

AUSTRALASIAN ANTARCTIC EXPEDITION

1911-14.

UNDER THE LEADERSHIP OF SIR DOUGLAS MAWSON, D.Sc., B.E.

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SCIENTIFIC REPORTS.

SERIES C.—ZOOLOGY AND BOTANY.

VOL. V. PART 8.

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# THE INSECTS OF MACQUARIE ISLAND

BY

R. J. TILLYARD, M.A., D.Sc., F.L.S., F.E.S.,

WITH APPENDICES

BY

PROFESSOR C. T. BRUES, Ph.D., AND A. M. LEA, F.E.S.,

WITH TWENTY-ONE TEXT-FIGURES.

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# THE INSECTS OF MACQUARIE ISLAND.

By R. J. TILLYARD, M.A., D.Sc., F.L.S., F.E.S.

With Appendices describing a new Hymenopteron, by Professor C. T. BRUES, Ph.D., Bussey Institute, Forest Hills, Boston, Mass., U.S.A., and a new Coleopteron, by A. M. LEA, F.E.S., Entomologist to the South Australian Museum, Adelaide, South Australia.

(With twenty-one figures in the Text.)

## INTRODUCTION.

THE small collection of insects brought back by the Mawson Antarctic Expedition was made by Mr. H. Hamilton, Biologist to the Macquarie Island Party. All the insects were collected on Macquarie Island between May, 1912, and November, 1913. The collection was handed to me for study in February, 1917, by Professor W. A. Haswell, M.A., D.Sc., F.R.S., to whom I desire to express my best thanks for offering me the chance of working out the material collected.

For the Lent Term, 1917, I was granted leave by the Council of the Linnean Society of New South Wales to act temporarily as Lecturer and Demonstrator in Zoology in the University of Sydney, in order to fill a vacancy caused by war conditions. The opportunity was taken to work out this Antarctic material during those three months. The delay in completion of the work has been entirely due to the difficulty of getting specialists to work out some of the obscure groups represented. My best thanks are due to Professor Brues for a very excellent description of a new Diapriid, accompanied by a finely executed figure, and to Mr. Arthur M. Lea, the well-known Coleopterist, for a description of an obscure Staphylinid. These descriptions will be found in Appendices A and B of this paper respectively.

The collection also contained some obscure *Cyclorrhaphous Diptera* in the form of three species of kelp-feeding flies, which could only be satisfactorily dealt with by a recognised expert in such groups. After some delay, these were forwarded, through Professor Brues, to Mr. F. Knab, at Washington. No acknowledgment of their safe arrival came to hand from the latter gentleman; and it was not until some time later that I learnt of Mr. Knab's illness and death, which has been so great a loss to the science of entomology. Having now to face the possibility of much further delay in securing the return of these specimens, and in getting another expert to undertake the working out of the material, I have finally decided to exclude the *Diptera Cyclorrhapha* from this paper, and to put the results, which have been in my hands for some time, together into the form of a single whole for publication.

It will readily be seen that a somewhat random collection of obscure insects of the kind here represented cannot be adequately dealt with by any single entomologist, even if the material is presented to him in the best possible condition of preservation for the study of the various groups. It was clear to me from the very first that I could only deal with certain groups myself, and would have to rely on the co-operation of recognised specialists for the working out of the remainder. The Collembola appealed to me as a group in the knowledge of which much progress has been made during the past twenty years, and on which, with practically all the important literature within reach, I might reasonably venture to try my hand, though without previous experience of the somewhat special technique required. There were also some larval and pupal forms in other Orders, which I have undertaken to figure and describe, seeing that such forms do not demand that extensive knowledge of the groups to which they belong, which would be necessary as an equipment before one could deal with the corresponding imagines (not represented in the collection). I have also figured and discussed, without naming, a small species of *Psychoda* (Diptera Nemocera) found in one of the tubes, but not noted as belonging to its contents by the collector, who may be presumed to have known what was put into each tube. I think that this insect was probably floating in the liquid medium poured into the tube, and may therefore have come originally from any part of the world, or may have bred out from the ship's bilge-water. It is certainly not like any of the species of this genus known to me from Australia.

Besides this, I have, at Professor Brues's own suggestion, added some remarks about his new Diapriid, together with figures which I made before sending the insect to him. I have also given a figure to illustrate Mr. Lea's description of his new Staphylinid, and have added a short description and figures of the larva, which was found with the beetle itself on the island.

The collection contains no set or pinned specimens, but consists only of nineteen small tubes of material preserved in liquid media, some being in 4 per cent. formalin, and some in 70 per cent. alcohol. Five of the tubes were found to contain material such as mites, crustacea, egg-capsules and eggs, which could not be dealt with in this paper. Thus there remained only fourteen tubes containing insect specimens. Of these, only nine contain imagines, the rest being larvæ or pupæ.

The Orders represented are the following :—

COLLEMBOLA.—Three species.

HYMENOPTERA.—One species.

COLEOPTERA.—One species (larva and imago).

LEPIDOPTERA.—One species (larva only).

DIPTERA.—Six species, one of which is represented only by larvæ and pupæ.

In order to visualise the conditions under which this insect fauna was collected, it is only necessary to refer to the chapters on Macquarie Island in Sir D. Mawson's

magnificent volume, "The Home of the Blizzard." In this paper it will be quite sufficient to give such details of the island as will make the positions of the various collecting places quite clear, or such as bear specially upon some point of interest in connection with the actual insects collected.

Macquarie Island is situated in latitude  $54^{\circ} 37'$  South, longitude  $158^{\circ} 34'$  East. It is very hilly, the highest point rising nearly 1,500 feet above sea-level. There are no trees; but the hill-sides are clothed in dark-green tussock-grass, scattered through which are patches of the more brightly coloured Maori Cabbage (*Stilbocarpa polaris*). One of the striking features of the island is the penguin rookeries, on the sites of which the vegetation becomes completely destroyed. Some of the insects in the collection were taken from under stones in these rookeries. Another feature of the island is the immense masses of kelp which are cast ashore after every burst of heavy weather. In the rotting kelp, various species of Diptera breed; and their larvæ form the principal diet of the introduced Maori Hens or Wekas.

The Expedition Hut of the Macquarie Island Party was situated on the lee side (east) of a small peninsula, which forms the extreme northern end of the island, and is known as the North Head Peninsula. This peninsula is about three-quarters of a mile long by one-quarter of a mile wide, and is connected with the main portion of the island by a sandy spit, uncovered except during very heavy weather. The wireless station was erected on the top of this peninsula.

The following are the positions of the various localities mentioned in the notes written on slips of paper by the collector, and wrapped around each separate tube of specimens:—

"North End" refers to the vicinity of the Hut.

"West Point" is at the north-west extremity of the island.

"Aerial Cove" lies directly below the wireless station, on the western side of Wireless Hill.

"Garden Bay" is not mentioned in Mawson's book. But, as the only Victoria Penguin rookery mentioned therein was close to the hut, and as an attempt to grow vegetables was made in the same vicinity, it is fairly certain that the name given by the collector, in association with a rookery of the species of penguin mentioned above, must have been quite close to the hut.

Owing to the methods of preservation, and the long time that has elapsed since the specimens were collected, the material is not, for the most part, in a very satisfactory state for detailed study. This applies especially to the Collembola, in many of which the delicate cuticle has become more or less detached from the underlying parts, rendering the task of determining the form of the ocellar groups and the post-antennal organ a very difficult one. For these specimens I tried three methods of study. Firstly the specimens were very carefully washed, passed up through ascending grades of alcohol,

and finally cleared in clove oil. They were then mounted in the usual way in Canada balsam. Some good results were obtained by this method. A further batch of specimens was macerated in caustic potash, until all the parts had been removed except the cuticle. The latter was then carefully washed, and treated in the same way as the entire insects of the first batch. This method gives excellent results in the study of the ocelli and other minute organs in the larvæ of Neuroptera, but it yielded only poor results with these Collembola, in which the cuticle was much more delicate. Finally, a third batch of specimens was taken and treated with a weak solution of calcium hypochlorite, the bleaching being expedited by the addition of a drop or two of weak hydrochloric acid. The bleached specimens were then allowed to dry off slowly, and were examined *in situ*. By this method the grouping of the ocelli became visible, together with the post-antennal organ, when present.

