, used as a spoon. Boomerangs and spears were made from the wood. For a boomerang a branch with the proper curve was selected, and an incision about an inch deep was cut into it at each end of the proposed weapon. Then the point of a yamstick or other piece of wedge-pointed wood that had been hardened in the fire was driven under the cut wood at the smaller end. A piece split off that required very little finishing to make it a perfect boomerang. Sometimes two or three were made off the same branch by deepening the cuts after each one had been split off. For spears a tree with a perfectly straight stem 10 or 12 feet long was cut down, the top cut off, and then split into halves and quarters by having wedge-shaped pieces of wood driven into the small end. The trees split very readily. I split a tree 10 feet long into halves with a single blow with an axe struck on its smaller end. The spears made from the tree in this manner were 9 to 10 feet long, from $1\frac{1}{4}$ to $1\frac{1}{2}$ inches in diameter, chisel-pointed at one end, and with a blunt point at the other. They were never thrown, but were held in both hands, and used to thrust with in a charge. I believe they were peculiar to that district, for I never saw any of them north of the Grey Ranges. All the *Acacia*-trees seem to have died out, for when ten years ago I looked down upon the great plain from the top of Mount Robe, the only trees on it were a few pines and some mallee in scattered clumps.

ABSTRACT OF PROCEEDINGS
OF THE
Royal Society of South Australia,
FOR 1897-98.

ORDINARY MEETING, NOVEMBER 2, 1897.

W. L. CLELAND, M.B. (President), in chair.

EXHIBITS.—J. G. TEPPER, F.L.S., exhibited specimens of an Aleurodidae, *Trioza sp.*, on Sterculia-leaves from Botanic Garden. The larvæ emit white waxy threads and coat surface of leaves with sugary fluid, which if not removed by ants or in other ways render plants sickly. Also some peach-tree aphid (*Myzus cerasi*), remarking they were difficult to remove by spraying. Also specimen of tick (*Ixodes muralia*), presented by Mr. Wirtheimer, and taken from a snake skin sent to him from Queensland. A. ZEITZ, Assistant-Director of the Museum, made some remarks upon Alexandra Parrot (*Spathopterus Alexandræ*) from Glen Edith, N.T., which had bred in captivity, but had not reared their young. Prof. TATE showed herbarium specimens of *Polypodium proliferum*, new for South Australia, from Cournamount, River Murray. Collected by the Rev. Henry T. Hull, of Mount Pleasant, who remarks that "there is no doubt of its occurrence in a wild state. On a recent visit I saw hundreds, if not even thousands, of plants" (25/10/97).

BALLOT.—W. G. Torr, LL.D., M.A., B.C.L., was elected a Fellow.

PAPERS.—"A Newly-discovered Cambrian Trilobite from Yorke's Peninsula," by R. ETHERIDGE, Jun. "Description of New Mollusca," by Professor TATE.

ORDINARY MEETING, DECEMBER 7, 1897.

W. L. CLELAND, M.B. (President), in the chair.

EXHIBITS.—W. HOWCHIN, F.G.S., exhibited and described palæolithic implements from the brick-earths of Sussex, and

gravels of France, from Madras Presidency, and from Somaliland.

PAPER.—“On Some Australian Insects of the Family Psyllidae,” by W. M. Maskell, of Wellington, N.Z.

S. DIXON reported result of the deputation to the Minister of Education in reference to preparing a manual on insectivorous birds and predatory insects for use in Public Schools.

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ORDINARY MEETING, APRIL 5, 1898.

PROF. TATE, F.G.S. in the chair.

EXHIBITS.—Prof. TATE showed pieces of prismatic sandstone from the Hawkesbury series, N.S.W. and Western Victoria. Also some “limestone biscuits” from Biscuit Flat, S.E.; having referred to certain speculations of Rev. J. Tenison Woods in his work on South Australian Geology, 1862, as to the origin of these biscuits, he went on to describe the appearance of the biscuits—their highly calcareous nature. A section through the narrow part shows concentric rings around a central spot or space, and in several examples a fresh water shell (*Bulinus*) is found to be the nucleus. Mr. Thomas Smeaton wrote describing some observations made by him some 30 years ago on limestone biscuits from S.E. and elsewhere, and came to much the same conclusion as Prof. Tate.

MR. TEPPER, F.L.S., showed a piece of green opal from Coolgardie, W.A. Also a pupa of codlin moth obtained from apple stem between three apples, and which had made a nest in a bottle where it had been placed subsequently.

A. ZEITZ, Assistant Director of Museum, brought under the notice of the meeting a small green pigeon (*Chalcophaps chrysochlora*) caught at Bews near Kadina, very rarely found so far South, its proper home being Queensland and New South Wales. Also a small fish of the perch tribe (*Chelmo truncatus*) and of the scaly finned family, so named because the dorsal and anal fins are thickly covered with scales. Also an unusually large specimen of the blue-tongued lizard (*Cyclodes gigas*) from Leighs Creek; about 18 inches long.

PAPERS.—“Description of new Coleoptera,” by Rev. Thos. Blackburn, M.A.

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ORDINARY MEETING, MAY 3, 1898.

W. L. CLELAND, M.B. (President), in the chair.

OBITUARY NOTICE.—J. G. O. TEPPER, F.L.S., drew attention to the death of W. M. Maskell, of Wellington, N.Z., a corresponding member of the Society. It was decided to send a letter of condolence to the Hon. Secretary of the Philosophical Society, Wellington.

EXHIBITS.—W. HOWCHIN, F.G.S., laid on table a photograph of a large erratic boulder transported by glacial action some ten miles up the Inman River Valley.

PAPERS.—“Further Discoveries of Glacial Remains in South Australia,” by W. HOWCHIN, F.G.S.; “The Influence of Vegetation on Climate and the Rainfall,” by J. G. O. TEPPER, F.L.S.

ORDINARY MEETING, JUNE 7, 1898.

W. L. CLELAND, M.B. (President), in the chair.

EXHIBITS.—Prof. TATE, F.G.S., exhibited a grass (*Aristida depressa*) from Mount Lyndhurst (collected by Mr. Koch) new to South Australia. Also a sedge (*Cyperus lœvigatus*) from River Hindmarsh (collected by Miss J. L. Hussey), first found in South Australia at Nilpena, but in an extreme varietal form, and this year J. H. Maiden, Government Botanist of N.S.W., has received a specimen of it from Mount Lyndhurst. The Port Elliot plant, which in its Schoenus-like habit represents the typical form widely spread over warmer regions of the world, chiefly in maritime districts, has hitherto only been known for Australia at Swan River, W.A.

J. G. O. TEPPER, F.L.S., exhibited a cocoon of an insect on an eucalypt bough curiously simulating a *Serpula*.

EDWIN ASHBY showed *Callochiton platessa*, *Acanthochites speciosus*, and *A. asbestos*, and small medusa from Aldinga.

PAPERS.—“Respecting Contact Metamorphism occurring at Kalgoorlie, W.A.” by H. B. CORBIN; “On two Deep Level Occurrences in South Australia of Recent Marine Deposits,” by Prof. TATE.

ORDINARY MEETING, JULY 5, 1898.

W. L. CLELAND, M.B. (President), in the chair.

EXHIBITS.—A large series of specimens from White Cliffs, illustrating pseudomorphism by noble opal, by Prof. TATE, the property of the School of Mines. These included scalenohedra after calcite, opalised sandstone, reptilian humerus, Ichthyosaurian vertebra, wood-structure, and various molluscan tests.

W. HOWCHIN, F.G.S.—A piece of quartzite with polished surface, taken from a large bed of the same rock in the Onkaparinga watershed, exhibiting pseudoglacial features; a piece of black flint pseudomorph after calcite, from Wallaroo Mines; also specimens showing rock-faulting, contortion, and interrupted jointing, and others illustrating various geological phenomena.

PAPER.—“On a new Myoporum from South Australia,” by J. H. MAIDEN and E. BETCHE.

Dr. STIRLING, M.D., F.R.S., moved the following resolution (Prof. TATE seconded. Carried.) :—“That whereas the aborigines of Australia are rapidly disappearing, it is desirable, in the interests of science and of our successors, that a comprehensive and enduring record of the Australian race, in the fullest anthropological and ethnological significance, should be taken before it is too late; that this Society communicate with the Royal Societies of Victoria, New South Wales, Queensland, and West Australia and the Linnean Society of New South Wales, with the object of asking whether those Societies will join in a combined movement, together with such other scientific bodies as may be interested, to induce the Governments of their respective colonies to promise contributions of say £500 from each colony, payable in such annual instalments as may be necessary to defray the expenses of such a work; that contingent upon the approval by this Society of the above resolution, the Council be requested to put it into effect by forwarding copies to the bodies mentioned.”

ORDINARY MEETING, AUGUST 2, 1898.

