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Review of the Australasian Genera of Signal Flies (Diptera: Platystomatidae)

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ABSTRACT. The distribution patterns of platystomatid genera in the 12 recognized provinces of the Australasian Region are recorded. Notes are provided on biology and behaviour, including parasitism by fungi and strepsipterans, and mimicry of other insects and spiders. Means of separation from other acalyptrate families are provided. A key to Australasian genera is given. The subfamily Angitulinae is placed in synonymy of Platystomatinae. The subfamily classification is briefly discussed. The following new genera are described: *Aetha, Bama, Eumeka, Hysma, Par, Phlyax, Signa, Tarfa, Terzia, Tomeus. Gonga* and *Polimen* are new subgenera of *Naupoda* and *Bama* respectively. The genus *Lasioxiria* Hendel is a new synonym of *Atopognathus* Bigot. *Chaetostichia* Enderlein is a new synonym of *Scholastes* Loew. *Eopiara* Frey, described as a subgenus of *Piara* Loew, is raised to generic status. The genera *Angituloides* Hendel and *Giraffomyia* Sharp are reduced to subgenera of *Angitula* Walker. The following new species are described: *Aetha cowanae, Bama (Polimen) shinonagai, Eumeka hendeli, Hysma lacteum, Paryphodes hospes, Signa mouldsi, Tarfa bowleyae, Terzia saigusai, Tomeus wyliei, Zealandortalis gregi. Lule speiseri* de Meijere, 1914 is a new synonym of *Phasiamya metallica* Walker, 1849. New generic combinations are made as follows: *Angitula austeni* (Hendel, 1913) (*Angituloides*); *Angitula irregularis* (Malloch, 1940) (*Giraffomyia*); *Angitula regularis* (Malloch, 1940) (*Giraffomyia*); *Angitula solomonensis* (Malloch, 1940) (*Giraffomyia*); *Angitula willeyi* (Sharp, 1899) (*Giraffomyia*); *Atopognathus hirsutus* (Hendel, 1914a) (*Lasioxiria*); *Bama bipunctatum* (Hendel, 1914a) (*Euxestomoea*); *Bama papuanum* (Hennig, 1940b) (*Xiria*); *Bama strigatum* (Hennig, 1940b) (*Xiria*); *Chaetorivellia tarsalis* (Walker, 1861c) (*Ortalis*); *Cleitamoides trigonalis* (de Meijere, 1913) (*Cleitamia*); *Eopiara chrysoptera* (Frey, 1964) (*Piara*); *Eopiara elegans* (Frey, 1964) (*Lamprogaster*); *Lamprophthalma egregia* (de Meijere, 1924) (*Plagiostenopterina*); *Lamprophthalma medionotata* (de Meijere, 1924) (*Plagiostenopterina*); ?*Microepicausta sangiensis* (de Meijere, 1916) (*Elassogaster*); *Neohemigaster fascifrons* (de Meijere, 1916) (*Pterogenia*); *Neohemigaster guttata* (Walker, 1856) (*Lamprogaster*, later in *Pterogenia*); *Par evitta* (Malloch, 1939a) (*Elassogaster*); *Phlyax simmondsi* (Bezzi, 1928) (*Naupoda*); *Scholastes aduncivena* (Enderlein, 1924) (*Chaetostichia*); *Xiriella lunaris* (de Meijere, 1916) (*Lule*).

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The Platystomatidae, recently termed signal flies, are probably among the four largest families of acalyptrate Schizophora in the Australasian Region, but in the Americas and in the Palaearctic Region the representation is comparatively small. There are about 119 known world genera and nearly 1200 described species. In the Australasian Region there are 54 recognized genera and c. 493 probably valid described species. At least 220 additional undescribed Australasian species have been sighted in collections, and I estimate that the total Australasian platystomatid fauna is unlikely to include less than 900 species.

It is the main aim of this paper to provide means of identification and general basic information on the genera of Platystomatidae living in the Australasian Region, including the Oceanian Region, as delimited by Evenhuis (1989) and in the section on Geographic Distribution below.

Methods and terminology

In general I follow a traditional system with minimal use of terms implying doubtful, unproved, or, for present purposes, irrelevant homologies. Details are given by McAlpine (1973a), with most terms also explained by Harrison (1959), Crosskey (1973), and Colless & McAlpine (1991). Paired bristles and other paired structures are described in the singular, except where the context makes this inappropriate. The antenna is treated as a six-segmented appendage and the segments are numbered consecutively from the base (Fig. 96). The greater part of the arista thus consists of segment 6 and the very short segment 4 may not be visible in dried specimens. The system of nomenclature of wing veins (Fig. 1) is the simplest possible for one not concerned with trans-ordinal homologies. Cell-4 index is defined as the ratio of the length of the antepenultimate section of vein 4 to the full length of the discal cell along vein 4.

In using the keys and descriptions particular care should be taken in interpreting the terms **bristle, setula, hair, pubescence**, and **pruinescence** (see McAlpine, 1973a).

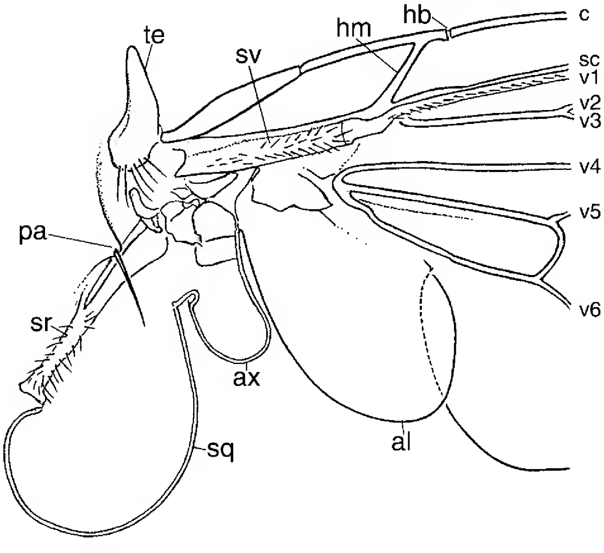


Figure 1. *Euprosopia tenuicornis* Macquart, base of wing of female. Abbreviations: al, alula; ax, axillary lobe; c, costa; hb, humeral break of costa; hm, humeral crossvein; pa, postalar callus bearing postalar bristle; sc, subcosta; sq, squama; sr, suprasquamal ridge; sv, stem vein (base of R); te, tegula (sexually dimorphic); v1–v6, veins one to six.

An effort has been made to make the key to genera workable for all dried adults in good condition, provided that a good stereo-microscope with magnifications up to ×75 is used. However, because of individual variation, great diversity in some genera, and incomplete knowledge of the fauna, it should not be too readily assumed that specimens which do not key out necessarily belong in unrecorded genera.

The following abbreviations refer to institutions housing specimens:

AM	Australian Museum, Sydney
AMST	Zoological Museum, Amsterdam
ANIC	Australian National Insect Collection, CSIRO, Canberra
BM	The Natural History Museum, London
BPB	Bernice P. Bishop Museum, Honolulu
CNC	Canadian National Collection, Agriculture Canada, Ottawa
DEI	Deutsches Entomologisches Institut, Eberswalde
FRIL	Forest Research Institute, Lae
HELS	Zoological Museum Helsinki
KONE	Department of Agriculture and Livestock, Konedobu, Port Moresby
MNB	Museum of Natural Science at Humboldt University, Berlin
MNM	Hungarian Natural History Museum, Budapest
NAT	Natal Museum, Pietermaritzburg
RMS	Naturhistoriska Riksmuseet, Stockholm
NMWC	National Museum of Wales, Cardiff
NSMT	National Science Museum, Tokyo
OX	University Museum, Oxford
PM	Museum national d'Histoire naturelle, Paris
UQ	University of Queensland Insect Collection, Brisbane
USNM	National Museum of Natural History, Washington
WM	Natural History Museum, Vienna
ZMC	Zoological Museum, Copenhagen

The following collectors' names are abbreviated to the initials: J.H. Barrett, D.J. Bickel, T.G. Campbell, G. Daniels, B.J. Day, A.L. Dyce, E.D. Edwards, J.L. Gressitt, G.A. Holloway, A. Hughes, J.W. Ismay, N.L. Krauss, D.K. McAlpine, B.J. Moulds, M.S. Moulds, H. Roberts, J. Sedlaček, M. Sedlaček, P. Shanahan, S. Shinonaga, B.J. Sinclair, H.A. Standfast, F.H. Taylor, A. Walford-Huggins, A.R. Wallace, T.A. Weir, F.R. Wylie.