#### SPECIES ALREADY DESCRIBED FROM MACQUARIE ISLAND.

Although Macquarie Island has been visited by several scientific expeditions, very few insects appear to have been collected there, or, at any rate, few have been described. In November, 1907, the New Zealand Government steamer "Hinemoa" visited the Auckland and Campbell Islands, and landed scientific parties on both groups. Macquarie Island does not seem to have been visited; but, in the excellent publication subsequently issued by the New Zealand Government, entitled "The Sub-antarctic Islands of New Zealand," and based mainly upon the results obtained by these parties of scientists, the authors who have dealt with the various Orders of Insects have included a few from Macquarie Island, so as to make the survey approach as nearly as possible in extent to the demand implied in the title of the book. Thus this publication, issued in 1909, includes all the insects known from the sub-antarctic islands of New Zealand up to that time; and I am not able to trace any new species described from them since. It is necessary to take into account the insects described from all these islands; for, although Macquarie Island lies almost twice as far to the south of New Zealand as do the other groups, yet the possibility of some of the same, or very closely allied, species occurring there is very considerable.

In Vol. I of the above-named publication, the following species are described from Macquarie Island :—

*Order* : COLLEMBOLA.

*Family* : PODURIDÆ.

(1) ACHORUTES VIATICUS TULLBERG.

"On some Sub-antarctic Collembola." Article xvii, by Professor G. H. Carpenter.  
(4\*, p. 377.)

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\* References to the Bibliography on p. 377, are printed in heavy type.

*Order* : DIPTERA.

*Family* : DOLICHOPODIDÆ.

(2) SCHÆNOPHILUS PEDESTRIS, *Lamb.*

“The Diptera of the Sub-antarctic Islands of New Zealand.” Article vii (8, p. 132).  
(Type in the Cambridge Museum, England.)

*Family* : PHYCODROMIDÆ.

(3) CÆLOPA NIGRIFRONS, *Lamb.*

Op. cit. (8, p. 140). (Type in Cambridge Collection.)

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DESCRIPTIONS OF THE INSECTS IN THE COLLECTION.

*Order* : COLLEMBOLA.

*Sub-order* : ARTHROPLEONA.

*Family* : PODURIDÆ.

*Genus* : ACHORUTES, † *Templeton*.

Numerous specimens of a small blue-black species belonging to this genus are present in the Collection. As Professor Carpenter has already recorded the common occurrence on Macquarie Island of the well-known and almost world-wide species *A. viaticus*, Tullberg, it seemed highly probable that the specimens here present belonged to the same species. There was, however, the possibility of an allied species of the same genus also occurring on the Island, either in company with the recorded species, or in some different habitat or locality. I therefore studied a considerable number of specimens, and compared my results with those obtained by Professor Carpenter. The conclusion I have come to is that the species here represented is the same as that studied by him. In most of the specimens studied by me, the anal papillæ are somewhat more elongated than in the figure given by Professor Carpenter (4, p. 378); but this may only be due to the poor state of preservation of the specimens, most of which have the cuticle standing well away from the underlying tissues. My drawings of the post-antennal organ, ocelli, claw, and empodium, and of the dens and mucro of the spring, agree very closely with those of Professor Carpenter, as may be seen by comparing Text-fig. 1, *a-d*, with his figures already referred to.

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† I have followed Carpenter in refusing to recognise Börner's transference (1906) of this well-known name of seventy year's standing, to that hitherto universally known as *Anoura* or *Neanura*. It is high time that a system of *nomina conservanda* should be adopted which should be inviolate from these termitic attacks.

*ACHORUTES VIATICUS*, Tullberg.

(Text-fig. 1.)

Numerous specimens of this almost cosmopolitan species are present in the Collection, in an unnumbered tube.

Collector's note:—"Collembola common on decaying animal and vegetable matter. Macquarie Island." No dates given.

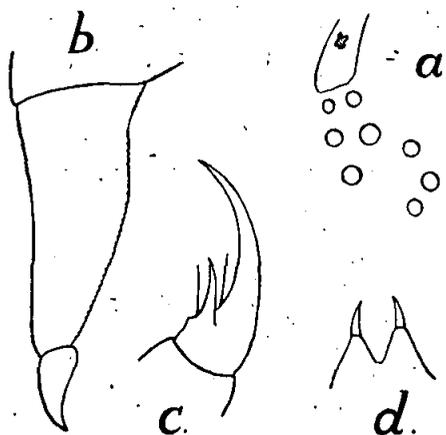


Fig. 1.—*Achorutes viaticus*, Tullberg.

(a) Post-antennal organ and group of ocelli. (b) Dens and mucro of spring. (c) Claw and empodial appendage of hind foot. (d) Anal papille. (All  $\times 330$ .)

A number of these specimens have been mounted on a slide numbered AAE. II, and placed in the Australian Museum, Sydney. Others have been put into Tube No. C. 43 (from which other species originally contained in it have been removed), and have also been placed in the Australian Museum. It is of interest to note that this species has also been taken in Tierra del Fuego.

Family : ENTOMOBRYIDÆ.

Genus : ENTOMOBRYA, Rondani.

= *Degeeria* auct.

This widely distributed genus is easily recognised by the great extent of the fourth segment of the abdomen, the absence of scales, and the presence of a single tenent hair on each foot. A few specimens of a single species from Macquarie Island are present in the Collection. This species appears to be new, and is described herewith.

ENTOMOBRYA MAWSONI, *n.sp.*

(Text-figs. 2-5.)

*Total length* of full-grown specimens, 2.5 mm., omitting antennæ and spring.  
*Depth of abdomen* at its greatest, 0.6 mm.

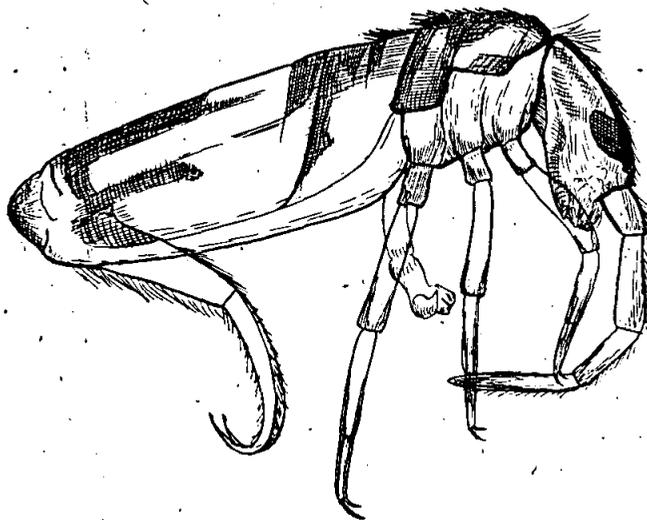


Fig. 2.—*Entomobrya mawsoni* n.sp. Lateral view. ( $\times 34$ .)

Head depressed, narrow, somewhat elongated, the ocelli situated on two very conspicuous patches of black pigment.

*Antennæ* 1.5 mm. long, the terminal joint 0.5 mm. long; very slender, clothed with minute hairs, and with a few long, slender, scattered hairs on the two basal joints. (No post-antennal organ present.)

*Ocelli*, eight on each side, arranged as shown in Text-fig. 3. Four of these ocelli are large, three of medium size, and a single one is very small and difficult to locate.



Fig. 3.—*Entomobrya mawsoni* n. sp. Group of ocelli. ( $\times 200$ .)