W. L. CLELAND, M.B. (President) in the chair.

EXHIBITS.—A. ZEITZ, Assistant-Director of the Museum, specimen of Leatherjacket (*Monacanthus*, sp.), with abnormal dorsal spine from St. Vincent's Gulf. Also a blue ruff-heron (*Demigretta jugularis*) from Wallaroo. It is found in tropical Australia, but rarely so far south. S. DIXON specimens of telluride ore, carrying 40 per cent. of gold, in schistose rocks from the Kalgurlie Mine, W.A. W. HOWCHIN, F.G.S., gave an interesting description of foraminiferal sand, obtained through the kindness of Prof. David, of Sydney, and Mr. Geo. Sweet, of Melbourne, from the Funafuti Atoll, and from the bore put down to test the nature of the underlying rocks. The beach consists largely of nullipore fragments sometimes consolidated into rock masses. The foraminifera are not very abundant in their variety, but form almost the entire mass of the beach sand, and belong to eleven genera, including sixteen species, and present an almost identical facies with those of the fossil fauna of the lower tertiaries of Southern Australia. Organic remains from the bore at 150 feet were scarce; those from the 400-feet depth were more abundant, particularly amphistegina, which made up the most of the rock materials, and were in each case characteristically of shallow water species, which would seem to indicate subsidence of the

platform on which the atoll rests. A photograph of Funafuti was also shown.

BALLOT.—E. Meyrick was elected an Honorary Fellow.

PAPERS.—“Two new species of Cretaceous Mollusca.” “New species of Eulimidæ and Pyramidellidæ;” Revision of the Australian Cyclostremidae and Liotiidae [Publication unavoidably postponed]. The author points out that great diversity of opinion has prevailed as to the correct systematic position of the component species; some under different generic names have been placed in both families. The limits of the genera of Cyclostremidae are better defined, and the following two new genera are proposed:—(1.) CYCLOSTREMELLA, type *Liotia Lodderæ*, Petterd, is separated by its varicosely margined aperture; (2) PSEUDOLIOTIA, type *Cyclostrema micans*, A. Adams (= *Liotia Angasi*, Crosse), is defined as somewhat like *Liotia*, with a thick porcellanous (non-perlaceous inside) test, aperture oblique, its margin thickened, operculum horny and multispiral, without a granulose exterior. *Cirsonella*, Angas, falls as a synonym under *Tubiola*, A. Adams, in the family Cyclostremidae; “On some Recent and Fossil Species of Philobryæ,” by Prof. TATE, F.G.S.

ORDINARY MEETING, SEPTEMBER 6, 1898.

W. L. CLELAND, M.B. (President) in the chair.

BALLOT.—Mr. EDWIN ASHBY was unanimously elected an auditor.

PAPERS.—“Notes on Australian Lepidoptera,” by Dr. A. JEFFERIS TURNER; “Lists of Plants on Mount Lyndhurst Run,” by M. KOCH; “Deep-seated Eocene Strata in the Croydon and other Bores,” by Prof. TATE, F.G.S.

ANNUAL MEETING, OCTOBER 4, 1898.

W. L. CLELAND, M.B. (President) in the chair.

EXHIBITS.—Prof. TATE exhibited botanical specimens collected by Mr. C. F. Johncock from the neighbourhood of Mount Remarkable—these were: the geococcus state of *Blennodia cardaminoides*, *Kennedya prostrata*, leaves of *Xanthorrhœa quadrangulata* from the summit of the Mount, *Solanum lacunarium*, *Adiantum aethiopicum*, and *Pterostylis pedunculata*. Rev. THOS. BLACKBURN, B.A., exhibited obsidian bombs.

Annual report and balance-sheet were read and adopted.

ELECTION OF COUNCIL.—President, W. L. Cleland, M.B.; Vice-Presidents, Prof. Tate, F.G.S., and W. Howchin, F.G.S.; Hon. Treasurer, Walter Rutt, C.E.; Hon. Sec., G. G. Mayo, C.E.;

Members of Council, Prof. Rennie, D.Sc., E. C. Stirling, M.D., Rev. Thos. Blackburn, B.A., S. Dixon, J. S. Lloyd, and W. H. Selway; auditor, Edwin Ashby.

Presidential Address was read by the PRESIDENT, and upon the motion of Prof. TATE, seconded by Prof. STIRLING, was ordered to be printed in the Society's Transactions.

PAPERS.—“The Use of the Wedge by the Natives of the Great Barrier Plain in making their Boomerang and Spears,” by John Harris Browne. Report on the Birds collected on the Calvert Expedition, by A. J. NORTH, C.M.Z.S., and G. A. KEARTLAND. “Dimorphism in South Australian Cruciferae,” by Prof. TATE, F.G.S.; “Descriptions of New Microlepidoptera,” by Dr. A. J. TURNER; “Notes on the Nest and Eggs of *Porzana fluminea*,” by Dr. A. M. MORGAN; “Descriptions of seven New Species of South Australian Polyplacophora,” by Dr. TORR and E. ASHBY; “Descriptions of New Australian Coleoptera,” by Rev. T. BLACKBURN.

ANNUAL REPORT.

The Council reported that the scientific work of the Society had been steadily carried on during the year. Part 1 of vol. XXII was ready for distribution in August.

Prof. Tate, F.G.S had been engaged in making a revision of the Australian Cyclostremidae and Lioiidæ, and had also made independent observations of the Calcareous Biscuits from the South-Eastern district of the colony. W. Howchin, F.G.S., had discovered further traces of glacial action in Hindmarsh Valley, and a Trilobite from Yorke's Peninsula, which R. Etheridge, jun., of Sydney, has described as *Ptychoparia Howchini*.

Valuable papers have been contributed during the year by Prof. Tate, F.G.S., Dr. Verco, Rev. Thos. Blackburn, B.A., the late W. M. Maskell, J. H. Maiden, Dr. A. J. Turner, and J. G. O. Tepper.

Exchanges of publications have been accepted with various scientific bodies. The Council have to report the death of a corresponding member, W. M. Maskell, the late Registrar of the University of New Zealand, who had shortly before his lamented death forwarded a valuable paper to the Society.

A movement has been initiated by Prof. Stirling for obtaining the support of the various Colonial Governments and learned societies in an organized attempt to collect and preserve all ethnological and anthropological information relative to the aborigines of Australia.

During the year J. H. Maiden, Director of the Botanic Garden, Sydney, and E. Meyrick were elected Honorary Fellows.

The membership of the Society is as follows:—10 Hon. Fellows, 9 Corresponding Members, 70 Fellows, 1 Associate.

Early in the year Mr. Sam. Dixon initiated a discussion on the advisability of securing the dissemination of reliable information respecting the insectivorous birds and useful insects of South Australia. After discussing the matter at several meetings, a Sub-Committee, consisting of the President, Prof. Tate, Messrs. S. Dixon, J. G. O. Tepper, and W. C. Grasby, was appointed to take such steps as they considered necessary. The Committee invited the co-operation of the Royal Geographical Society, Royal Agricultural Society, the Zoological Society, and the Agricultural Bureau. All these Societies decided to assist in attaining the objects of the Sub-Committee, and a meeting of the representatives was held at the University, when it was decided to wait on the Hon. the Minister of Agriculture and Education.

The Minister promised to make enquiries and decide what action the Government would take. No official reply has yet been received.

THE TREASURER IN ACCOUNT WITH THE ROYAL SOCIETY OF SOUTH AUSTRALIA.

	Dr.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
October 1st, 1897.							
To Balance	91 4	3	By Cost of Transactions—	
“ Subscriptions—						Printing ...	... 58 5 0
Royal Society	74 16	0	Illustrating ...	... 9 5 0
Field Naturalists' Section	15 0	0	Publishing...	... 7 9 0
Malacological Section	3 10	0	“ Wages—Caretaker ...	... 74 19 0
“ Grant from Government	93 6	0	“ Printing, Postage, and Stationery	... 4 0 0
“ Interest	76 18	2	“ Library—Carriage and Shelving	... 4 10 8
				2 18	9	“ Grants-in-aid—	
						Field Naturalists' Section ...	... 10 0 0
						Deputation re Insectivorous Birds ...	... 0 9 7
						“ Exchange on Cheques ...	... 10 9 7
						“ Balance in Savings Bank, Oct. 1st, 1898	... 0 1 9
							162 19 0
							<hr/> £264 7 2

Audited and found correct,
 EDWIN ASHBY, Auditor.
 1st October, 1898.

WALTER RUTT, Hon. Treasurer.

PRESIDENT'S ADDRESS.