Geographic distribution

The Australasian Region, the area covered in this review, is the same as the Australasian and Oceanian Regions together, of Evenhuis (1989), who proposed no dividing line between the two. The Region is thus defined in the west by Weber's Line ("original" version of Merrill, 1945), in the north by the northernmost islands of Micronesia and in the east by the easternmost islands of Polynesia. To the south, I am not concerned with islands beyond Tasmania and the two main islands of New Zealand, as such islands probably harbour no platystomatids. South Island, New Zealand, provides the southernmost recorded habitat of playtstomatids, in view of their apparent absence from southern parts of South America.

On the basis of present knowledge, it appears that Australasia harbours the most diverse platystomatid fauna of any biogeographic region. New Guinea is likely to have a particularly large number of undiscovered species (see discussion in McAlpine, 1994). About 80% of the species sorted from New Caledonia remain undescribed, and it would not be surprising if some other island groups prove significant sources of new discoveries.

Of the Australasian genera 34 (64%) are endemic to the Region. These are: *Achias, Aetha, Angitula, Apactoneura, Apiola, Asyntona, Atopognathus, Bama, Brea, Chaetorivellia, Cleitamia, Cleitamoides, Duomyia, Eumeka, Euxestomoea, Guamomyia, Hysma, Inium, Laglaisia, Lenophila, Loriomyia, Loxoneuroides, Mesoctenia, Montrouziera, Par, Pseudocleitamia, Pseudorichardia, Phlyax, Scotinosoma, Signa, Tarfa, Terzia, Tomeus, Zealandortalis*. Of the remaining 20 genera all except *Paryphodes* extend to the Oriental Region: *Antineura, Conicipithea, Elassogaster, Euprosopia, Lamprogaster, Lamprophthalma, Meringomeria, Microepicausta, Naupoda, Neohemigaster, Plagiostenopterina, Pogonortalis, Pseudepicausta, Pterogenia, Rhytidortalis, Rivellia, Scholastes, Trigonosoma, Zygaenula.*

Eight of the Australasian genera are shared with the Afrotropical Region: *Elassogaster, Lamprophthalma, Naupoda, Paryphodes, Plagiostenopterina, Pseudepicausta, Rivellia, Scholastes.*

Five of the Australian genera are shared with the Palaearctic Region: *Elassogaster, Euprosopia, Lamprophthalma, Rhytidortalis, Rivellia.*

Only one Australasian genus occurs naturally in the Americas (both Nearctic and Neotropical Regions), the almost cosmopolitan *Rivellia*. However, an Australian species of *Pogonortalis* is introduced in California. *Duomyia* was erroneously recorded from Chile on the basis of a mislabelled specimen (see McAlpine, 1973a).

For the purpose of recording generic distributions, I divide Australasia into 12 provinces as indicated in Fig. 2. Delimitation of these follows natural barriers and a degree of convenience, rather than national boundaries. Thus the biogeographically diffuse areas covered by the terms Indonesia, Papua New Guinea, and Kiribati have no place in this system. The boundaries between Micronesia and Polynesia have been simplified, because ethnic zones are not relevant to playtstomatid distributions, and because these zones are little known and probably largely depauperate in platystomatids.

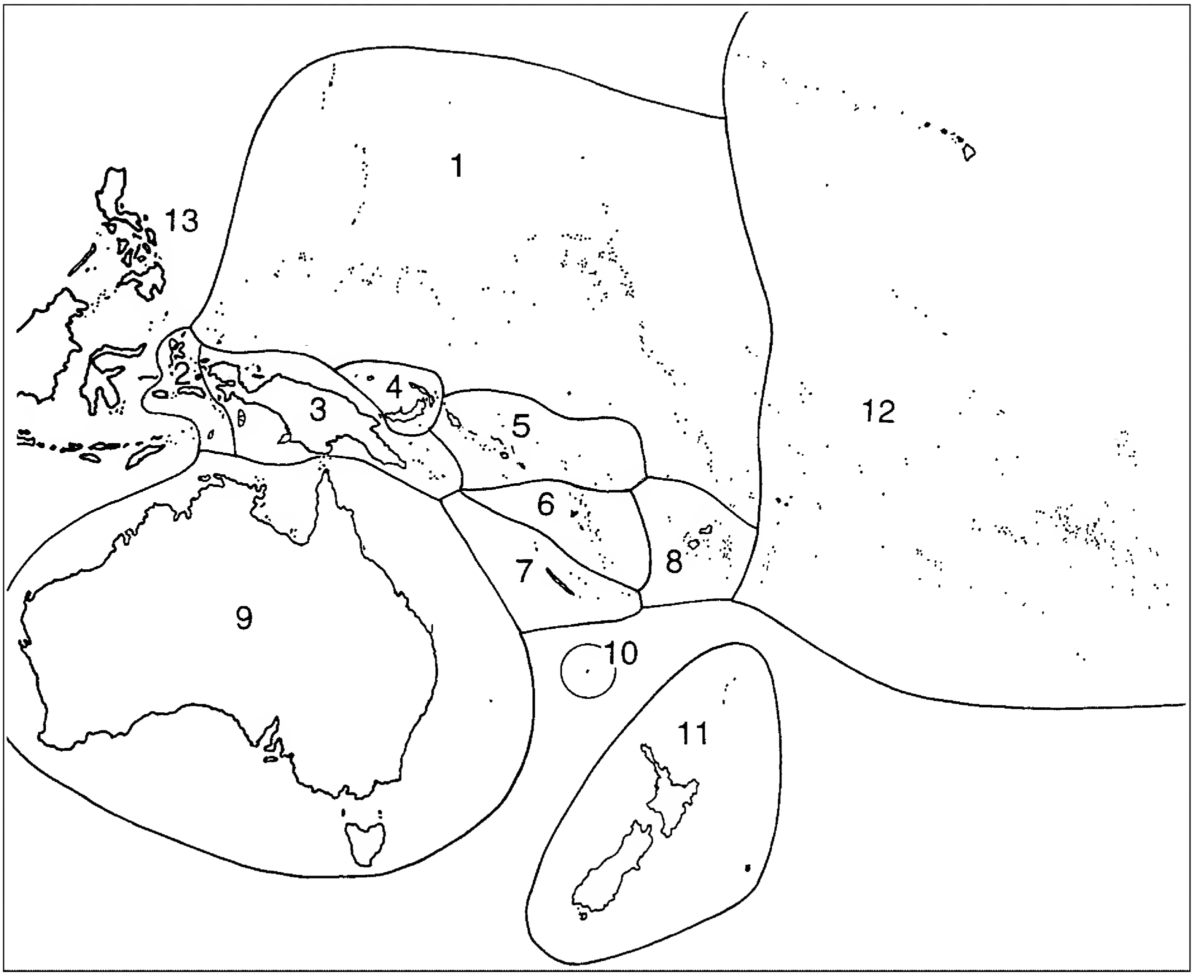


Figure 2. Provinces of Australasia which harbour platystomatids. 1, Micronesia. 2, Moluccas. 3, New Guinea. 4, Bismarck Archipelago. 5, Solomon Archipelago. 6, Vanuatu. 7, New Caledonia. 8, Fiji. 9, Australia. 10, Norfolk Island. 11, New Zealand. 12, Tropical Polynesia. 13, excluded (Oriental Region).

The platystomatid faunas of many Australasian provinces are still poorly collected and studied. Many of my statements about distribution, diversity, and relationships may need some revision as new data become available.