*Thorax*, with the mesonotum almost continuous with the head, quite covering the small prothorax, but not overhanging the head. Sides of the meso- and metanotum slightly overhanging the bases of the coxæ.

*Legs*.—Fairly long and slender, with the tarsal claw and empodium well developed; the former with the vestige of a single tooth midway along its inner edge.

*Tenent hair* longer than claw, as shown in Text-fig. 4.

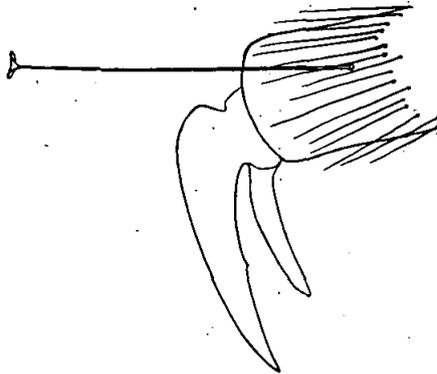


Fig. 4.—*Entomobrya mawsoni* n.sp. Claw, empodial appendage and tenent hair of hind foot. ( $\times 368$ .)

Abdomen with the first three segments short, partially fused, the fourth very long, and fairly distinctly separated off from the rest, the terminal segments very short.

*Spring*, 1.6 mm. long, the manubrium and dentes each about 0.7 mm. long, the mucrones  $28 \mu$  long. In the dead specimens, the dentes are usually much curved, as shown in Text-fig. 2.



Fig. 5.—*Entomobrya mawsoni* n.sp.  
(a) Mucro and portion of dens ( $\times 392$ ). (b) Mucro, more greatly magnified. ( $\times 596$ .)

The microscopic structure of the distal end of the dens, and of the mucro, is shown in Text-fig. 5. The *dens* carries a series of minute crenulations or corrugations on the dorsal edge, and a series of fine short transverse lines arranged close to the ventral edge; both these structures are of the normal type met with in this and other closely allied genera. The hairs of the dens are also of the normal type for this genus, being slightly feathered and fairly stiff. The *mucro* is very short, with both teeth much curved, the dorsal tooth somewhat broader than the terminal, but of about the same length. Between the two teeth there is a very small blunt prominence. Near the base, the mucro carries a stiff *dorsal spine*, not reaching quite to the tip of the dorsal tooth.

*Ventral tube* fairly prominent, 0.4 mm. long when fully extended, usually appearing cylindrical; in the type specimen, an exerted bifid tip is visible.

*Colouration*, a pale semi-transparent yellowish brown, with patches of darker markings. These markings are either dark-brown or blackish, except on the legs, where they appear touched with bluish or purplish. On the head, besides the black eye-patches, there is a slightly darker mid-dorsal band; in the adult, the antennæ are dark brown. On the thorax, there is an irregular, dark, longitudinal, mid-dorsal band, and separate latero-ventral blotches on both meso- and meta-thorax. The legs are darkened on the trochanters, the tips of the femora, the whole of the middle tibio-tarsus, and the distal half or more of the fore and hind tibio-tarsi. On the abdomen, the first three segments have a dark mid-dorsal band, extending obliquely and sharply downwards and backwards along the sides of seg. 3, bordering seg. 4. On the posterior half of seg. 4, are two parallel but irregular dorsal bands, extending laterally downwards and backwards on either side, bordering seg. 5. There is also a dark patch anally.

*Types*:—Holotype, indicated by arrow, and paratype on slide No. AAE. 12, deposited in the Australian Museum, Sydney. A third specimen on slide No. AAE. 13, with paratypes of *Arrhopalites davidi* n.sp. Also two specimens, not mounted, placed in 70 per cent. alcohol, in Tube No. C. 24, with the original collector's labels "C. 24," and "Macquarie Island." All these deposited in the Australian Museum, Sydney.

*Habitat*:—Macquarie Island; collected by H. Hamilton. Collector's note:—"Common under stones in Victoria Penguin Rookery. Garden Bay, Macquarie Island. 20.8.12."

This species is dedicated to Sir Douglas Mawson, Leader of the Australian Antarctic Expedition. It appears to be fairly closely allied to *E. pulchra* Schöff, from Tierra del Fuego. (10.)

*Sub-order*: SYMPHYPLEONA.

*Family*: SMINTHURIDÆ.

*Genus*: ARRHOPALITES, Börner.

The Collection contains a number of mature and immature specimens of a small purplish-black Sminthurid, which appears to fit into this genus, on the following characters:—

*Ventral tube* smooth-walled, without any tubercles. (Sub-family *Sminthuridince*). No clubbed hairs on the distal end of the tibio-tarsus. Fourth joint of antennæ strongly annulated. Dorsal edges of mucro similar in shape.

The only other genera of *Sminthuridæ* recorded from the Sub-antarctic regions are *Sminthurinus* Börner and *Sminthurus* Latr. The former is at once distinguished

from *Arrhopalites* by having the fourth joint of the antennæ simple, without annulations, and the distal end of the tibio-tarsus with clubbed hairs. Both genera belong to the sub-family *Sminthuridinae*. The genus *Sminthurus* Latr., as now restricted, has a ventral tube with tuberculate walls, and also differs from both the above genera in the structure of its antennæ and other characters.

The species of *Arrhopalites* represented in the Collection appears to be new and is described below.

*ARRHOPALITES DAVIDI* *n. sp.*

(Text-figs. 6-8).

*Total length* of mature individual 1.4 mm., omitting antennæ and spring.

*Greatest breadth* (at middle of abdomen) 0.7 mm.

*Head* depressed, broadly oval, somewhat flattened dorso-ventrally.

*Antennæ* with the terminal (fourth) joint longer than the other three taken together, the total length being 0.9 mm., of which the fourth joint occupies 0.5 mm. Basal segment very short, the second about two-thirds as long as the third. A few small scattered hairs of normal structure on these two segments. Fourth segment with twelve or thirteen whorls of small hairs placed at equal intervals apart from base to apex, and indicating the divisions of this segment into separate annuli; apex moderately pointed. In most of the specimens the antenna is strongly bent between the third and fourth joints. (Text-fig. 6a.)

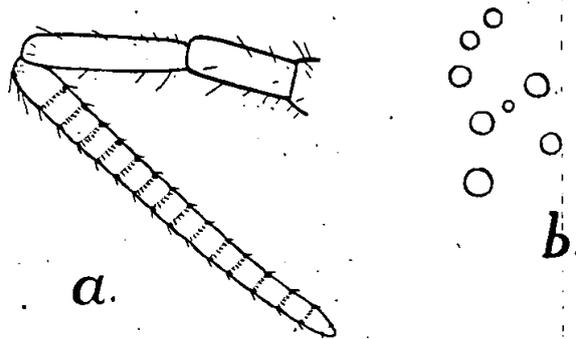


Fig. 6.—*Arrhopalites davidi* *n. sp.*  
(a) Antenna ( $\times 104$ ). (b) Group of ocelli ( $\times 392$ ).

*Ocelli* only visible in bleached specimens, eight on each side, arranged as in Text-fig. 6b. Seven of the ocelli are of medium to large size, the eighth very small and not easy to make out.

*Thorax* and abdomen as usual in this family, the *prothorax* forming a short neck, the rest of the thorax and abdomen forming a compact globular body, with the segmental divisions more or less obliterated, the two terminal segments much smaller, the fifth being of the usual protruding saddle-shaped formation.

*Legs* moderately short, slenderer than the spring; tarsal claws strongly built, sharp, and nearly twice as long as the empodial appendage. (Text-fig. 7.)