During the year now ending the Society has received various valuable contributions on matters relating to natural history and geology, which are the sciences that in a new country are the most prolific in furnishing original papers and monographs. The object of this Society as a scientific body is to place on record only new facts relating to science as they bear on South Australia. This is the rule of the various learned Societies of the Australian Colonies, so that the proceedings of this Society should reflect the increase to our scientific knowledge respecting South Australia in any given year. The thanks of this Society are certainly due to those science-workers who loyally forward the results of their labours on South Australian subjects to be incorporated in our proceedings. To some of the Fellows it may be a matter of regret that attempts have not been made by the Council to place scientific subjects in a popular form before the meetings. It should be remembered, however, that the functions of a Royal Society are not to popularise science nor to give instruction, but simply to publish results of work done or to discuss the deductions which may legitimately be drawn from ascertained scientific data. Our workers are, however, so few, and each one is almost necessarily an authority on his own particular speciality, that the opportunities for profitable discussion do not often present themselves for want of a sufficient number of those who would be entitled to speak *ex cathedra*. Again, the existence of the University as a rallying focus for anyone interested in science, as there are to be found some of our chief exponents of various branches of science, also tends to deprive the meetings of this Society of one of its objects, namely, a common meeting ground for the exchange of scientific thoughts. As to the popularising of science, this Society might possibly have taken up the matter if it were not being already done in a pre-eminently satisfactory manner by the University and the branches of the Society. For this Society to attempt to do the same would be superfluous, and anything that is unnecessary is certain to be mischievous. It is no object of this Society to enter into competition with other institutions, and although it may be a matter of regret that our meetings are not as well attended as they might be, yet the regret is not on account of the smallness of the audience, but of the smallness of the band of science

workers. It has, however, been already stated that many of our workers do not attend the meetings because they have had opportunities elsewhere of meeting those with whom they are in science matters *en rapport*. The utility of this Society is therefore not to be measured by the number who attend the meetings but rather by the bulk of its published memoirs. The intrinsic value of the contributions has always maintained a very high scientific standard. It must also be remembered that each of these contributions necessitates a vast amount of labour and minute and painstaking investigation, so that although the quantity may not always be great, the quality is unimpeachable. Another obstacle to the size of our proceedings has been at times the question of ways and means, and the study of certain subjects has had to be postponed owing to the unlikelihood of the Society being equal to the necessary expenditure. As an example may be cited what has been done with regard to the unique Callabonna fossils. In 1894-5 a beginning was made by describing and illustrating certain bones of *Genyornis Newtoni*, but since then there has been no further publication. On those who can afford to wait fortune in the end generally condescends to smile and so it is in this case. There is now every certainty that the work will be pushed on with vigour, as the Government has generously, and with a due appreciation of the scientific value of the work, caused a sum of money to be set apart for this especial object. It must be particularly gratifying to all who have the welfare and encouragement of scientific work at heart to have this tangible proof of the enlightened interest which the present Ministry of South Australia takes, not only in assisting to obtain scientific materials, but also in making it available for the benefit of the scientific world.

At the meeting held in July, 1898, an important resolution was carried, expressing the desirability of a united action on the part of the Australian Colonies to arrange and publish an authoritative Treatise, as complete as possible, of the Australian race. There is every reason to hope that material assistance will be obtained from the various Governments for effectively carrying out this national work. It will also be conceded by all that no time should be lost in setting about the collecting of all available information. In South Australia, apparently, no systematic and comprehensive attempt has been made to study the aboriginal races of this colony. In the pages of our proceedings during the past twenty years appear various important, but isolated, contributions towards the anthropology of Australia. The most important of these are probably those relating to the tribes inhabiting an area of country having a radius of two or three hundred miles from a centre about the Finke River. The reason

why it is advanced that these contributions have a greater ethnological value, from an Australian point of view, than other important studies made to the west of the Gulf of Carpentaria, the Daly River, and other parts of the coastal region of the Northern Territory, is that the tribes in Central and Southern Australia are less likely to be mixed with other races. And one of the greatest points of interest in connection with the study of the aborigines of Australia would be that here, if anywhere, it should be possible to investigate perhaps one of the purest examples of a race that is autochthonic as contrasted to exotic in its local origin. In other words, in studying the purest examples of the Australian aborigines, the scientific investigator would be studying as purely local productions as would be found in the respective flora and fauna. The isolation of the Central and Southern parts of Australia from other centres of human occupation, the absence of rivers or other easy modes of transit, and the background of a vast uninhabited ocean, presents a habitat that is unique in the completion of its severance from the rest of the world or from any invading influences. So that whatever affinities the aborigines of Australia may have as a race with certain black Hill Tribes of Southern India or Papuans or Negritos of the Archipelagos to the east of Australia, they would still present a study from an isolation point of view vastly superior to any that could be obtained in any other country, or under any other existing conditions with which we are acquainted. Mr. Romanes attaches very great importance to the effects of isolation and devotes part III. of his work "Darwin and after Darwin" chiefly to a discussion of the varieties and bearings of isolation in modifying forms of life. "In isolation," he says, "we have a principle so fundamental and so universal that even the great principle of natural selection is less deep, and pervades a region of smaller extent." Isolation is defined as the prevention of intercrossing between a separate section of a species or kind and the rest of that species or kind; whether such separation be due to geographical barriers, to migration, or to any other state of matters leading to exclusive breeding within the separated group. This application of isolation to the aborigines of Central and Southern Australia has been particularly fortunate, as there is reason to believe that the Australian race is amongst the most primitive known, and the most direct issue of the primitive stock from which the various races bordering the greater part of the Indian Ocean may possibly have been sprung in the remote past. If this should be the case with the aborigines of Australia it would tend to show that isolation must have an injurious effect on the development or the evolution upwards of any particular species. It is not difficult to

see how this may be, and how the effect would be somewhat similar to what takes place in what is called "composite portraiture." In the latter, for instance, only the more salient points of say some 50 portraits are manifested, the result being unlike any, and yet having some common resemblance to all. So in the long-continued breeding of a pure race the more salient features of the people would be the more likely to be perpetuated, and the minor deviations or tendencies to evolution would stand a greater risk of not being transmitted. If this view is correct, the picture presented by the aborigines of Australia is not that of a degenerate, but rather of a primitive race, a people whose chances of further evolution have been lessened by their extreme degree of isolation. As in the composite portrait, individual peculiarities would remain in abeyance and only the broader distinctive traits of the race or species would appear. As regards the idea that the aborigines of Australia are a degenerate or retrogressive race it appears that reliance is based chiefly on certain rites and customs to support the view. Mr. Helms, in the anthropological contribution to the results of the Elder Exploring Expedition, after rejecting the shipwreck theory, favours the opinion that the aborigines of Australia have become a retrogressive race, basing the conclusion on their extraordinary sexual rites for retarding an excess of population, on their complicated marriage laws, and, besides, on other remarkable features of intellectual culture, pointing to the supposition that they must be the remnants of a highly-advanced culture. It seems improbable that isolation would cause retrogression, although it would favour a race becoming stationary and perhaps accentuated. Another explanation may be advanced in place of retrogression. We possibly err in attaching a too high mental or intellectual value to the rites and customs mentioned by Mr. Helms, an error into which we do not fall in considering the many wonderful acts and habits of various animals. For instance, in considering the engineering skill of the beaver in constructing dams, it is not necessary to suppose that it had some Archimedean ancestor who had a genius for construction and the application of physics. Nor, again, to suppose that some ancestors of the honey-bee had a talent for practical sociology, and elaborated the existing ethics and distribution of labour which characterises ordinary hive-life. It is not necessary to suppose that these are examples of retrogression. As different substances emit sounds characteristic of themselves when struck, owing to some speciality in the arrangement and nature of their molecules, so it is conceivable that organisms would respond in varying ways to the constant action of stimuli. It is possible in this way to see how by a slow process of evolution the gradual adjusting of the nervous cellular structures with their

dendrites or branches under persistent stimuli of a given character may lead to a condition of unconscious cerebration, having all the appearance of conscious intent. We may all admire and appreciate the mechanical skill of these rodents, and the ethical effects of some of the customs of these insects, and of this species of the genus homo, but it is another matter, and a probably unwarranted assumption, to attribute the same power of intellectual appreciation to these beavers, honey-bees, or aborigines, either now or in the remote past, that we ourselves possess. That these three types of animals should have responded to stimuli in an apparently intelligent manner may be considered as evidence of the high quality of their primary nervous structure, but not necessarily as evidence of conscious volition of adapting means to an end. Personal contact with an aboriginal by no means shows him to be a stupid fellow, but it would be asking too much to expect him to appreciate the restraints of civilization. As an illustration of how savage man acts in common with many animals and birds in a way which more civilised peoples have lost may be mentioned the power of travelling to and reaching distant places without any apparent guidance. Darwin, in his posthumous "Essay on Instinct," which appears *in extenso* as an appendix to Mr. Romanes' work on "Mental Evolution in Animals," says we should be very cautious in attributing to migratory animals any capacity in this respect which we do not ourselves possess. And he quotes from the navigator Wrangel on the "unerring instinct" of the natives of N. Siberia, and from Sir George Grey's "Expedition to Australia" of the powers of the aborigines here, in the same direction. If any act has the appearance of conscious intent, it might be assumed that this power of unerringly travelling to a given place would be one. And yet there is no more ground for supposing that it is the case with savage man than with other members of the animal world.