1. **MICRONESIA**. The four genera recorded for this province are: *Guamomyia, Pogonortalis, Scholastes* (all from Guam, Malloch, 1942), and *Pseudorichardia* (Tuvalu, in AM). No endemic genus is known, but the fauna may be considerably richer than indicated by the immediately available data.

2. **MOLUCCAS**. For present purposes this province covers only the islands between Weber's and Lydekker's Lines, the latter given as "Weber's Line (modified)" by Merrill (1945), and Aru is definitely excluded. It is thus not coextensive with the Indonesian province of Maluku. The 17 recorded genera are: *Angitula, Antineura, Asyntona, Atopognathus, Brea, Chaetorivellia, Elassogaster, Euprosopia, Lamprogaster, Lamprophthalma, Plagiostenopterina, Pseudepicausta, Pterogenia, Rivellia, Scholastes, Trigonosoma, Zygaenula*. None of these is endemic to the province.

This province provides the western limit for the ranges of *Angitula, Asyntona, Atopognathus, Brea*, and *Chaetorivellia*, all genera restricted to less remote tropical parts of the Australasian Region. The placement of this province at the western limit of the Region therefore has a degree of biogeographic justification. The Oriental genera *Lamprophthalma, Trigonosoma*, and *Zygaenula* penetrate no further eastwards than this province.

3. **NEW GUINEA**. I have previously discussed the platystomatid fauna of this province (McAlpine, 1982). The province includes the large island of New Guinea and the following minor islands or groups: Aru, Waigeo, Salawati, islands of Geelvink Bay, D'Entrecasteaux Group, Trobriand Group, Woodlark, Louisiade Group. The inclusion of Aru with New Guinea rather than Moluccas is justified by the fact that its recorded platystomatids all belong in typical New Guinea genera, and many of its species are shared with mainland New Guinea.

The 31 recorded genera are: *Achias, Angitula, Antineura, Asyntona, Atopognathus, Bama, Brea, Chaetorivellia, Cleitamia, Cleitamoides, Elassogaster, Eumeka, Euprosopia, Euxestomoea, Guamomyia, Hysma, Laglaisia, Lamprogaster, Loriomyia, Mesoctenia, Microepicausta, Naupoda, Neohemigaster, Paryphodes, Plagiostenopterina, Pseudepicausta, Pseudocleitamia, Pterogenia, Rivellia, Scholastes, Tomeus*. The following seven genera are endemic to this province: *Bama, Cleitamia, Cleitamoides, Laglaisia, Loriomyia, Pseudocleitamia, Tomeus*. The more widely distributed genera *Atopognathus, Euprosopia*, and *Lamprogaster* have very substantial specific representation in New Guinea, and c. 95% of species of the large genus *Achias* live in New Guinea.

I stated (McAlpine, 1973a) that New Guinea has the greatest number of platystomatid species of any part of the world of comparable area. Subsequent work (including McAlpine, 1994, and much unpublished work) has strengthened this view.

The record of *Lenophila* from New Guinea (McAlpine, 1982) was based on a misidentification.

4. **BISMARCK ARCHIPELAGO**. This province includes the islands of the New Britain, New Ireland, and Manus (Admiralty) districts of Papua New Guinea. The 18 recorded genera are: *Achias, Angitula, Atopognathus, Brea, Elassogaster, Eumeka, Euprosopia, Euxestomoea, Guamomyia, Lamprogaster, Mesoctenia, Microepicausta, Par, Plagiostenopterina, Pseudepicausta, Pterogenia, Rivellia, Scholastes*. Only *Par* is endemic to the province.

The Bismarcks provide the eastern limit for the genera *Achias, Brea, Euxestomoea*, and *Mesoctenia*, and are in this respect an eastern extension of the New Guinea province.

5. **SOLOMON ARCHIPELAGO**. This province includes the Bougainville district of Papua New Guinea and the islands forming the present nation of Solomon Islands, including the Santa Cruz Group. The 14 recorded genera are: *Angitula, Asyntona, Atopognathus, Elassogaster, Euprosopia, Lamprogaster, Microepicausta, Naupoda, Plagiostenopterina, Pseudepicausta, Pterogenia, Rivellia, Scholastes, Terzia*. The genus *Terzia* is endemic to the province.

The platystomatid fauna has been reviewed by Curran (1936) and Malloch (1940).

6. **VANUATU**. The platystomatids of this group of mostly small islands are perhaps too little known for profitable discussion. The two recorded genera are *Euprosopia* and *Pseudorichardia*. Though both have wide distributions, this is the only province known to harbour both genera.

7. **NEW CALEDONIA**. This province includes the main island of New Caledonia, with its small satellites, and the more removed Loyalty Islands. The seven recorded genera are: *Eumeka, Lamprogaster, Montrouziera, Rivellia, Scholastes, Signa, Tarfa. Montrouziera, Signa*, and *Tarfa* are endemic, but, whereas *Signa* is so far known only from the main island, *Montrouziera* and *Tarfa* are perhaps restricted to the Loyalty Islands. The proportion of endemic genera (43%) is greater than that of any other Australasian province.

Though the number of genera is only half that recorded for the Solomon Archipelago, the preliminary species count (material studied by me) is about as great, despite the much smaller land area of New Caledonia. *Lamprogaster* (at least 14 species) and *Signa* (at least 10 species) are the genera with largest representation, these species being all endemic to the province, and perhaps to the main island. Most of them remain undescribed. New Caledonia is already recognized as a significant botanical hot spot (Jaffre *et al*., 1998). Preliminary evidence indicates that it is also a hot spot for platystomatid diversity.

8. **FIJI**. The Fijian platystomatids were reviewed by Bezzi (1928), but some emendments to generic placement are now made. The five recorded genera are *Meringomeria, Phlyax, Pseudorichardia, Rivellia*, and *Scholastes*. Only *Phlyax* is

endemic. The genera *Duomyia, Lamprogaster*, and *Naupoda* have been recorded from Fiji in error, the first two from mislabelled Australian material (see McAlpine, 1973a), and *Naupoda* from generic misplacement of the type species of *Phlyax* (q.v.).

The presence of *Meringomeria* and *Phlyax* is of unusual interest. *Meringomeria*, which appears to have at least two endemic Fijian species, is otherwise represented only in the Oriental Region. *Phlyax*, though endemic to Fiji, is the only Australasian genus of the subfamily Trapherinae. There is no record of either *Meringomeria* or the Trapherinae from any other province of the Australasian Region.

9. **AUSTRALIA**. For purposes of this review, this province includes the six Australian states, the Northern Territory, Torres Strait Islands, and Lord Howe Island. The 26 genera are: *Achias, Aetha, Asyntona, Atopognathus, Brea, Duomyia, Elassogaster, Eumeka, Euprosopia, Euxestomoea, Guamomyia, Hysma, Inium, Lamprogaster, Lenophila, Loxoneuroides, Mesoctenia, Microepicausta, Naupoda, Plagiostenopterina, Pogonortalis, Pterogenia, Rhytidortalis, Rivellia, Scotinosoma, Zealandortalis.*

The following six genera are endemic to the province: *Aetha, Duomyia, Inium, Lenophila, Loxoneuroides*, probably *Scotinosoma*. *Duomyia* is much the largest of the endemic genera with at least 106 species.

The platystomatid fauna of Tasmania is an extension of that of mainland Australia, with no known endemic taxa. The seven recorded genera are: *Duomyia, Euprosopia, Lamprogaster, Lenophila, Microepicausta, Rhytidortalis, Rivellia.*

Lord Howe Island harbours the genera *Duomyia, Guamomyia, Naupoda, Pogonortalis*, and *Rivellia*. The species of *Duomyia* and *Pogonortalis* are very closely related to mainland Australian species. *Naupoda nudiseta* (Bezzi) is endemic to the island. *Guamomyia*, represented by one species endemic to the island, is known elsewhere only from northern Micronesia, New Guinea, and Bismarck Archipelago.