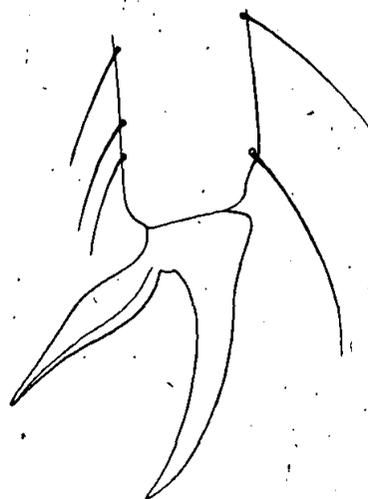


Fig. 7.—*Arrhopalites davidi* n.sp. Claw and empodial appendage of hind foot. ( $\times 368$ .)

*Ventral tube* with long, cylindrical arms of a very pale yellowish grey colour; when fully extended, these arms are about as long as the hind legs, but of somewhat stouter cross-section than the hind femora. The apex of each arm is sharply truncated, each arm being a hollow cylinder serving as the opening of a gland.

*Spring* 0.7 mm. long, the dens and mucro together only slightly longer than the manubrium, as measured in the backwardly directed position in the dead insect. *Mucro* relatively long and slender, about  $140\mu$  long, shaped as shown in Text-fig. 8.



Fig. 8.—*Arrhopalites davidi* n.sp.—Mucro and distal end of dens. ( $\times 368$ .)

*Colouration*.—Deep purplish-black above pale-greyish below; the ventral tube very pale yellowish-grey, the tarsal claws and the mucrones of the spring almost colourless.

**Types.**—Holotype, indicated by arrow, and four paratypes, on slide No. AAE. 13., in company with a specimen of *Entomobrya mawsoni* n. sp. Also a number of paratypes in 70 per cent. alcohol, in tube No. C. 25. All the above placed in the Australian Museum, Sydney.

**Habitat.**—Macquarie Island. Collected by H. Hamilton. Collector's note to tube No. C. 25.—“Jumping Arthropods. Common under stones, in crevices of rock, and under moss. Have tremendous jumping powers when touched. North End, Macquarie Island. 1.19.12 (*sic*). In 70 per cent. alcohol.”

There were also other specimens of this species in a tube numbered C. 43, undated, and without label.

This species is dedicated to Professor T. W. Edgeworth David, C.M.G., D.Sc., F.R.S., Geologist to Sir E. Shackleton's Antarctic Expedition, and Professor of Geology in the University of Sydney.

No other species of this genus is known from Antarctic or Sub-antarctic regions. But a species of the allied genus *Sminthurinus* (*Sm. granulatus* End.) has been recorded from Crozet Island, while the genus *Sminthurus* itself is represented by three species in Tierra del Fuego and by an undetermined species in Kerguelen Island. (5.10.11.)

*Order* : HYMENOPTERA.

*Sub-order* : CLISTOGASTRA OR APOCRITA.

*Division* : VESPIFORMIA.

*Family* : DIAPRIIDÆ.

This family contains small and sometimes wingless Hymenoptera of rather obscure affinities, but usually placed near the beginning of the Vespiformia, and thus coming between the Chalcidoidea and the Ants. To the uninitiated, the wingless species of this family would probably be taken for small Ants; but they differ from the true Ants in many characters, notably in the much more generalised form of the antennæ and the base of the abdomen.

The family may be defined as follows :—

Winged or wingless Vespiformia, with the trochanters two-jointed, but the distal joint difficult to make out, as it is generally closely attached to the femur. Mandibles with three teeth or less situated towards the apex. Antennæ inserted well above the clypeus, near the middle of the face, and usually on a raised frontal prominence, with the more distal joints forming a more or less distinct club; not elbowed, as in the Ants. Fore legs with an antennal comb. Gaster more or less globular. Wings, when present, with or without a basal cell; the marginal vein in the forewing linear, not triangularly thickened. Small or minute insects, generally blackish.

A few specimens of a small wingless species of this family were present in the Collection, in tube No. C. 2\*, to which was attached the following Collector's note:—"Small carib-like (*sic*) beetle, found under stones near sea-coast and in sites of Penguin rookeries. North End, Macquarie Island. 16.8.12. In 70 per cent. alcohol."

Some of these tiny insects were sent by me to Professor W. M. Wheeler of Harvard University, who handed them over to his colleague Professor C. T. Brues. The latter determined them as belonging to a new wingless genus of *Diapriidae*, which he has called *Antarctopria* n.g., the species being described under the name *Antarctopria latigaster* n. sp. The descriptions of both genus and species are given in Appendix A.

Genus: ANTARCTOPRIA n.g. Brues.

ANTARCTOPRIA LATIGASTER n.sp. Brues.

(Text-figs. 9, 10, and 22.)

(Description of genus and species in Appendix A, pp. 27, 28.)

Types.—Holotype in Australian Museum, Sydney, in tube No. Co. 2. Paratypes also placed in tube No. Co. 2 at bottom, separated from type by a strong plug of cotton wool. Other paratypes in Coll. Bussey Institute, Forest Hills, Mass., U.S.A., and in Coll. Tillyard.

The following additional notes on this species are of interest:—

The *antennal comb*, which, as Professor Brues informs me, has not been used for taxonomic purposes in this family, is of very interesting structure. I have shown it

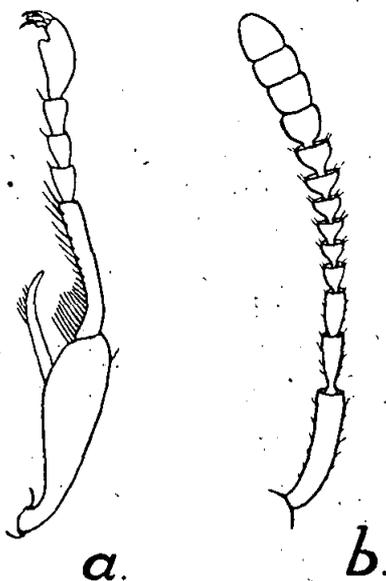


Fig. 9.—*Antarctopria latigaster* n.sp. Brues. Female.  
(a) Fore leg, showing antennal comb ( $\times 108$ ). (b) Antenna. ( $\times 52$ .)

\* It is clear, I think, that the letters accompanying the numerals on the tube-labels were originally intended to indicate the Orders of Insects contained inside; thus C = Collembola, Co = Coleoptera. But the Diptera and Lepidoptera are also placed in tubes marked Co., as well as this little Hymenopteron, which the collector mistook for a Carabid.—R.J.T.

in Text-fig. 9a, and alongside it (Text-fig. 9b) the *antenna*, (at about one-half the magnification of the comb), so that its method of use may be more easily appreciated. The comb is formed by specialisation of the tibia of the foreleg, with its spur, and by the arrangement of the most basally situated setæ of the metatarsus as a series of closely placed bristles, much like the slender teeth of a fine hair-comb. The large curved tibial spur acts as a retinaculum, keeping the antenna pressed close against the row of fine teeth on the comb. The antenna is drawn through the comb from the base upwards. Thus, the base of the antenna being narrow, the insect has no difficulty in inserting it between the retinaculum and the comb, and the cleaning process becomes more effective distally, as the antenna widens out. It is quite likely, also, that the tibial spur may have some power of springing, so that it gives way to the antenna slightly during the passage of the wider distal joints, and then moves back into place when the process is completed.

This process has not, of course, been actually observed in this insect, but may reasonably be inferred from the known action of the comb in other Hymenoptera and from its structure in this species.

Text-fig. 10 gives an outline of the ventral side of the female, showing the ovipositor not projecting beyond the end of the abdomen.

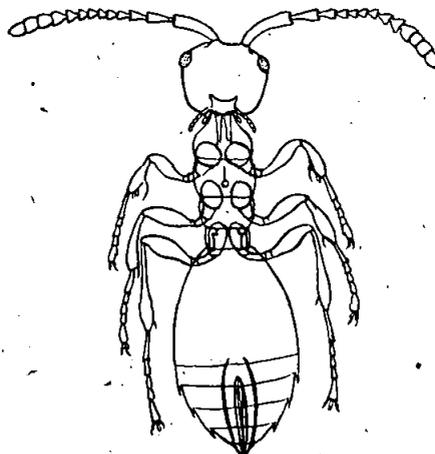


Fig. 10.—*Antartopria latigaster* n.sp. Brues. Female. Ventral view, showing ovipositor. (× 24.)