An analogy may also be sought in the evolution of language, that results which appear volitional have not in reality so arisen. As Prof. Max Müller says in his "Chips," man in his primitive state was endowed, not only like the brute with the power of expressing his sensations by interjections and imitations, he possessed likewise the faculty of giving more articulate expression to the rational conceptions of his mind. That faculty was not of his own making. It was an instinct, and so far as language belongs to that instinct, it belongs to the realm of nature. And it is also seen that different anthropological centres responded to this instinct in different ways, but always in the same way as regards general construction for any particular centre. It thus may be assumed that languages, with their vocabularies and grammatical construction, were unconsciously

evolved as the result of stimuli acting on certain organisms endowed with a certain potentiality. As regards the individuals using any specific language, it was a case of unconscious cerebration, and it was left for the learned comparative philologist to explain the mechanism and the rationale. This is the only conclusion that can be reached, for it would be absurd to suppose that languages could have been consciously evolved by the peoples using them. Returning, then, to the curious rites and customs and laws of the aborigines of Australia, it does not seem necessary to suppose any antecedent condition of greater culture or civilisation to explain their existence. And this is more particularly the case as there appear absolutely to be no other vestiges of such supposed greater culture. Also, what is known as "unconscious cerebration" robs many intelligent acts of their claim to be the result of conscious intent.

I may shortly refer to the general custom of circumcision amongst many of the tribes of the Australian aborigines. This naturally is a custom closely associated in the mind with Jewish rites, and the question arises, Can there be any racial connection in the matter? Some ethnologists have advanced the opinion that in the remote past there was a great African-Austro-Malayan centre of development of the human race. At this period of extreme antiquity there was probably a much greater distribution of land in the southern hemisphere than at present, and that there probably existed continents, now submerged, making communication between Australasia and Africa much easier. A reviewer of Wallace's "Malay Archipelago" in the "Anthropological Review" for 1869 writes:—"We shall not be surprised if in Madagascar be found the key to the problem of the relationship of the races of the Malayan Archipelago. If the dark and light tribes of this great island are sprung from the same stock, the same must be true of the dark and light races of the Archipelago. While, therefore, in the aborigines of Australia we may perhaps have the most direct issue of the primitive stock from which these races have sprung, we see in the tribes of Madagascar the secondary human centre from which both Malays and Papuans have branched off." The Rev. W. Ellis was struck with the Polynesian characteristics of the Hovas of Madagascar, and many observers, amongst whom may be mentioned Prof. Huxley, have maintained that the Papuans are more closely allied to certain African than to other races. The curious phenomenon has been referred to by some writers of the existence side by side of dark and light races at various remotely separated points around the basin of the Indian Ocean. Such were the light and dark hill tribes of India, the light and dark races of the Malayan Archi-

pelago, the Hovas and dark tribes of Madagascar, the Hottentots and Kaffirs, and the light and dark people of Semitic origin with African affinities. If in the remote dawn of the appearance of man on the earth the so called Semitic races had their earliest progenitors from amongst this great southern anthropological centre, of which the Australian aborigines are amongst the most primitive examples, it is a curious coincidence that a certain rite should be common to both notwithstanding their present great racial separation. If the theory may be allowed that the rites and customs of the Australian aborigines are the results of unconscious cerebration resulting from the action of a succession of stimuli on a certain pre-disposed nervous organisation, may it also be conceded that a similar underlying strain of nervous organisation exists also in the Semitic races. If the Australian aborigines and the Semitic peoples should have even this remote anthropological connection, it is conceivable that they would respond in a similar manner under certain conditions. It is evident that unless the Semitic nervous organization had been *en rapport* with the idea of circumcision, no mandates, however authoritative, would ever have nationalised it as completely as is seen in certain Semitic people.

What is wanted, however, are not theoretical speculations about Australian aborigines and their affinities, but the more prosaic work of collecting and arranging authoritative data. It is to be feared that there will be great difficulties in the way of obtaining these, and it will tax the energies and resources of the Australian anthropological leaders and specialists to initiate a working plan for overcoming these difficulties. Whatever this plan may be, it should be characterised by a uniformity applicable to the whole range of the subject, and it should be pursued with an unswerving steadiness. In the interests of the subject it is to be sincerely hoped that amongst our leaders in Australia may be found one who possesses the genius of organization, and that all others, great or small, will loyally contribute their quota to the best of their abilities and opportunities. If this national work on the Australian aborigines is carried out in a manner worthy of the subject, it will rank as one of the most important contributions to ethnological science.

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NOVEMBER, 1898.

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Election.

HONORARY FELLOWS.

- 1893. *COSSMANN, M., Rue de Maubeuge, 95, Paris.
- 1897. *DAVID, T. W. E., B.A., Professor of Geology Sydney University, New South Wales.
- 1897. *DENNANT, JOHN, F.G.S., Inspector Technical Schools, Camberwell, Victoria.
- 1876. ELLERY, R. L. J., F.R.S., F.R.A.S., late Government Astronomer Victoria, The Observatory, Melbourne, Victoria.
- 1890. *ETHERIDGE, ROBERT, Director Australian Museum, Sydney.
- 1893. GREGORIO, MARQUIS DE, Palermo, Sicily.
- 1855. HULL, H. M., Hobart, Tasmania.
- 1897. *MAIDEN, J. H., F.L.S., F.C.S., Director Botanic Gardens, Sydney, New South Wales.
- 1898. *MEYRICK, E. T., B.A., Ramsbury, Hungerford, Wiltshire, England.
- 1876. RUSSELL, H. C., B.A., F.R.S., F.R.A.S., Government Astronomer New South Wales, Sydney, New South Wales.
- 1894. *WILSON, J. T., M.D., Professor of Anatomy Sydney University.

CORRESPONDING MEMBERS.

- 1881. BAILEY, F. M., F.L.S., Colonial Botanist, Brisbane, Queensland.
- 1881. *CLOUD, T. C., F.C.S., Manager Wallaroo Smelting Works, South Australia.
- 1880. *FOELSCHE, PAUL, Inspector of Police, Palmerston, Northern Territory, South Australia.
- 1893. *MCKILLOP, REV. DAVID, S.J., late Daly River Mission, Northern Territory.
- 1886. NICOLAY, REV. C. G., Fremantle, W.A.
- 1883. *STIRLING, JAMES, Government Geologist, Victoria.
- 1893. *STRETTON, W. G., Palmerston, Northern Territory.

FELLOWS.

- 1874. ANGAS, J. H., Adelaide, South Australia.
- 1897. *ASHBY, EDWIN, Adelaide, South Australia.
- 1887. BAGOT, JOHN, Adelaide, South Australia.
- 1893. *BEDNALL, W. T., Adelaide, South Australia.
- 1887. *BLACKBURN, REV. THOMAS, B.A., Woodville, South Australia.
- 1884. BOETTGER, OTTO, Adelaide, South Australia.
- 1886. *BRAGG, W. H., M.A., Professor of Mathematics University of Adelaide, South Australia.