10. **NORFOLK ISLAND**. The only recorded genera are *Pogonortalis* and *Rivellia*, each with one species. This is a quite small island with, understandably, a minuscule platystomatid fauna. The *Rivellia* sp. is very similar to some Australian species of its genus, but the endemic *Pogonortalis hians* Schneider & McAlpine is not very close to congeneric species of the Australian mainland and Lord Howe Island.

11. **NEW ZEALAND**. This province can be interpreted broadly to include the Kermadec, Chatham, and more southerly island groups, but only the two main islands (North and South) are known to harbour platystomatids. The only recorded genus is *Zealandortalis* (see Harrison, 1959). This was thought to be endemic, but an Australian species is now described in the genus (see below).

12. **TROPICAL POLYNESIA**. I include in this province all the main island groups of the central-eastern Pacific, from Tokelau, Samoa, and Tonga in the west to French Polynesia and the Pitcairn Group in the east, and the Hawaiian Chain in the north. The six genera recorded from the province are: *Apactoneura, Apiola, Plagiostenopterina, Pseudorichardia, Rivellia, Scholastes*. *Apactoneura* and *Apiola* are endemic.

The two endemic genera are recorded only from the Samoan Islands, which harbour all six genera (Malloch, 1930b). Only *Pseudorichardia* and *Scholastes* seem to have a wide distribution through the province (Malloch, 1932).

Biology

The flies of the family Platystomatidae, are biologically diverse, particularly in the larval stages. Summaries of their biology are given by McAlpine (1973a, 1998, 1999). The most complete treatment of larval biology is that of Ferrar (1988). Some additional biological and habitat data are recorded below under generic headings. In particular, parasitism of adults by Strepsiptera is mentioned under *Paryphodes*, parasitism by laboulbenialean fungi under *Rivellia*, and possible larval association with roots of *Acacia* under *Rivellia*. Possible Batesian mimicry of blowflies (Calliphorinae) is mentioned below under *Lamprogaster*, of braconid or ichneumonid wasps under *Tarfa*, of ants (Formicidae) under *Inium*, of pompilid wasps under *Antineura* and *Eumeka*, of vespid wasps under *Achias* and *Lamprogaster*, of chrysomelid beetles under *Phlyax*, and of jumping spiders (Salticidae) under *Atopognathus* and *Lenophila*. In general, these mimicry hypotheses need testing by field observations, as effective mimicry often depends on behaviour as well as morphology. No flightless forms with reduced wings are known in the Platystomatidae, but it should be noted that the family is apparently unrepresented on far southern islands, which harbour such forms in other dipterous families.

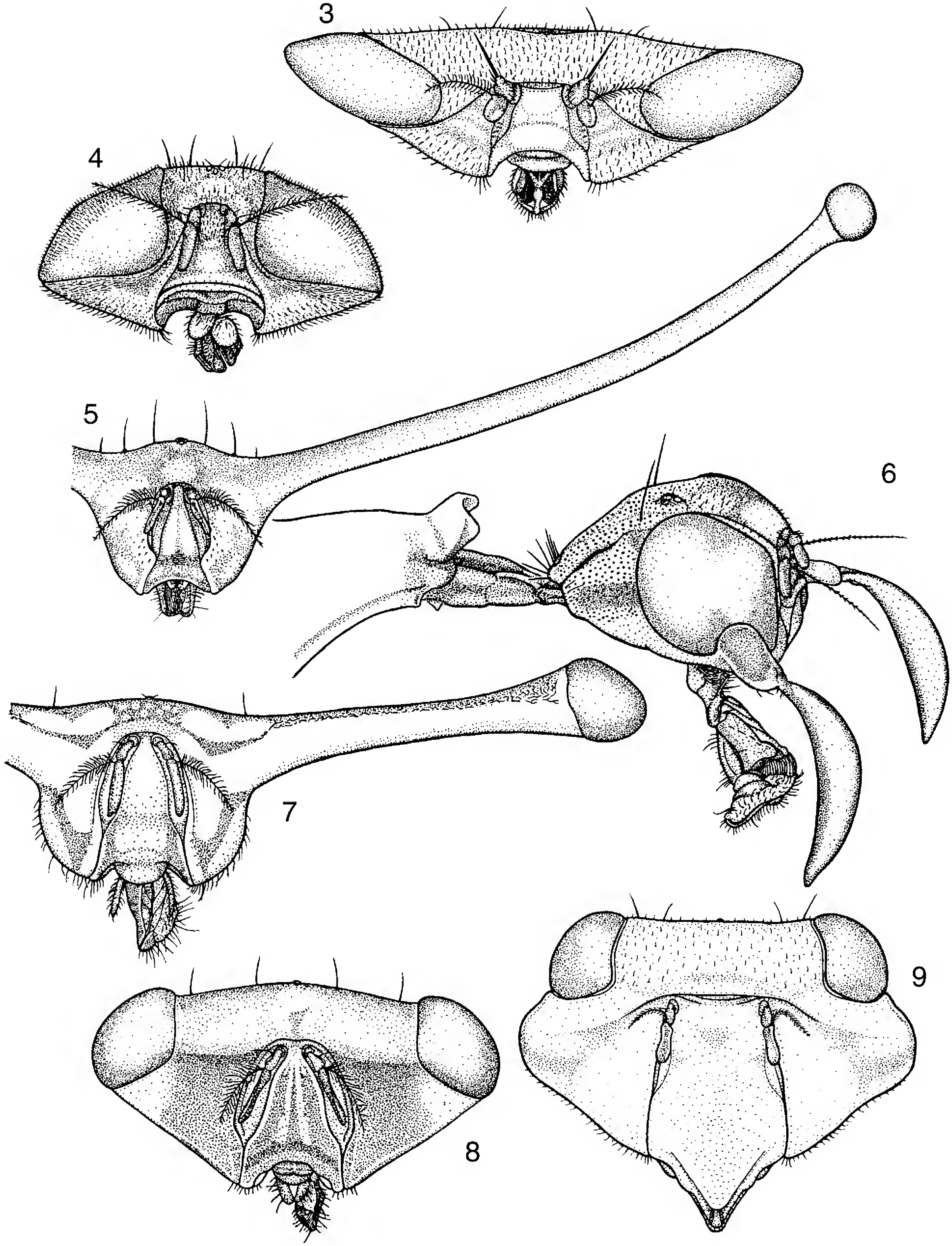
Sexual dimorphism, other than that in the organs of copulation and oviposition, is very diverse in platystomatids, a summary being given by McAlpine (1998), with additional data by McAlpine (2000). Some functional aspects of sexual dimorphism are considered by McAlpine (1973b, 1975, 1979, 2000). Further mention of sexual dimorphism is made below under the numerous genera in which it has been observed. A range of head modifications in male platystomatids is shown in Figs. 3–9.

Family identification

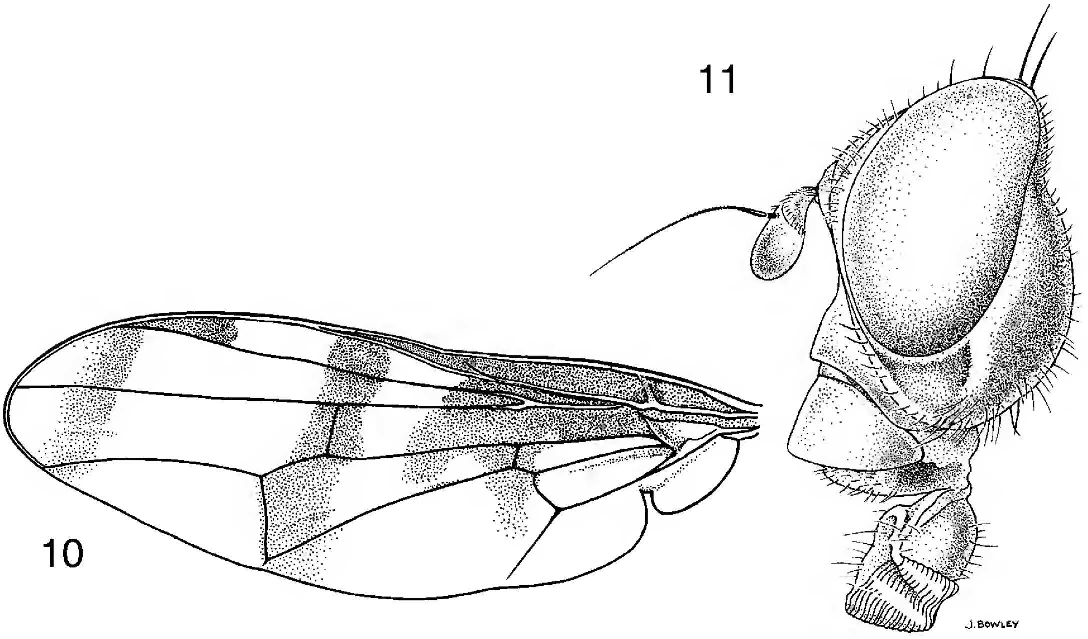
Platystomatid adults may generally be identified by use of the keys to families of Diptera given by Colless & McAlpine (1991) or Oosterbroek (1998). Unfortunately platystomatid larvae are so little known that it is unlikely that larval characters diagnostic for the family will be recognized in the foreseeable future.