*Order* : COLEOPTERA.

*Sub-order* : POLYPHAGA.

*Division* : STAPHYLINIFORMIA.

*Family* : STAPHYLINIDÆ.

The Collection included six imagines and about a dozen larvæ of a small Staphylinid Beetle belonging to the genus *Homalium*. Some of these were contained in tube No. Co. 1; to which was attached the following Collector's note :—" Small beetles and larva, common under stones and decaying animal matter. North End, Macquarie

Island. 3.7.12. In 70 per cent. alcohol." Others were in an unnumbered tube, inside which was the following note on a slip of paper:—"Under rotting bones. Macquarie. Nov., 1913. H.H."

A number of these were sent to Mr. A. M. Lea, the well-known Coleopterist of the South Australian Museum, who described the imago as a new species of *Homalium*.

*Genus*: HOMALIUM.

HOMALIUM VARIIPENNE *n.sp.* Lea.

(Text-figs. 11, 12.)

(Description of species in Appendix B, p. 29.)

Type.—Holotype in Australian Museum, Sydney, mounted on card, together with a paratype imago mounted on its back, and a larva also on same card; No. AAE. I4. Co-type and a number of larvæ in tube No. Co. 1, in 70 per cent. alcohol, also in Australian Museum. Another paratype in South Australian Museum, No. 1, 7957.

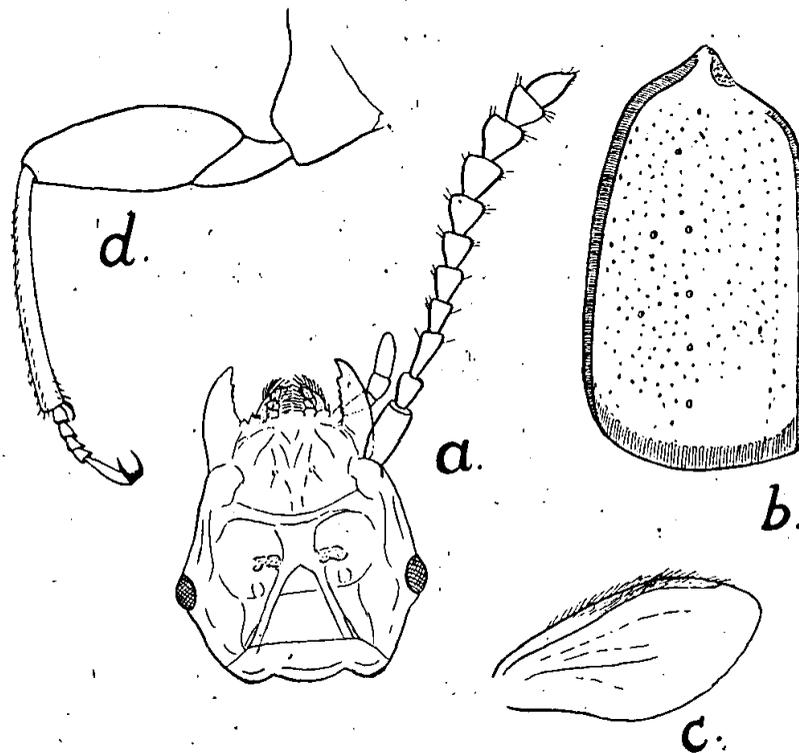


Fig. 11.—*Homalium variipenne* n.sp. Lea.

(a) Head of a cleared specimen, showing antenna (that of left side omitted), mouth-parts and tentorium. (b) Elytron, viewed from the inside. (c) Hind wing. (d) Hind leg. (All  $\times 46\frac{1}{2}$ .)

As Mr. Lea's description is not accompanied by any figures, I give, in Text-fig. 11, figures of the head, elytron, hind wing, and hind leg, all much magnified, and drawn from a cleared and mounted specimen, one of two which I have retained in my collection.

In Text-fig. 12, I also show the head and extremity of the abdomen of the larva. The larvæ in the Collection range from about 2.5 mm. to 4 mm. in length, the latter being probably full grown or nearly so. They are long, rather slender, sub-cylindrical in shape, with each abdominal segment distinctly wider distally than basally. Their

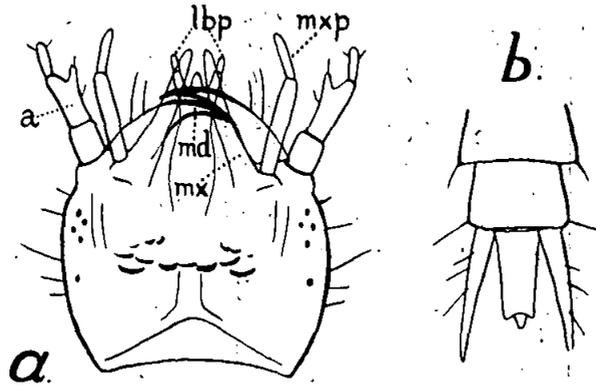


Fig. 12.—*Homalium variipenne* n.sp. Lea. Larva.  
(a) Head of a cleared specimen; a, Antenna. lbp, Labial palpi. md, Mandible. mx, Maxilla. mxp, Maxillary palpus ( $\times 87\frac{1}{2}$ ). (b) End of abdomen, showing anal papilla and appendages of seg. 9. ( $\times 46\frac{1}{2}$ .)

general colour is of a pale, rather dirty, yellow. The legs are rather short, the anal papilla or sucker and the paired appendages of seg. 9 (the so-called *cerci*) rather long and conspicuous. The antennæ have the middle joint bifid distally. The mandibles, though strongly formed, carry no internal teeth. Both maxillary and labial palpi are two-jointed, the basal joints of the former being very long.

*Larval Type* on Slide No. AAE. I5, with two paratypes. The type is indicated by an arrow.

*Habitat*.—Macquarie Island.

*Order*: LEPIDOPTERA.

*Sub-order*: HETERONEURA.

*Super-family*: PYRALIDINA.

*Family*: PYRALIDÆ.

*Sub-family*: CRAMBINÆ.

The Lepidoptera are represented in the Collection by a single well-grown caterpillar, in good condition, preserved in 70 per cent. alcohol. As this is the first record of the occurrence of a moth on Macquarie Island, it seemed worth while studying the caterpillar carefully, with a view to placing it as nearly as possible in its correct systematic position.

For this purpose, careful drawings were made of the position of the ocelli on the head, the arrangements of the crochets on the abdominal prolegs, and the chaetotaxy of the prothorax, mesothorax, and fifth and ninth abdominal segments. The result is that the caterpillar is determined, without any doubt whatever, to be a Pyralid belonging to the sub-family *Crambinae*, and therefore almost certainly a feeder on the tussock-grass that is so abundant on the Island.

In this connection, the Collector's note attached to tube No. Co. 5, in which the caterpillar was placed, runs as follows:—"Found on grassy tuft, near West Point, Macquarie Island. Feb. 9th, 1913. In 70 per cent. alcohol."

As there is a possibility that species of *Crambinae* may be bred from caterpillars found on this or other sub-antarctic islands in the future, I think it best to give a full description of the insect, with special reference to those structures which determine its systematic position:—

*Description of Caterpillar belonging to the Sub-family CRAMBINÆ.*

(Text-figs. 13-17.)