1883. *BROWN, H. Y. L., F.G.S., Government Geologist South Australia
Adelaide.
1882. BROWNE, L. G., Adelaide, South Australia.
1897. *BROWNE, J. H., North Adelaide, South Australia.
1893. BRUMMITT, ROBERT, M.R.C.S., England, Kooringa, South
Australia.
1884. BUSSELL, J. W., F.R.M.S., North Adelaide, South Australia.
1879. *CLELAND, W. L., M.B., Ch.M., J.P., Colonial Surgeon, Resident
Medical Officer Parkside Lunatic Asylum, Lecturer on
Materia Medica University of Adelaide, Parkside, South
Australia.
1876. (L) COOKE, E., Commissioner of Audit South Australia, Adelaide,
South Australia.
1895. COOKE, JOHN H., Adelaide, South Australia.
1887. *DIXON, SAMUEL, Adelaide, South Australia.
1876. DOBBIE, A. W., Adelaide, South Australia.
1896. DRUMMOND, J. H. G., M.D., Moonta.
1893. DUDLEY, U., Drake, N.S.W.
1890. *FAST, J. J., F.G.S. (Corresponding Member, 1884), Adelaide.
1886. FLEMING, DAVID, North Adelaide, South Australia.
1882. FOWLER, WILLIAM, Melton, Yorke's Peninsula, South Australia.
1889. FRASER, J. C., Adelaide, South Australia.
1880. *GOYDER, GEORGE, JUN., F.C.S., Government Analyst South
Australia, Adelaide, South Australia.
1887. GRASBY, W. C., F.L.S., Grenfell-street, Adelaide, South Australia.
1896. GREENWAY, THOMAS J., East Adelaide.
1896. HAWKER, E. W., LL.B., B.A., F.G.S., Gladstone Chambers,
Adelaide.
1891. *HOLTZE, MAURICE, F.L.S., Director Botanic Gardens, Adelaide
(Corresponding Member, 1882), Adelaide, South Australia.
1883. *HOWCHIN, WALTER, F.G.S., Goodwood East, South Australia.
1898. HUGHES, SAMUEL, B.Sc., Registrar School of Mines, Adelaide.
1893. JAMES, THOMAS, M.R.C.S., England, Moonta, South Australia.
1896. JONES, J. W., Conservator of Water, Adelaide.
1853. (r) KAY, ROBERT, General Director and Secretary South Australian
Public Library, Museum, &c., Adelaide, South Australia.
1894. KERSHAW, JAMES A., Entomologist National Museum, Melbourne.
1898. *KOCH, MAX, Mount Lyndhurst, Far North.
1897. LEA, A. M., Col. Entomologist, Perth, W.A.
1884. LENDON, A. A., M.D., M.R.C.S., Honorary Physician Children's
Hospital, North Adelaide, Adelaide, South Australia.
1856. LLOYD, J. S., Adelaide, South Australia.
1888. *LOWER, O. B., F. Ent. S., Broken Hill, N.S.W.
1885. *LUCAS, R. B., Adelaide, South Australia.
1874. MAYO, G. G., C.E., Adelaide, South Australia.
1888. MOLINEUX, A., F.L.S., Secretary Central Agricultural Bureau
South Australia, Kent Town, South Australia.
1897. *MORGAN, A. M., M.B., Ch.B., Adelaide.
1859. (L) MURRAY, DAVID, Adelaide, South Australia.
1884. MUNTON, H. S., Brighton, South Australia.
1896. PARKER, THOMAS, C.E., F.G.S., Rockhampton, Queensland.
1893. PERKS, R. H., M.D., F.R.C.S., Adelaide, South Australia.
1883. PHILLIPS, W. H., Adelaide, South Australia.
1886. POOLE, W. B., Adelaide, South Australia.
1892. PRIESTLEY, P. H., Unley Road, Parkside.
1898. PURDIE, ALEX., M.A., Lecturer on Metallurgy School of Mines,
Adelaide.

1885. *RENNIE, H. E., M.A., D.Sc., F.C.S., Professor of Chemistry University of Adelaide.
1876. *RUTT, WALTER, C.E., Assistant Engineer-in-Chief, Adelaide, South Australia.
1891. SELWAY, W. H., JUN., Adelaide, South Australia.
1893. SIMSON, AUGUSTUS, Hobart, Tasmania.
1857. SMEATON, THOMAS D., Blakiston, Littlehampton, South Australia.
1871. SMITH, ROBERT BARR, Adelaide, South Australia.
1881. *STIRLING, EDWARD C., C.M G , M.A., M.D., F.R.S., F.R.C.S., Lecturer on Physiology University of Adelaide, Director South Australian Museum, Adelaide, South Australia.
1893. *STREICH, VICTOR, F.G.S., Windanya, W.A.
1876. *TATE, RALPH, F.G.S., Professor of Natural Science, University of Adelaide.
1886. *TEPPER, J G.O., F.L.S., Entomologist South Australian Museum (Corresponding Member, 1878), Adelaide, South Australia.
1898. *TORR, W. G., LL.D., Way College.
1894. *TURNER, A. JEFFERIS, M.D., Brisbane.
1889. VARDON, JOSEPH, J.P., Adelaide, South Australia.
1878. *VERCO, JOSEPH C., M.D., F.R.C.S., Lecturer on Therapeutics University of Adelaide, Adelaide, South Australia.
1883. WAINWRIGHT, E. H., B.Sc., St. Peter's College, South Australia.
1878. WARE, W. L., Adelaide, South Australia.
1859. WAY, RIGHT HON. SAMUEL J., D.C.L., Chief Justice and Lieutenant-Governor South Australia, Adelaide, South Australia.
1882. *WHITTELL, HORATIO, M.D., M.R.C.S., F.R.M.S., President Central Board of Health and City Coroner, Adelaide, South Australia.
1886. *ZIETZ, A. H. C., F.L.S., Assistant Director South Australian Museum, South Australia.

ASSOCIATE.

1895. CLELAND, JOHN B , Parkside, South Australia.
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APPENDICES.

FIELD NATURALISTS' SECTION
OF THE
Royal Society of South Australia.

FIFTEENTH ANNUAL REPORT OF THE
COMMITTEE,

BEING FOR THE YEAR ENDING SEPTEMBER 30, 1898.

Evening Meetings.—Eight evening meetings have been held, at which papers or lectures have been given as under:—

- 1897.
- Oct. 19—"Seven Hundred Miles through Western Australia," Mr. S. Smeaton, B.A.
 - Nov. 16—"The Sun as the Sole Support of all Terrestrial Life," Mr. J. G. O. Tepper, F.L.S.
- 1898.
- April 19—Meetings of the Science Congress at Sydney, held January, 1898—Mr. M. S. Clark, Mr. S. Smeaton, B.A., Mr. W. H. Selway, jun.
 - May 17—Meetings of the Science Congress at Sydney, held January, 1898—Mr. W. H. Selway, jun. "The Influence of Vegetation on Climate and the Rainfall," Mr. J. G. O. Tepper, F.L.S.
 - June 21—"How Animals elude their Enemies," Mr. S. Smeaton, B.A.
 - July 19—"An Appeal for Scientific Workers on the Coleoptera," Rev. T. Blackburn, B.A.
 - Aug. 16—"The Origin, Growth, and Decline of Mountain Ranges," Mr. W. Howchin, F.G.S.
 - Sept. 20—"Annual Meeting, Chairman's Address, Mr. M. Symonds Clark.

From this list it will be seen that the addresses have covered perhaps a wider range even than usual. It is hoped that the Rev. T. Blackburn's appeal for scientific workers in the Coleoptera will meet with some response, as there are so few engaged in this important branch of Natural History in the Australian

Colonies. At another meeting it was mentioned that Major Reinbold, of Germany, was anxious to secure from these shores specimens of minute or parasitic algae, and would be glad of correspondents in this colony.

Exhibits have formed, as usual, a prominent and interesting feature of the evening meetings. Amongst those shown during the year were some rare shells, including *Callochiton platessa*, and *Ephippodonta McDougalli*, from Port Willunga (this being a new locality for these shells). The egg of the Kiwi (*Apteryx Bulleri*) ; the fossil teeth of *Diprotodon australis*, found at Fulham, near Adelaide. Many flowering plants from the Port Elliot district, including *Claytonia corrugolacea* (new locality), and the Alga, *Nitophyllum caulescens* (new species in 1897); pressed plants from Central Australia, besides scale-insects, birds, beetles, moths, butterflies, and marine specimens were amongst the exhibits shown at these meetings.

At the first evening meeting in 1898 the members of the Section did Mr. W. H. Selway, jr., the honour to present him with a handsome travelling bag as a memento of his services as Honorary Secretary for some years.

Excursions.—To many members the out-door meetings form the most attractive feature of the Section's operations, and, as we are essentially a *Field Club*, this is, perhaps, not to be wondered at. The following is a list of the twelve excursions made during the year :—

Date.	Place.
1897.	
Oct. 9	Montacute.
" 23	Aldgate.
Nov. 15	Port Noarlunga.
Dec. 11	National Park (Long Gully).
1898.	
March 19	Dredging off Semaphore.
April 23	Dredging Port River.
May 14	Highbury, and Messrs. C. F. Newman & Sons' Nursery, near Houghton.
June 20	(Whole day) Marino.
July 23	(Excursion to Athelstone arranged, but not held owing to inclement weather).
Aug. 13	Anstey's Hill and Messrs. Newman's Nursery.
Sept. 1	(Whole day) Field's River, via Reynella.
" 24	Tea Tree Gully.

Of the above the trip to Port Noarlunga was the longest, but the weather then was too hot to render energetic investigations at all agreeable, although geology and conchology received some attention. A new locality was found in the walk down Field's River from Reynella, when a pleasant and instructive day was spent in geological study. The largest attended excursion

was that to Montacute, when geology was again in the ascendant and the scene of the old gold mine at that place was viewed with interest. For botanical results the visit to Aldgate was the most successful, when quite a dozen distinct species of orchids were found, including *Thelymitra grandiflora*, *T. urnalis*, *T. ixoides*, and *Calochilus Robertsoni*. Other flowers then seen were *Baeckea diffusa* and a white variety of *Kennedyia prostrata*. *Conospermum patens* was found at Highbury on May 14, and the orchid *Diuris maculata*, was gathered in the same locality on August 13. On various excursions bird-life received some attention, but no outing especially for this purpose was made. Before going into summer recess a picnic excursion was made in December last to the upper portion of National Park, when the opportunity was taken of explaining to present members the history of the successful efforts made by this Section in past years to obtain Government Farm vested in trustees for the public benefit. The experiment of continuing the excursions right through the winter months was again tried with success, only one engagement, that fixed for July, falling through on account of inclement weather. The attendance at both indoor meetings and excursions has been well maintained during the year.