For those desiring a more rigorous method of sorting to family level, without going through an unnecessary priming, I offer the four not necessarily simple steps for adult flies suspected as belonging in the Platystomatidae.

Step 1: Segregation of the higher Diptera. Platystomatid flies have the general features of the division (or series) Schizophora or "higher Diptera." Flies of this division usually have three stout antennal segments (the first or basal one shortest), and the large third segment has a fine bristle-like structure, the arista, arising from near the base of its



Figures 3–9. Modified head capsules of male platystomatids. 3, *Asyntona* "sp. A" (Bougainville, AM). 4, *Atopognathus goniceps* (Hendel). 5, *Laglaisia* "sp. 1" (Sewan, West New Guinea, AM). 6, *Angitula (Giraffomyia)* "sp. A" (New Britain, AM). 7, *Achias furcatus* Hendel. 8, *Achias wallacei* McAlpine. 9, *Mesoctenia* "sp. 1" (Bainyik, Papua New Guinea, AM).



Figures 10–11. *Hysma lacteum* n.sp. 10, wing. 11, head of female.

dorsal surface (Fig. 96); also they generally have a curved slit, the ptilinal fissure (Fig. 68, pt), on the head, immediately above the sockets of the antennae. In the Schizophora the number of wing veins and their branches is normally not above that shown in Fig. 10.

Step 2: Identifying the setulose vein 1. The Platystomatidae are one of the few families of Schizophora which have a series of many setulae (macrotrichia) on the dorsal surface of vein 1 of the wing, extending from approximately the level of the humeral crossvein to the distal end of this vein where it merges with the costa (Fig. 1). These setulae are **distinctly larger** than the microtrichia or pubescence—very fine hair-like processes that clothe much of the surface of the wing membrane and the veins, but do not tend to form a linear series on veins. Failure to appreciate the difference between setulae and microtrichia sometimes leads elementary students to classify *Strongylophthalmyia* spp. (family Tanypezidae) as platystomatids. The only other Australasian schizophoran families with such an extensive series of setulae on vein 1 are the Tephritidae (true fruit flies) and Pyrgotidae (nocturnal scarab-killing flies), except on islands to the south of New Zealand, where platystomatids are absent

The small flies of the family Lonchopteridae also have a series of dorsal setulae on vein 1, but lonchopterids, which do not belong among the Schizophora, have no ptilinal fissure and the arista arises from the apex of antennal segment 3. The genus *Herina* Robineau-Desvoidy (family Otitidae) also has a series of dorsal setulae on vein 1 but these are restricted to the distal part of the vein; *Herina* has a well developed, isolated proepisternal (propleural) bristle, which is always absent in Platystomatidae.

Step 3: Sorting platystomatids from tephritids. Platystomatids consistently have no break, or incision in the costa at the point where the subcosta meets it; the costa is quite continuously developed and sclerotised through this point, though there is usually a visible break indicating a flexible point in the costa a little beyond the level of the humeral crossvein (humeral break, see Fig. 1). Tephritids, on the other hand, do have a break or incision in the costa at the distal end of the subcosta (usually in addition to the humeral break) which can be detected by using an appropriately high magnification, carefully positioning the wing, and using transmitted light. The great majority of tephritids have one or more pairs of incurved lower fronto-orbital bristles in front of the usual upper fronto-orbital bristles nearer the inner vertical bristles. These paired bristles are well differentiated by their size, thickness, or regular placement, from any irregular covering of hairs or setulae on the postfrons. Platystomatids have no incurved lower fronto-orbital bristles, but one to three upper fronto-orbital bristles of diverse inclination may be present just in front of the inner vertical bristle on each side of the postfrons, often on a differentiated fronto-orbital plate. The vast majority of tephritid species have the anal crossvein (free transverse section of vein CuA or CuA_2) strongly indented so that the anal cell is acutely produced posterodistally. In the platystomatids the anal crossvein is straight, simply curved (e.g., Fig. 10), or strongly reflexed (Fig. 79), but it is only strongly indented and tephritid-like in the rarely collected genus *Loriomyia* Kertész (Fig. 85). In a few platystomatids (e.g., *Lenophila achilles* McAlpine & Kim) the anal crossvein has slight sigmoid curvature and the anal cell is posterodistally acute, but the crossvein is scarcely indented.

Step 4: Sorting platystomatids from pyrgotids. The Pyrgotidae are a large and morphologically diverse family having much in common with the Platystomatidae, including the extent of dorsal setulae on vein 1. Most Australasian pyrgotids have the first two abdominal sternites fused into a single plate, though a transverse line of demarcation may still be visible; but all known platystomatids have these sternites separated by a distinct membranous zone. A significant proportion of Australasian pyrgotids have no distinct ocelli on the head; all known Australasian platystomatids have well-developed ocelli. Thus, most pyrgotids can be distinguished from platystomatids by having either sternites 1 and 2 fused or no visible ocelli. Many pyrgotids also have the anal crossvein indented, approximately as in the Tephritidae. The residue of pyrgotid species that have separate sternites 1 and 2 as well as distinct ocelli is very small and these species, so far as I am aware, are distinguishable from platystomatids by having a break in the costa at the end of the subcosta (even though the majority of other pyrgotids have no such break). Female platystomatids generally have tergite 6 of the abdomen very short and capable of being withdrawn underneath the margin of tergite 5, or absent. Thus at most only four tergal (dorsal) abdominal plates are visible in front of the ovipositor sheath (the first two tergites being fused). By contrast, female pyrgotids have tergite 6 well developed and resembling tergite 5, though much shorter. Very few Australasian platystomatid species have female tergite 6 permanently exposed (*Apiola*, some *Angitula* spp., one *Duomyia* sp.). The first two of these have characteristic wings (Figs. 123, 88), and the latter localised species is unlikely to be encountered before otherwise closely similar species are seen.

While there are numerous other morphological features of the Platystomatidae that can help to distinguish the family, these may be largely dispensable to those simply wishing to sort material. Reference may be made to the more detailed work of McAlpine (1973a) if required.

Subfamily classification

A classification of the Platystomatidae into five subfamilies was proposed by McAlpine (1973a). Some aspects of this classification seem unsatisfactory in the light of morphological study of additional taxa.

Freidberg (1994, only printed abstract published) seems to have raised once again the possibility of relationship between "Phytalmiini (Tephritidae), [and] Angitulinae (Platystomatidae)". Hennig (1940a) disposed of this supposed alliance as convergence, and our more recent studies (McAlpine & Schneider, 1978) confirm the tephritid affinities of the Phytalmiini, without revealing any evidence of polyphyly for the Tephritidae.

In characterising Platystomatinae and Angitulinae as separate subfamilies (McAlpine, 1973a), I inclined to regard the relatively well-developed female tergite 6 as a plesiomorphy in the ground plan of Angitulinae, and the greater reduction of this tergite in Platystomatinae as a unifying apomorphy (probable autapomorphy) for the latter (though it is shared with the Scholastinae and Plastotephritinae). Hence, with reference to the well defined autapomorphies of Angitulinae, both could be treated as probably monophyletic groups. Further study convinces me that, even if the better developed tergite 6 is a groundplan condition for the *Angitula* alliance, it is unlikely to represent a plesiomorphy relative to the groundplan for Platystomatinae (sensu McAlpine, 1973a).