*Total length* 13.5 mm. *Shape*, sub-cylindrical, the head of medium size, the last three abdominal segments tapering slightly. *General colour* of the preserved specimen, yellowish brown, with the head and prothoracic shield very dark brown, the spiracles blackish, and the pinacula brown, more or less conspicuously darker than the general body colouration. *Setæ* dark brown or black, mostly very distinct. This colouration almost certainly indicates a fairly dark-green caterpillar when alive, with darker head and prothoracic shield, and fairly conspicuous markings, perhaps of olive green colour. (Text-fig. 13.)

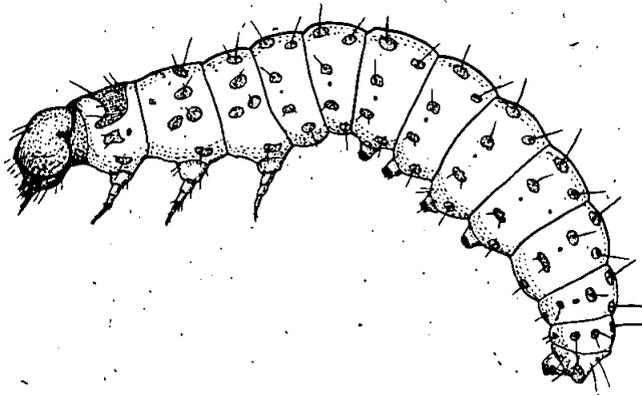


Fig. 13.—Caterpillar of a Crambine moth, found on tussock grass. ( $\times 7\frac{1}{2}$ .)

*Head* with the ocelli arranged as shown in Text-fig. 14. In the dorsal group, the first, second, and third stand well apart, forming an obtuse-angled isosceles triangle with the second ocellus at its vertex. The fourth dorsal ocellus is close up to the third, both being very close to the antenna. In the ventral group, the more anterior,

or sixth, ocellus is smaller and less conspicuous than the fifth, and lies directly below the fourth dorsal. Setæ are present in the ocellar region, as shown in Text-fig. 14.

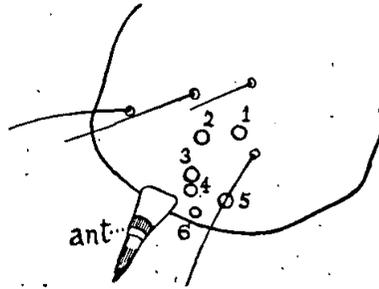


Fig. 14.—Region of antenna and ocelli of left side of head of caterpillar shown in Text-fig. 13. *ant.*, Antenna. 1, 2, 3, 4—the four ocelli of the dorsal group; 5, 6—the two ocelli of the ventral group. ( $\times 36$ .)

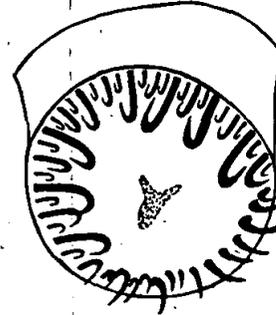


Fig. 15.—Proleg of sixth abdominal segment of caterpillar, shown in Text-fig. 13. ( $\times 104$ .)

*Spiracles* normal, the prothoracic and that of abdominal seg. 8, the largest, the former distinctly oval.

*Thoracic Legs and Abdominal Prolegs* both normally formed, the latter somewhat short and stout. The *armature of the prolegs* consists of a complete circling of hooks of three sizes, as shown in Text-fig. 15. The bases of all the hooks lie on the one circumference, so that the circling is *uniserial*. The largest hooks are separated from one another by hooks of medium size alternating with them, while the smallest hooks are intercalated between all those of the two larger sizes. The circling is most complete on the part furthest from the middle line of the abdomen; towards the middle

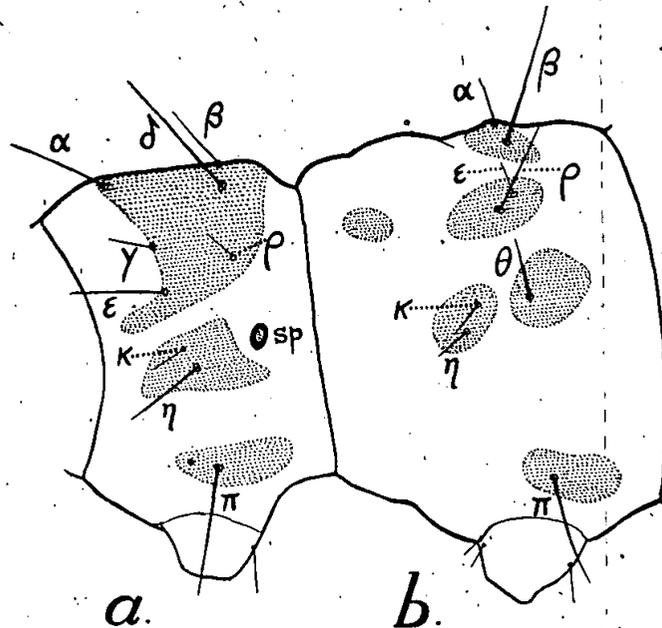


Fig. 16.—Chaetotaxy of prothorax (*a*) and mesothorax (*b*) of the caterpillar shown in Text-fig. 13. *sp.* Prothoracic spiracle. The Greek letters indicate the setæ, the nomenclature being that of Fracker. The large prothoracic shield and the pinacula carrying the setæ are shaded. The legs are omitted except only the coxæ. ( $\times 30$ .)

line, the triordinal arrangement degenerates into a simpler arrangement, the largest hooks being absent, and the smallest ones somewhat irregularly developed here and there between the predominant middle-sized ones. (Text-fig. 15.)

*Chaetotaxy*.\*—The outstanding characters of the chaetotaxy are that there are no secondary or tufted setae developed, and each proleg only bears four setae, viz., *pi*, *nu*, *tau*, and *sigma*, of which the last, lying on the inner side towards the middle line of the body, is not visible in Text-fig. 16a. The seta *theta* is absent on all except the meso- and meta-thorax. The *kappa*-group is represented by a single pinaculum bearing two setae, *kappa* and *eta*, on every segment from the prothorax to the eighth abdominal (Text-fig. 15a, b, 16a). The ninth abdominal segment has only a single seta (*eta*) on the pinaculum which is in line with the eighth abdominal spiracle, but the pinaculum situated above this carries two setae, *rho* and *epsilon*.

Text-figs. 16 and 17 show the chaetotaxy of the prothorax, the mesothorax, and the fifth and ninth abdominal segments. The combination of the form of the armature of the prolegs with the presence of *kappa* and *eta* on a single pinaculum on the

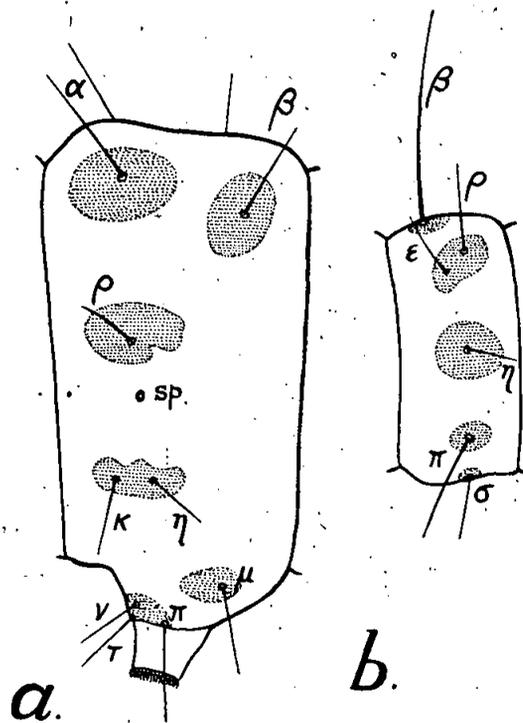


Fig. 17.—Chaetotaxy of the fifth (a) and ninth (b) abdominal segments of the caterpillar shown in Text-fig 13. *sp.*, Spiracle of the fifth segment. The Greek letters indicate the setae, the nomenclature being that of Fracker. The pinacula carrying the setae are shaded. ( $\times 30$ .)

prothorax, and with the presence of *eta* only on the corresponding pinaculum of segment 9, while *theta* is absent from all segments except the meso- and meta-thorax, marks this larva definitely as belonging to the *Crambinae*.