Protection of our Native Fauna and Flora.—A separate report deals with this important branch of the Section's work. It will be seen therefrom that the consideration of the Bill for the Protection of Birds has been the chief feature of this year's efforts.

Rules.—During the year a revised edition of the Rules of the Section has been printed and distributed to the members.

Sydney Science Congress.—Several members of this Section had the privilege of attending the meetings of the Australasian Association for the Advancement of Science, held in Sydney in January last, and derived much profit and pleasure from their visit.

Obituary.—Your Committee regret to have to record the death since last annual meeting of Messrs. T. Fabian and T. Evans, who were Foundation members of the Section, and who audited its accounts for many years past.

Financial.—The subscriptions, as in the two previous years, have considerably exceeded the disbursements, and the Parent Society, therefore, continues to benefit financially by the Section's existence.

Membership.—More new members have joined than in the previous year, whilst more names have also been removed from the roll, so that the membership continues stationary. The number now on the list is 87.

M. SYMONDS CLARK, Chairman

W. H. SELWAY, JUN., Hon. Secretary.

Adelaide, September 19, 1898.

TENTH ANNUAL REPORT OF THE NATIVE FAUNA
AND FLORA PROTECTION COMMITTEE, TO BE
PRESENTED TO THE ANNUAL MEETING OF
THE FIELD NATURALISTS' SECTION OF THE
ROYAL SOCIETY OF SOUTH AUSTRALIA, 20TH
SEPTEMBER, 1898.

The Committee have met three times only in the past year; but a great deal of attention has been given by members to the Birds and Other Animals Protection Bill. The late Minister of Education had promised to take charge of the Bill, which was printed by the Government, and the Committee had hoped that it might be passed by the last session of Parliament. Dr. Cockburn obtained leave for its introduction, but unfortunately did not proceed further with it.

The Secretary had an opportunity of handing to Mr. A. J. Campbell, of Melbourne, whose articles on "Australian Birds" in the *Australasian* are well known, a copy of the Bill, and he suggested alterations in some of the vernacular names in the first schedule (which the Committee decided should be embodied therein as alternative names), to make them agree with those adopted by the Committee of the Australasian Association for the Advancement of Science.

Recently a legal gentleman occupying a high position in Adelaide, who takes a very warm interest in the preservation of our birds, recommended several alterations in the Bill, the chief of which was the elimination of all reference to "other animals," and the change of the title to "The Birds' Protection Bill." The Bill was printed in its new form, and sent to the Secretary of the Society for the Protection of Birds, who forwarded it to this Committee. The phraseology had been altered, making it more concise and otherwise improving the Bill. After carefully considering it, the Committee, though regretting the omission of the protection to "other animals," which would have been afforded by their own Bill, decided to accept it, subject to a few alterations. The Committee hope that this Bill will be speedily introduced, so that it will become law this session.

In the opinion of the Committee this question becomes daily of more importance, and recent action in Germany, France, and America shows the imperative necessity for protective legislation without which it is hopeless to expect the preservation of many invaluable birds, whose destruction of insect pests tends so much to the successful cultivation of our vegetable products. But the Committee feel that unless supported by public opinion the best legislation is liable to be inoperative.

SAMUEL DIXON, Chairman.

Adelaide, September 19, 1898.

FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF SOUTH AUSTRALIA.

RECEIPTS AND DISBURSEMENTS FOR THE YEAR, 1897-8

Audited and found correct,

J. S. LLOYD,
J. W. BUSSELL, } Auditors.

Adelaide, 19th September, 1898.

W. H. SELWAY, JUN.,
Hon. Secretary and Treasurer.

ASTRONOMICAL SECTION
OF THE
Royal Society of South Australia.

SIXTH ANNUAL REPORT.

In submitting this report, the Committee congratulate their fellow-members on the continued success of the Section as a society, the roll showing a slight increase in strength, notwithstanding some having dropped out by reason of not paying their subscriptions under Rule XI.

Five general meetings have been held during the past year, one of which was devoted to viewing the stars by the aid of the Equatorial in the dome of the Observatory; another being entirely given up to the discussion of the subject of a Bill then before Parliament, by which it was proposed to make an alteration in the standard time of the colony, and which, by a resolution of the Legislative Council, had been referred to the Astronomical Section for a report thereon. This meeting was held on the 25th August, 1898, and was largely attended, and the following resolution unanimously carried:—"That if in the commercial interest of South Australia any change is desirable, it should be in the alteration of the nominal hours of business rather than in the present standard time, which is part of an almost universal system."

This resolution was embodied in a report, and immediately thereafter forwarded to the Honorable the Chief Secretary as the report of the Section on the said Bill.

The Committee met five times during the past year.

Papers on the following subjects have been read:—

"The New Astronomy." Lady Brown.

"Time and its Measurement." Sir Charles Todd, F.R.S.

"Is it probable there can be a Second Moon to the Earth?"

Capt. Lee.

These and other cognate subjects have been discussed at the General Meetings.

The Astronomical Notes (which have been issued to members monthly since July, 1895) have during the past year proved as instructive as in former years, their publication being one of the bulwarks of the Society.

Circulars have been sent to members, inviting them to forward subjects for discussion, and the question-box is still open to those desiring information on any subject.

Adopted at the Annual Meeting of the Society, held at the Adelaide Observatory, on the evening of Tuesday, 11th October, 1898.

C. TODD, President.

W. E. CHEESEMAN, Hon. Secretary.



ASTRONOMICAL SECTION OF THE ROYAL SOCIETY, SOUTH AUSTRALIA

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BALANCE-SHEET FOR YEAR ENDING, 30th SEPTEMBER, 1898.

| RECEIPTS.                   | £ s. d.     | EXPENDITURE.                 | £ s. d.     |
|-----------------------------|-------------|------------------------------|-------------|
| To Balance, September, 1897 | ... 22 10 6 | By Royal Society ...         | ... 17 10 0 |
| “ Subscriptions ...         | ... 10 0 0  | “ Postage ...                | ... 2 19 6  |
| “ Interest ...              | ... 0 9 7   | “ Stationery ...             | ... 0 14 0  |
|                             |             | “ Advertising ...            | ... 0 6 6   |
|                             |             | “ Printing Monthly Notes ... | ... 2 8 0   |
|                             |             | “ Balance ...                | ... 9 2 1   |
|                             |             |                              | £33 0 1     |

Read at annual meeting, 11th October, 1898, and adopted.

W. E. CHEESEMAN, Secretary and Treasurer.  
C. TODD, President.  
Audited and found correct,  
RICHARD F. GRIFFITHS.

## GENERAL INDEX.

[Generic or specific names printed in italics are described as new

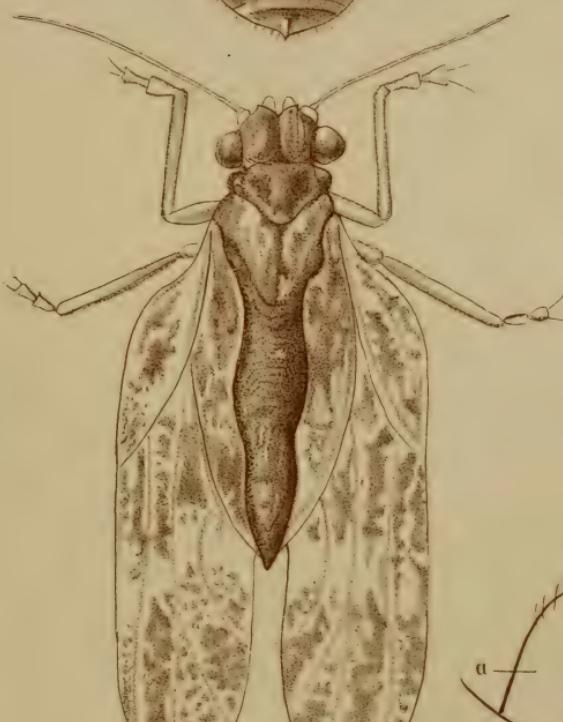
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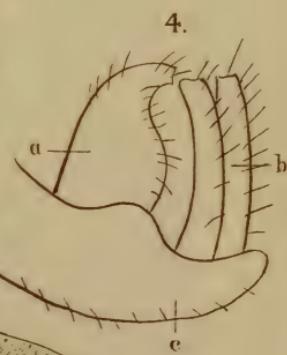