In relation to this problem, consideration of variation in female tergite 6 in the genus *Duomyia* is instructive. I have examined females of c. 90 of the species of this genus. With one exception, all species seen have a much reduced tergite 6 which becomes concealed under tergite 5 in dried specimens. The exceptional species (*Duomyia* "sp.18" in AM, numerous females examined) has a well-developed tergite 6, which is non-retractile, quite broad laterally, with setulose surface, and enlarged posterior marginal bristles. Within the Platystomatidae, such a condition resembles the presumed plesiomorphic state manifested in the outgroups Pyrgotidae and Tephritidae. Three possible phylogenetic interpretations are theoretically possible. (1) *Duomyia* "sp.18" represents a primitive sister group to the greater part of the Platystomatinae, which is synapomorphic in this character. (2) *Duomyia* "sp.18" is related to other taxa with closely similar general morphology, but these other taxa (many of which are placed in the subfamily Platystomatinae and a number in the genus *Duomyia*) have attained the apomorphic state by multiple convergence. (3) The condition in *Duomyia* "sp.18" is due to an evolutionary reversal in its own peculiar lineage, and is effectively a species-level autapomorphy within the broad taxonomic field of Platystomatinae, which are characterised by the almost uniform homologous condition of a reduced, retractile female tergite 6. I reject interpretation (1) as extremely improbable in view of the apparently close relationship of *Duomyia* "sp.18" to *D. glebosa* McAlpine and a group of closely related undescribed species. Interpretation (2) must be rejected as passing far beyond the requirements of theoretical parsimony into the realm of fantasy. Interpretation (3) must therefore be accepted by elimination of alternatives.

Accepting that the reduction tendency in female tergite 6 of Platystomatidae has been markedly reversed within *Duomyia*, I now regard it as possible/probable that the relatively well-developed tergite 6 in the trapherine genera *Xiria* Walker and *Phasiamya* Walker and the "angituline" subgenera *Angituloides* and *Giraffomyia* is also a secondarily derived condition. In those numerous platystomatid groups which show heterogeneity in development of female tergites 4–5, evolution of these structures also may not necessarily be unidirectional.

Clearly, the Angitulinae must be incorporated into the Platystomatinae for reasons given below in the discussion of *Terzia* n.gen. This means that all taxa in which the aedeagus is known to possess a pair of hollow terminal filaments with terminal gonopores are now placed in the Platystomatinae, and this is considered to be a groundplan condition for the subfamily.

Delimitation of the remaining three subfamilies is problematical. Australasian genera sometimes placed in the Plastotephritinae are *Chaetorivellia, Atopognathus*, and

Guamomyia, but A. Whittington has indicated (pers. comm.), from his studies of this mainly Afrotropical subfamily, that these assignments may be incorrect. *Chaetorivellia* is here assigned to the Scholastinae, though it is in incomplete agreement with the characterisation previously given (D. McAlpine, 1973a). *Atopognathus* and *Guamomyia* are here categorized as of doubtful subfamily position, together with *Apiola* which is poorly known morphologically and certainly not close to the "angituline" genera, now placed in Platystomatinae. Thus no Australasian genera now remain in the Plastotephritinae.

The Scholastinae and Trapherinae are discussed separately below. As aedeagal structure seems to be of major significance in the subfamily classification of platystomatids, it is possible that correlative study of reproductive biology may help interpretation of phylogeny. I also point out that gross morphology of the female reproductive system is known for very few genera.

Key to Australasian genera of Platystomatidae

1 Stem vein (base of R, Fig. 1, sv) dorsally before level of humeral crossvein with numerous setulae 2

—— Stem vein without setulae before level of humeral crossvein (setulose beyond) 5

2 Fronto-orbital bristles distinct; scutellum devoid of hairs; squama very narrow; New Guinea .... *Bama* part

—— Fronto-orbital bristles absent or vestigial; scutellum with few or many dorsal hairs; squama large and rounded (Fig. 1, sq) 3

3 Face with strongly raised flat-topped carina; mesopleural bristle usually absent; ♂: aedeagus with pair of terminal filaments (e.g., Figs. 24–26); ♀: abdominal tergite 5 long, or short but well sclerotised and exposed 4

—— Face without median carina; mesopleural bristle present; ♂: aedeagus without paired terminal filaments (e.g., Fig. 106); ♀: abdominal tergite 5 vestigial; widely distributed .... *Pterogenia*

4 Mesoscutum, mesopleuron, and abdominal tergites 2 to 5 largely glossy and almost without pruinescence; second basal cell largely bare; wing hyaline, with three small transverse brown stripes and very small apical spot on vein 3; New Guinea (one aberrant species) .... *Lamprogaster* part

—— Mesoscutum, mesopleuron, and/or tergites 2 to 5 almost entirely densely pruinescent; second basal cell usually largely microtrichose; wing with more extensive dark markings than indicated above; widely distributed .... *Euprosopia*

5 Eye densely haired; scutellum extensively haired dorsally; axillary lobe with fringe of long hairs, each >4 times as long as pubescence on vestigial squama; ♀: aculeus broad and blade-like; widely distributed .... *Atopognathus*

—— Eye bare or with sparse minute hairs; other characters not entirely as above 6

6 Metathorax with complete, deep, glossy postcoxal bridge (Fig. 90, pcb); humeral callus hairless or almost so; mesoscutum with hairing mainly reduced to few longitudinal series; outer vertical, ocellar, humeral, supra-alar, posterior intra-alar, dorsocentral, and mesopleural bristles absent; legs long; mid-femur neither thickened nor ventrally spinose; squama vestigial, without lobe 7

—— Metathoracic postcoxal bridge usually absent, if complete, dull-pruinescent; other characters not entirely as above 8

7 Scutellum without setiferous horns; pronotum very short and inconspicuous; thorax fulvous; Solomon Archipelago .... *Terzia*

—— Scutellum with pair of setiferous horns (Fig. 90, ss); pronotum enlarged, variously modified; thorax shining (often metallic) black; Moluccas, New Guinea, Bismarck and Solomon Archipelagos .... *Angitula*

8 Mid femur thicker than other femora, with strong ventral spines; other femora without ventral spines 9

—— Mid femur usually not thicker than other femora, if ventrally spinose then fore femur and/or hind femur also spinose 10

9 Pronotum transversely narrow-linear, recessed into front of thorax and scarcely visible from above; mesoscutum much broader than long; antennal sockets rather broadly separated by at least the width of antennal segment 1; widely distributed .... *Mesoctenia*

—— Pronotum broadly visible from above, not recessed; mesoscutum not broader than long; antennal sockets usually separated by less than half width of segment 1; widely distributed .... *Brea*

10 Fronto-orbital bristles absent or not distinctly differentiated 11

—— Fronto-orbital bristles distinct, though often small 33

11 Arista densely whitish-pubescent for almost whole length; antenna excluding arista longer than face on median line; face with minute erect hairs (Fig. 62) 12

—— Arista almost bare, or short-haired on basal part only, or loosely haired to apex, or bipectinate; other characters not as above 13

12 First basal cell broad at level of basal crossvein, narrowed near middle by curvature of vein 4 (Fig. 61); penultimate section of vein 4 very short, straight; Moluccas, New Guinea, Philippines .... *Antineura*

—— First basal cell very narrow for most of length, widened near anterior crossvein; penultimate section of vein 4 longer, curved, dipping into discal cell; Sulawesi, not Australasian .... *Philocompus*

13 Mesopleural bristle absent 14

—— Mesopleural bristle present 20

14 Anal crossvein strongly bent at anterior third of length; section of costa on subcostal cell more than four times as long as that on marginal cell; ♂: costa basally inflated, eliminating first costal cell (Fig. 82); New Guinea .... *Cleitamoides*