\* The nomenclature for the setae adopted here is that of Fracker: "The Classification of Lepidopterous Larvae," Illinois Biological Monographs, vol. II. No. 1, July, 1915. pp. 1-169, ten plates.

The larvæ of different genera of *Crambinae* being closely similar, it is not possible to indicate the generic position of the larva here described.

In 1909, Meyrick (9) described a new genus, *Protyparcha*, and new species *P. scaphodes*, belonging to the sub-family *Crambinae*, from open tussock-grass country at Carnley Harbour, Auckland. It seems very probable that the caterpillar here described may belong to a species of this or of some closely related genus.

The specimen is placed in tube No. Co. 5, in 70 per cent. alcohol, and has been deposited in the Australian Museum, Sydney, together with the types of the other species dealt with in this paper.

*Order*: DIPTERA.

*Sub-order*: NEMOCERA.

*Family*: TIPULIDÆ.

(Text-figs. 18-20.)

This family is represented in the Collection by a single larva and by seven pupæ. The former is contained in tube No. X. 3, with the following Collector's note:—"Larva. Probably of species of *Tipula*, from stagnant pool near Huts. North End, Macquarie Island. 30.7.12. In 4 per cent. formalin." The pupæ are contained in tube No. Co. 6, with the following Collector's note:—"Pupæ. Of *Tipula* species. Found protruding from mud in stagnant pool. North End, Macquarie Island. Jan. 29th, 1913. In 70 per cent. alcohol."

From the dates and localities given, it seems exceedingly probable that the larva and pupæ both belong to one and the same species of Tipulid.

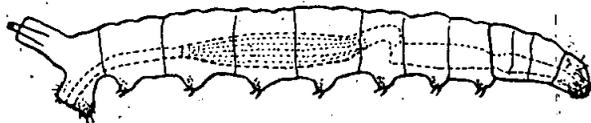


Fig. 18.—Larva of a Tipulid, found in a stagnant pool. ( $\times 5$ .)

Text-fig. 18 shows a profile view of the larva, which is 10.5 mm. long, and probably not fully grown. I have indicated the course of the alimentary canal, which



Fig. 19.—A pair of abdominal prolegs from the larva shown in Text-fig. 18, much enlarged to show their armature. ( $\times 108$ .)

was visible by transmitted light. The ventral prolegs on the abdominal segments are fairly prominent, and each pair is strongly armed with stout, thorn-like spines, as shown in Text-fig. 19. The colour of the larva is a uniform dark-brown.

Text-fig. 20 shows a profile view of the pupa, which appears to be of the usual Tipulid form, without any striking peculiarities. The specimens range from 10 to 12 mm. in length. The colouration of the head and wing-sheaths is a very dark-brown, of the thorax a medium brown, and of the abdomen a light yellowish-brown.

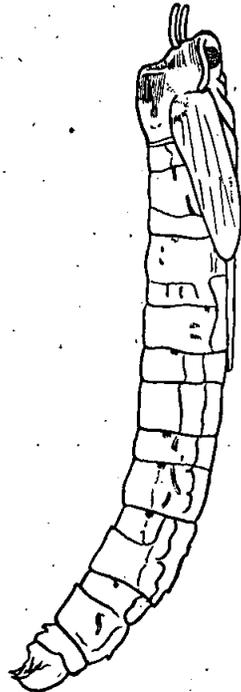


Fig. 20.—Pupa of the same Tipulid as that of which the larva is shown in Text-fig. 18. ( $\times 5$ )

This larva and pupæ may very probably belong to the genus *Dicranomyia*, or to some closely allied genus. A species of this genus has been described from Auckland Island by Lamb (8).

The specimens are deposited in the Australian Museum, Sydney, in the tubes in which they were originally placed by the Collector.

*Family*: PSYCHODIDÆ.

*Genus*: PSYCHODA.

(Text-fig. 21.)

Two specimens of a species of this well known genus were found in rather poor condition inside tube No. C. 24. As they had not been noticed by the Collector, who mentioned only the presence of Collembola inside this tube, I think it is very unlikely that they belong to the fauna of the Island. They probably became introduced into

the tube with the liquid medium when it was poured in; and may, therefore, be assumed to belong to some common and widely distributed species, or else to a species that may have been breeding out on the ship. As the paraffin wax sealing the cork of the tube was intact when I first examined it, it is clear that the flies were not introduced subsequently to the placing of the Collembola inside the tube.

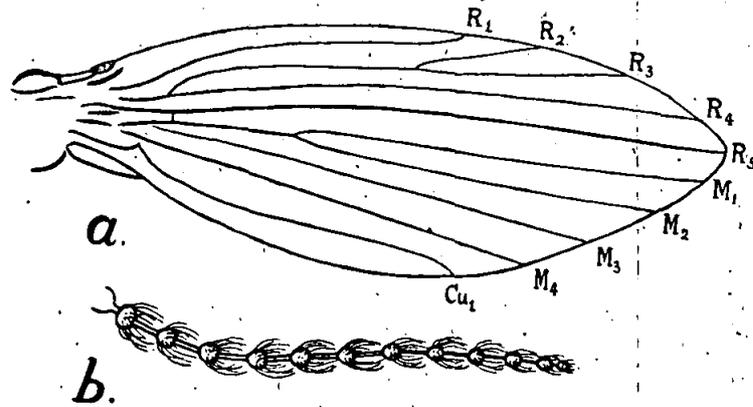


Fig. 21.—*Psychoda* sp. indet., found inside tube No. C. 24.  
 (a) Fore-wing ( $\times 16$ ); R<sub>1</sub> to R<sub>5</sub>, the branches of the radius; M<sub>1</sub> to M<sub>4</sub>, the branches of the media; Cu<sub>1</sub>, First cubitus.  
 (b) Antenna. ( $\times 52$ .)

In Text-fig. 21, I have drawn the forewing and antenna of this little Psychodid. It should be noted that the costal margin is less convex than usual, and that the fork of R 2 + 3 arises far distad, nearly up to the distal end of R<sub>1</sub>. I do not know of any Australian species, either named or unnamed, which shows anything approaching these characters.

Two specimens, on slide No. AAE 16, in the Australian Museum, Sydney.

## APPENDIX A.—HYMENOPTERA.

A NEW GENUS OF *DIAPRIIDÆ* FROM MACQUARIE ISLAND.

By CHARLES T. BRUES, Bussey Institution, Harvard University.

The Mawson Expedition to the Antarctic secured some specimens of apterous *Diapriidæ* among the few species of insects found on Macquarie Island. These were sent by Dr. R. J. Tillyard, who wished to include an account of them in his report on the insects from the Islands.

The specimens present no striking peculiarities at first glance, in fact are of quite generalised structure. I was surprised, therefore, to find on more careful examination that they could hardly be placed in any genus previously characterised. In keys to genera they will run near *Paramešius* or *Spilomicrus* on account of the 13-jointed antennæ; unarmed thorax, non-elongated face, gradually clavate antennæ, &c. In the configuration of the head, thorax, and abdomen, however, they differ considerably as is evident from the generic description. With *Malvina* Cameron it probably has some affinities, although differing in the unarmed propodeum. I would be inclined to regard it as a primitive form, with the wings lost in response to its immediate environment.