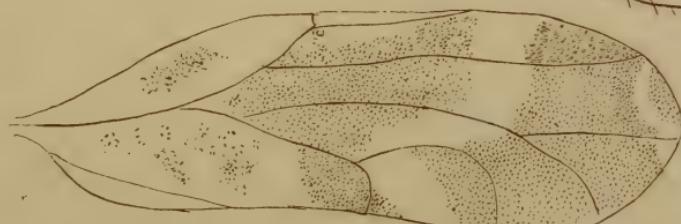
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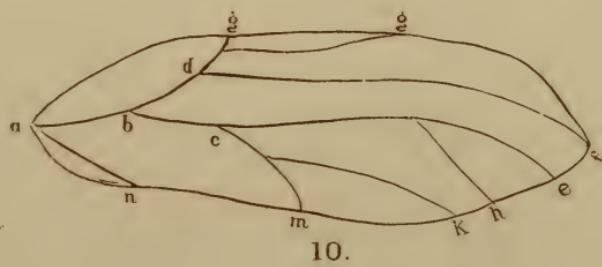
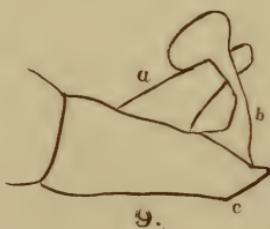
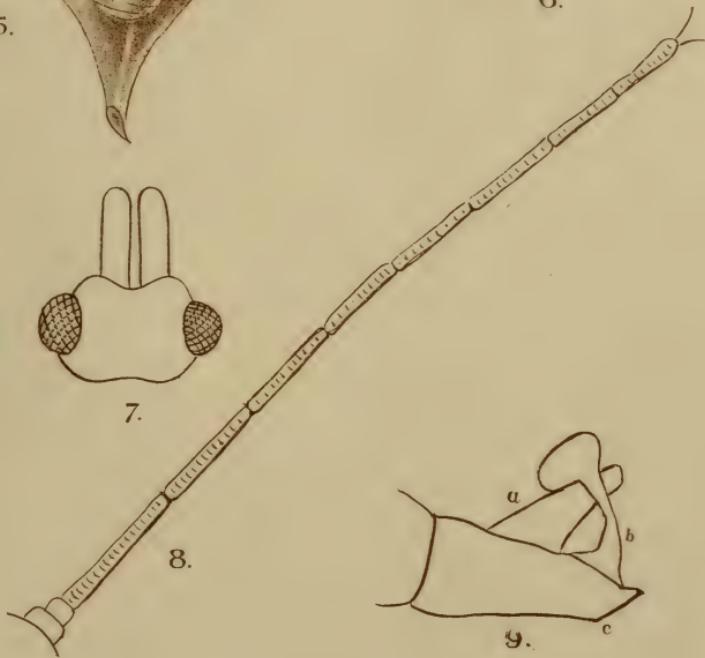
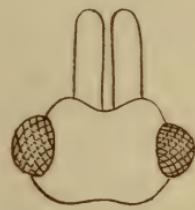
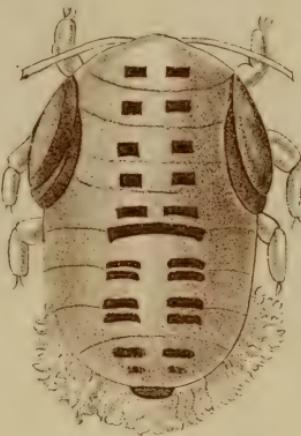
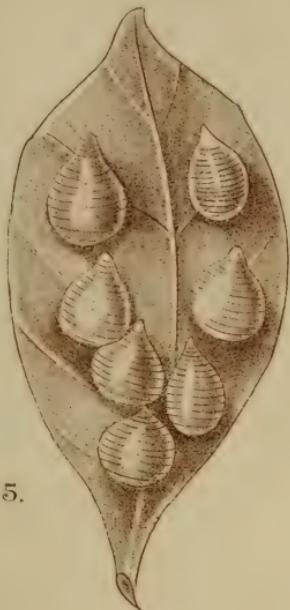


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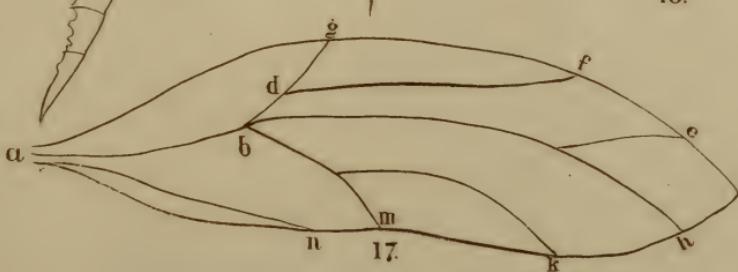
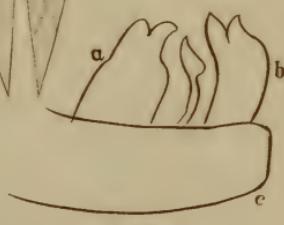
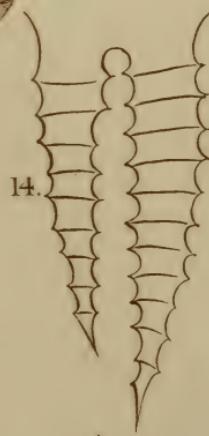
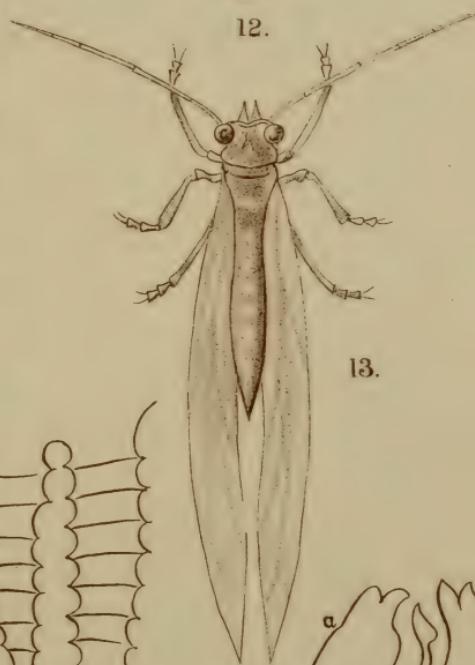
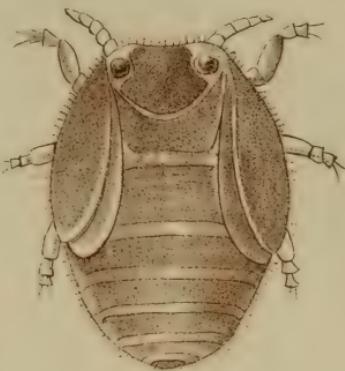
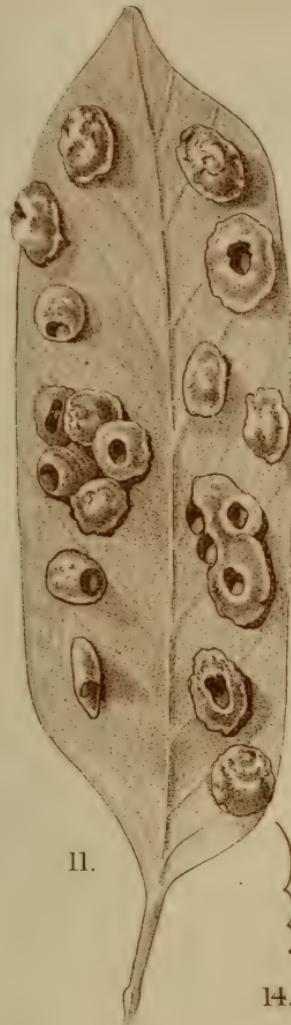


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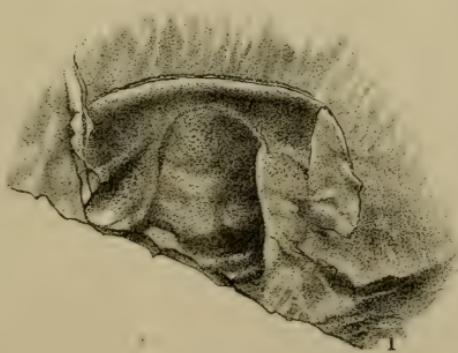