—— Anal crossvein curved or almost straight; section of costa on subcostal cell not much longer than that on marginal cell; ♂: costa not inflated basally 15

15 Arista long-haired, at least on mid section and usually for most of length, hairs tending to alignment in a dorsal and a ventral series (bipectinate condition); often some or all femora with ventral spinescent bristles but mid femur always without posterior bristles 16

—— Arista at most short-haired on basal part (hairs not much longer than basal diameter), usually bare on distal half, or, if relatively long haired, then mid femur with posterior bristles on distal half (few *Duomyia* spp.); femora usually without ventral spinescent bristles, except sometimes for a posteroventral series on fore femur 17

16 Antennal segment 2 rotund, cap-like; mid femur much thicker than other femora; squama vestigial, not forming lobe; ♂: eye never stalked or laterally protruding; horn-like cheek process often present; ♀: abdominal tergite 6 well developed, exposed, but shorter than tergite 5; Samoan Islands .... *Apiola*

—— Antennal segment 2 subconical to subcylindrical, more or less attenuated basally; squama forming a distinct broad to narrow lobe; mid femur not thicker than other femora; ♂: eye often stalked or laterally protruding; cheek process absent; ♀: tergite 6 vestigial, generally concealed; New Guinea, Bismarck Archipelago, northern Australia .... *Achias*

17 Basal crossvein very oblique, its distal end aligned with penultimate section of vein 5; postfrons usually with pronounced central tubercle; antennal segment 3 usually potentially extending far beyond lower margin of face on median line; second section of vein 4 at least three times as long as first; Moluccas, Oriental Region etc. .... *Lamprophthalma*

—— Basal crossvein transverse to somewhat oblique, meeting penultimate section of vein 5 at an angle; other characters variable 18

18 Squama vestigial, not forming a lobe; mesoscutum with transverse depression crossing medial line (evident in profile), much longer than wide; face somewhat saddle-like but without carina; scutellum with two pairs of bristles, bare medially but setulose laterally; suprasquamal ridge without erect hairs or setulae; mid femur neither bristled nor more conspicuously haired on posterior surface; widely distributed .... *Elassogaster* part

—— Squama forming a definite, often large lobe; mesoscutum without complete transverse depression; other characters not in above combination 19

19 Suprasquamal ridge without hairs (sometimes with short pubescence); supra-alar and prescutellar acrostichal bristles absent; mainly New Guinea species .... *Lamprogaster* part

—— Suprasquamal ridge with erect hairs (Fig. 1, sr); supra-alar and prescutellar acrostichal bristles often present; Australia .... *Duomyia* part

20 Prelabrum very deep, ventrally much extended towards proboscis; scutellar bristles only one pair or none; occiput very convex or prolonged; habitus elongate, ant-like; Queensland .... *Inium* part

—— Prelabrum not thus prolonged ventrally; other characters not entirely as above 21

21 Antennal segment 3 with numerous black setulae on inner surface; suprasquamal ridge with erect hairs; parafacial with fine hairs (distinct from pruinescence) near centre; thorax markedly elongate; Moluccas, Oriental Region .... *Conicipithea*

—— Antennal segment 3 without setulae, with only the usual pile-like (under low magnification) vestiture; suprasquamal ridge without erect hairs (often pruinescent); other characters variable 22

22 Face with strongly raised, sharply margined, flat-topped carina; squama very broad and rounded; posterior bridge of hind coxa without fine hairs; widely distributed .... *Lamprogaster* part

—— Without above combination of characters; face rarely with such carina in which case squama is narrow or vestigial 23

23 Mesoscutum wider than long; ♀: abdominal tergites 4 and 5 much reduced (less so in *Asyntona*) 24

—— Mesoscutum not wider than long; ♀: abdominal tergites 4 and 5 large and exposed 27

24 Anal cell acute at posterodistal angle; vein 4 ending at extreme apex of wing, its combined sections on discal cell much shorter than section on second basal cell (Fig. 121); widely distributed .... *Asyntona* part

—— Posterodistal angle of anal cell not acute; vein 4 ending a little behind apex, its sections on discal cell not shorter than that on second basal cell 25

25 Face with deep transverse central depression, highly convex and glossy below; antennal segment 3 at least four times as long as wide; abdominal tergites 2 and 3 with prominent median carina; Moluccas, Oriental Region .... *Trigonosoma*

—— Face little depressed centrally, not noticeably convex below; antennal segment 3 no more than three times as long as wide; abdominal tergites 2 and 3 without median carina 26

26 Antennal sockets separated by c. width of each or less; face almost entirely densely pruinescent; lower end of facial ridge with group of hairs not in a linear series; mesoscutum and dorsal surface of scutellum minutely roughened or pruinescent between hairs; New Guinea, Oriental Region .... *Neohemigaster*

—— Antennal sockets separated by c. twice width of each or more; face largely smooth and glossy; lower end of facial ridge with few hairs in a linear series; mesoscutum and dorsal surface of scutellum shining, almost smooth between hairs; Moluccas .... *Zygaenula*

27 First posterior cell not narrowed apically; distal section of vein 4 not curving forwards apically; parafacial with fine hairs near middle 28

—— First posterior cell narrowed apically; distal section of vein 4 curved anteriorly towards apex; parafacial haired at most only on upper extremity (often pruinescent) 29

28 Mesoscutum without pattern of numerous black spots; wing generally with brown markings; mesopleuron generally grey-pruinescent on entire posterior margin; widely distributed, not in Australia .... *Pseudepicausta* part

—— Mesoscutum with many black spots on a grey-pruinescent field (pattern not visible in greasy specimens); wing generally without dark markings; mesopleuron grey-pruinescent only on upper part; Australia, Oriental Region .... *Rhytidortalis* part

29 Face with fine hairs on central part; postscutellum setulose at sides; a dark longitudinal stripe covering first basal cell (Fig. 56), or wing with extensive infuscation; widely distributed .... *Plagiostenopterina* part

—— Face not haired; postscutellum without setulae; wing with neither dark stripe on first basal cell nor general infuscation 30

30 Fore femur with strong dorsal bristles; arista plumose or subplumose on basal part; scutellum not haired dorsally; Fiji, Oriental Region .... *Meringomeria*

—— Fore femur without distinct dorsal bristles; arista bare or with short pubescence; scutellum variable 31

31 Scutellum without hairs on central dorsal part, usually with few lateral hairs; vein 4 usually ending slightly in front of extreme apex of wing (Fig. 49); subcosta without ventral setulae on basal section; ♂ (where known): aedeagus with pair of terminal filaments; widely distributed .... *Elassogaster* part

—— Scutellum extensively haired dorsally; vein 4 ending at least slightly behind extreme apex; other characters variable 32

32 Subcosta with a series of small black ventral setulae before humeral crossvein; second basal cell less than half as long as discal cell; distal section of vein 5 approximately aligned with penultimate section; posterior bridge of hind coxa with fine hairs; ♂: aedeagus with pair of subequal terminal filaments; Bismarcks .... *Par* part

—— Subcosta without ventral setulae (microtrichose only); second basal cell more than half as long as discal cell; distal section of vein 5 somewhat bent posteriorly from junction with discal crossvein; posterior bridge of hind coxa hairless; ♂: aedeagus with only one terminal filament (Fig. 48, f); widely distributed .... *Microepicausta*

33 Sternopleural bristle present; ♀: abdominal tergite 5 reduced 34

—— Sternopleural bristle not distinct from surrounding setulae; ♀: abdominal tergite 5 variable 36

34 Scutellum strongly convex, entirely glossy black, without paler markings, setulose only on dorsal surface above level of lateral bristles; wing with large recurved black band (Fig. 94); Australia .... *Lenophila* part

—— Scutellum slightly convex, dorsally pruinescent, with yellowish U-shaped stripe or more extensively yellowish tawny, setulose laterally as well as dorsally; wing markings not including a recurved black band 35

35 Ventral margin of face not reflexed; scutellum without a ventrolateral series of bristles; first section of vein 4 shorter than second section (Fig. 111); basal section of vein 5 bare; widely distributed .... *Scholastes*