ANTARCTOPRIA *Gen. nov.*

Head quadrate or somewhat transverse; wide behind the eyes, not globose or subglobose; ocelli minute, in a small triangle; eyes small, clothed with sparse long hairs like those on the head; frontal prominence very distinct, but small; antennæ 13-jointed, gradually clavate, the club including five or six joints, first flagellar joint rather long, second to fifth small, moniliform; mandibles bidentate; maxillary palpi 5-jointed; labials two or three, probable three. Thorax much narrower than the head, about three times as long as wide; prothorax simple, woolly in front, slightly visible above at middle; mesonotum punctate, without furrows; scutellum transverse, truncate behind, with a rather shallow furrow at the base; tegulæ present; wings in the form of little hooks that reach only to the base of the propodeum. Propodeum short, nearly cylindrical, woolly, rugose, slightly raised to apex which is carinated and suddenly truncate. Abdomen large, oval, swollen, petiole extremely short, about one-third as wide as thorax and four times as broad as long; second segment occupying two-thirds of the abdomen, widest near apex, where it is nearly three times as broad as the thorax; third to fifth segments rapidly narrowed; following minute, forming the conical apex. Legs with the femora and tibiæ clavate; claws slender, simple. Body clothed with sparse, rather long, glistening hair.

The transverse-quadrate head and broad abdomen with the narrow thorax give the insect almost the habitus of a wingless Cynipid and the body lacks the highly polished appearance of most Diapriidæ.

Genotype the following species :—

*ANTARCTOPRIA LATIGASTER, sp. nov.*

(Text-figs. 9, 10, and 22.)

Length 2.0–2.7 mm. Black, the thorax and legs ferruginous or fuscous; antennal scape and the pedicel in part, rufous; palpi yellowish; head behind dull rufous. Head when seen from above about one-half wider than long; the temples about twice as wide as the eyes; rounded behind. Eyes nearly round; ocelli in a somewhat flattened triangle, the posterior pair closer to one another than to the eye-margin. Antennal scape half as long as the remainder of the antenna, not distinctly bispinulose at tip; pedicel twice as long as wide; first flagellar joint as long, but more slender; four following joints moniliform, growing scarcely wider, following gradually broader, and transverse, except the last, and forming the club. Mesonotum with a few punctures; groove at base of scutellum with a more or less distinct median raised line. Propleuræ smooth; mesopleuræ with short horizontal striæ behind. Petiole of abdomen rugose, not very distinctly fluted; body of abdomen impunctate, sparsely clothed with pale erect hairs, as are also the remainder of the body and the legs; second segment about twice as long as wide.

Types :—Holotype and paratypes from Macquarie Island. Holotype in Australian Museum, Sydney. No. Co.2; paratypes in Coll. Bussey Inst., and Australian Museum.

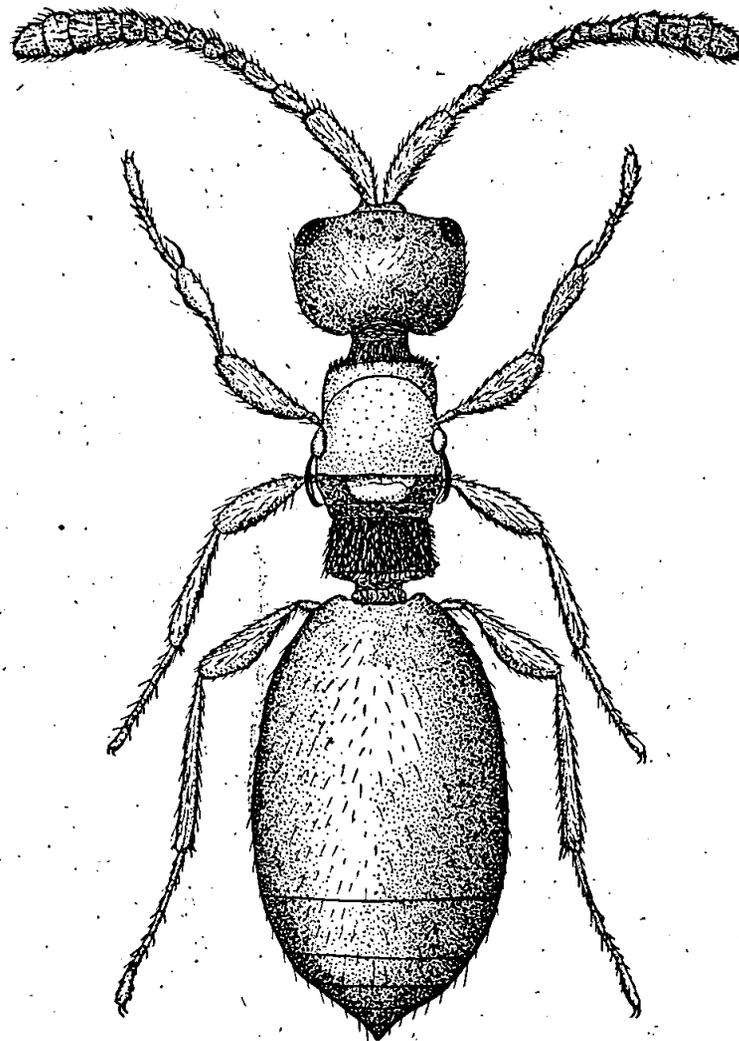


Fig. 22.—*Antartopria latigaster* n.sp. Brues. Viewed from above. ( $\times 60$ .)  
(Reproduced from a drawing sent by Professor C. T. Brues.)

## APPENDIX B.—COLEOPTERA.

### DESCRIPTION OF A NEW STAPHYLINID BEETLE FROM MACQUARIE ISLAND.

By A. M. LEA, F.E.S., South Australian Museum, Adelaide.

*HOMALIUM VARIIPENNE, n. sp.*

Piceous-brown; six basal joints of antennæ, palpi, and legs more or less flavous; elytra varying from entirely dark to almost entirely flavous. Head, prothorax, and elytra with a few short, erect setæ, upper surface of abdomen with short and not very dense, ashen pubescence, almost absent along middle; under surface more sparsely clothed, the sterna more sparsely than the abdomen.

*Head* (excluding neck) sub-triangular; with two small deep foveæ between eyes, and a shallow depression near each antennæ; surface finely shagreened and minutely punctate. Antennæ passing middle coxæ; first joint rather stout, as long as second and third combined, second and fourth sub-equal in length, and distinctly shorter than third, sixth—tenth equal, distinctly wider than the four preceding ones, eleventh about once and one-half the length of tenth. *Prothorax* rather strongly transverse, widest near apex, sides rounded in front, oblique to base; with a conspicuous but shallow longitudinal depression on each side of the middle, the depressions more opaque than the adjacent surface; two small foveæ at apex immediately behind those on head; surface finely shagreened, and with numerous small punctures. *Elytra* almost as long as head and prothorax combined, base much wider than base of prothorax, hind angles widely rounded off; with small, dense, sharply defined punctures. *Abdomen* elongate, shagreened and with small dense punctures; margins slightly wider than scutellum. *Legs* moderately long, length to apex of elytra  $2\frac{1}{2}$ , of abdomen,  $4\frac{1}{2}$  mm.

*Habitat.*—Macquarie Island.

The setæ on the upper surface, although erect, are so short and sparse that they could easily escape notice; in some lights, the abdominal pubescence has an almost golden gloss. Of the five specimens before me, two have a large flavous spot on each shoulder; each spot on the outside extends to the margin, on the inside about half-way to the suture, and posteriorly to about one-third from the apex; on a third specimen, the spots are similar in size, but vaguely indicated; on a fourth, the elytra are flavous, except for a narrow infuscation of the suture, and for a rather narrow apical border (this specimen has the prothorax with a more reddish tone than the others); the fifth

specimen has the elytra entirely dark; on all of them the abdomen is rather pale at the tip. The elytral punctures, especially posteriorly, exhibit a tendency to become longitudinal scratches.

The species is allied, but not very closely so, to *H. morrisoni* (Blackburn), but is considerably larger, cephalic and prothoracic punctures smaller and the abdominal ones larger, antennæ longer, &c.

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