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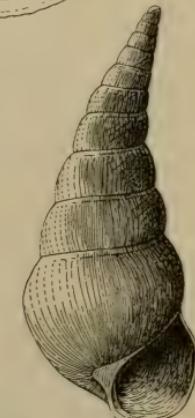
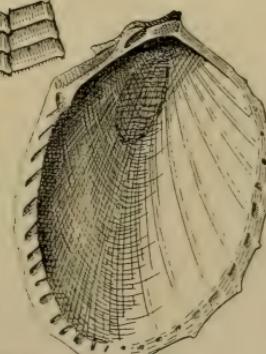
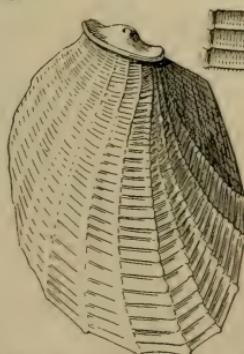
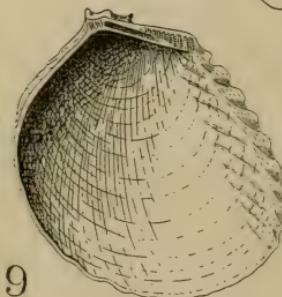
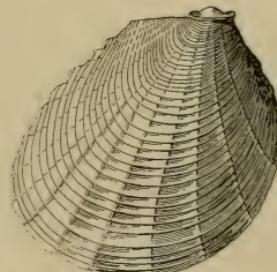
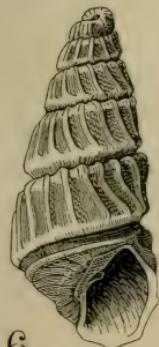
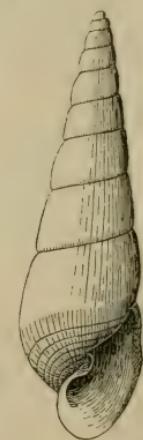
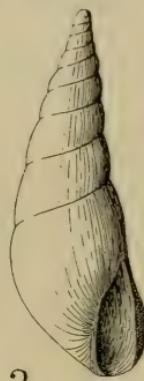
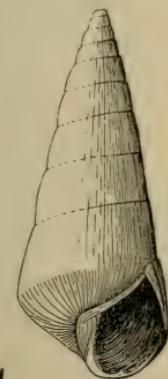
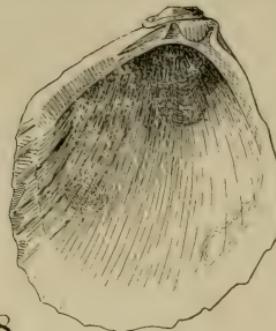
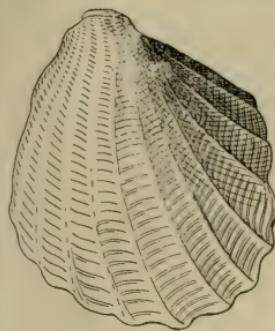


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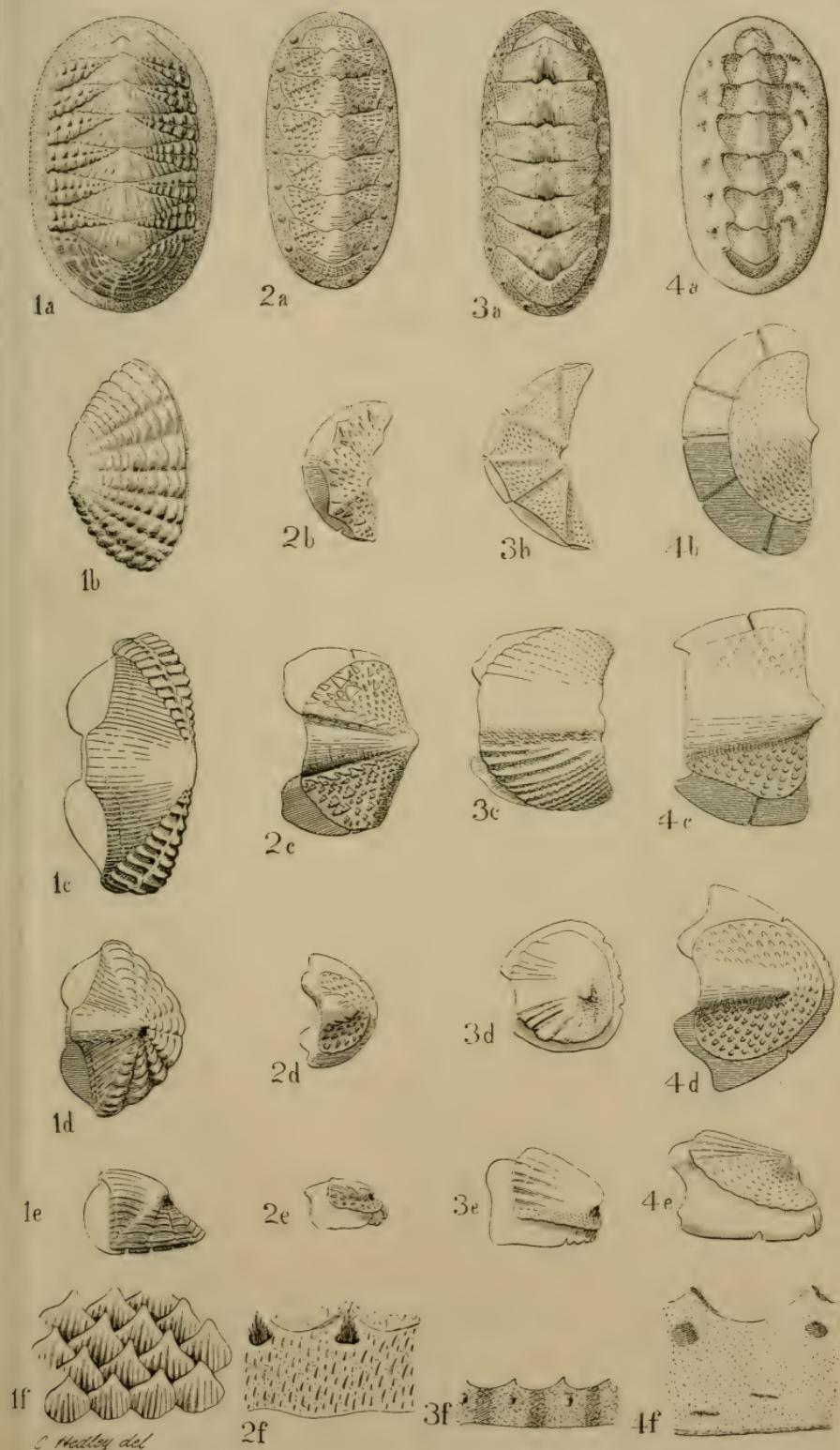
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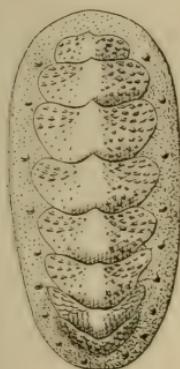




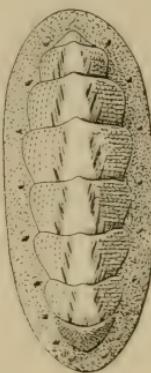




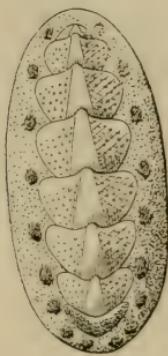




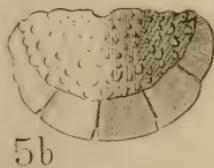
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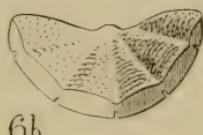
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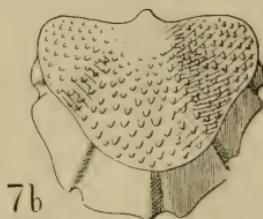
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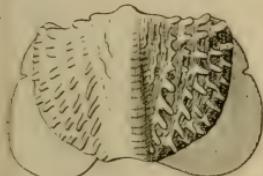
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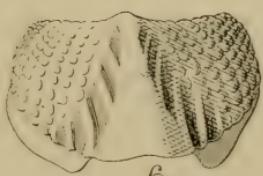
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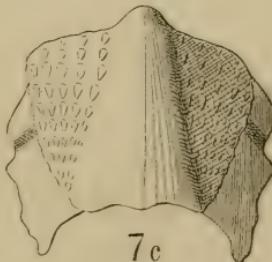
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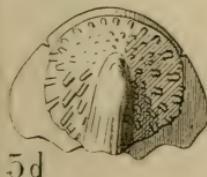
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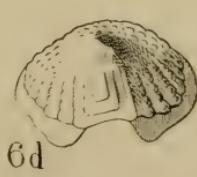
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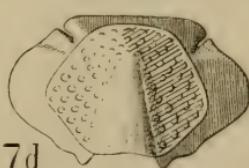
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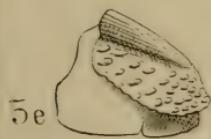
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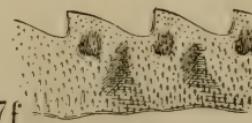
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OF THE

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7256

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VOL. XXII., Part I.

[WITH FOUR PLATES.]

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