—— Ventral margin of face narrowly reflexed, thus facing ventrally; scutellum with a ventrolateral series of bristles; first section of vein 4 longer than second section (Fig. 108); basal section of vein 5 dorsally setulose; New Guinea, Afrotropical Region .... *Paryphodes*

36 Part of vein 4 on discal cell shorter than that on second basal cell; squama very broad; form subglobose 37

—— Part of vein 4 on discal cell longer than that on second basal cell; squama variable; form usually more elongate 38

37 Anal cell acutely or subacutely pointed at posterodistal angle; vein 4 ending in wing apex (Fig. 121); posterior margin of scutellum thin, with numerous bristles intergrading with setulae; mesopleuron, in dorsal view, prominently gibbous anteriorly; widely distributed .... *Asyntona* part

—— Anal cell obtuse posterodistally; vein 4 usually ending behind wing apex (Fig. 117); posterior margin of scutellum thick, rounded; scutellar bristles in 2 or 3 well differentiated pairs; mesopleuron without dorsally visible anterior gibbosity; widely distributed .... *Naupoda*

38 Section of costa on subcostal cell more than five times as long as that on marginal cell 39

—— Section of costa on subcostal cell not more than three times as long as that on marginal cell 40

39 Anal crossvein strongly bent near middle, its posterior part running basad into vein 6 so that anal cell is without an angle at junction; New Guinea .... *Cleitamia*

—— Anal crossvein recurved near middle, then flexed distad posteriorly to form a short acute lobe to anal cell where it joins vein 6 (as in most Tephritidae, Fig. 85); New Guinea .... *Loriomyia*

40 First basal cell at least as wide as combined width of second basal and anal cells; posterodistal angle of discal cell acute (Fig. 59); New Guinea .... *Pseudocleitamia*

—— First basal cell narrower than combined width of second basal and anal cells; venation otherwise variable 41

41 Hind femur much thicker than other femora, with two series of stout ventral spines; scutellum with three pairs of marginal bristles and no hairs 42

—— Hind femur not significantly thicker than other femora, without seriate spines; scutellum with variable vestiture 43

42 First posterior cell divided by a complete supernumerary crossvein; second section of vein 4 (before anterior crossvein) much longer than first (Fig. 54); fore femur with a series of stout ventral spines; Samoan Islands .... *Apactoneura*

—— First posterior cell without supernumerary crossvein; second section of vein 4 shorter than first (Fig. 20); fore femur without ventral spines; southern Micronesia, eastern Melanesia, tropical Polynesia .... *Pseudorichardia*

43 All femora strongly thickened, fusiform, without ventral bristles or spines; upper pleurotergite (above callus) with many long fine hairs; lateral occipital bristle present; Sulawesi, not Australasian .... *Scelostenopterina*

—— Femora of normal shape, or only hind femur of male modified; upper pleurotergite not haired, except in some *Laglaisia* spp. with slender femora and no lateral occipital bristle 44

44 Arista bipectinate (plumose) for most of its length 45

—— Arista with non-seriate short hairs or almost bare 48

45 Anal crossvein strongly subangularly bent near middle (Fig. 79); postfrons broader than long; scutellum usually with fine ventral setulae; eyes of male usually stalked; New Guinea .... *Laglaisia*

—— Anal crossvein simply curved or almost straight; postfrons usually longer than broad; scutellum without ventral setulae, but often densely pubescent; eyes not stalked 46

46 Wing membrane with many pale dots on darker field; membrane in discal cell with sharp longitudinal crease; one or two scapular bristles present; ♂: aedeagus with pair of terminal filaments; Sulawesi, not Australasian .... *Euthyplatystoma*

—— Wing membrane without pale dots, without sharp crease enclosed in discal cell; scapular bristles absent; ♂: aedeagus without terminal filaments 47

47 Squama narrow-linear, not forming a lobe; scutellum very broad, without setulae, with metallic green reflections; vein 2 less than half as long as vein 3; anterior crossvein meeting vein 4 near distal end of discal cell (Fig. 122); Fiji .... *Phlyax*

—— Squama forming a distinct rounded lobe; scutellum of moderate width, dorsally setulose, not metallic green; vein 2 more than half as long as vein 3; anterior crossvein meeting vein 4 near mid-length of discal cell (Fig. 97); Moluccas, New Guinea, Solomon Archipelago .... *Chaetorivellia*

48 Median part of face with fine hairs; lateral occipital bristle present; wing with dark longitudinal streak entirely covering first basal cell (Fig. 56); mesoscutum markedly longer than wide; New Guinea, Queensland, Moluccas .... *Plagiostenopterina* part

—— Median part of face bare; other characters not entirely as above 49

49 Postscutellum with group of setulae on each side (Fig. 52, ps); distal section of vein 4 from its origin to apex convergent with vein 3; costal margin with black spot on end of vein 2 but none at apex (Fig. 50); scutellum haired dorsally on entire width; Australia .... *Aetha*

—— Postscutellum without setulae; other characters not entirely as above 50

50 Lower part of facial ridge with dense short black setulae; lower anterior margin of cheek with a series of longer peristomial setulae, the foremost approximating in position to a vibrissa (Fig. 126); hind femur with long anteroventral bristles; axillary lobe with fringe of long hairs, each >4 times as long as pubescence on the vestigial squama; Lord Howe I, New Guinea, Bismarck Archipelago, Micronesia .... *Guamomyia*

—— Facial ridge with fine usually uniseriate hairs only; lower margin of cheek with setulae mainly on posterior part (these often very long in *Pogonortalis*); other characters variable 51

51 Anterior crossvein very oblique, no shorter than and almost aligned with penultimate section of vein 4 (Fig. 28); face with flat-topped sharply margined carina; arista rather densely short-haired for most of length; mesoscutum as long as wide; Loyalty Is .... *Montrouziera*

—— Anterior crossvein not as above or other characters not entirely as above 52

52 Prelabrum deep and much prolonged ventrally towards proboscis, not arcuate in ventral view but sclerotised across full width; small, shining black ant-like flies; Queensland .... *Inium* part

—— Prelabrum not thus prolonged towards proboscis, arcuate to horseshoe-shaped in ventral view; habitus various 53

53 Scutellum dull brown with yellowish U-shaped stripe, setulose on entire dorsal surface and on ventrolateral surface below marginal bristles; lower end of facial ridge with numerous non-seriate setulae covering a broad field (Fig. 98); axillary lobe and squama both moderately large; first section of vein 4 longer than second section; New Guinea .... *Tomeus*

—— Scutellum without yellowish U-shaped stripe; other characters not entirely as above 54

54 Squama notably larger in area than axillary lobe 55

—— Squama vestigial or not much larger than axillary lobe 57

55 First costal cell largely bare; face without central carina; ♀: tergite 4 c. ¼ as long as tergite 3; tergite 5 still shorter; New Guinea .... *Bama* part

—— First costal cell entirely microtrichose; face usually with broad flat-topped carina between antennal grooves; ♀: tergites 4 and 5 not much reduced 56

56 Suprasquamal ridge with erect hairs or setulae (Fig. 1, sr); mesopleural bristle usually absent, if present, small; ♂: abdomen usually subcylindrical; Australia .... *Duomyia* part

—— Suprasquamal ridge with minute pubescence only; mesopleural bristle well developed; ♂: abdomen usually broadly ovate; widely distributed .... *Lamprogaster* part

57 Scutellum haired on central part of dorsal surface (hairs reduced to minute stumps in male of one *Rivellia* sp.) 58

—— Scutellum without hairs on central part of dorsal surface, sometimes with a few hairs at sides 63

58 Marginal cell much attenuated on distal half; hind femur longer than mesoscutum; second section of vein 4 (before anterior crossvein) less than half as long as third section; distal (fourth) section of vein 4 strongly converging with vein 3 apically (Fig. 18); Loyalty Is .... *Tarfa*

—— Marginal cell not much attenuated distally; other characters not entirely as above 59

59 Dark band on discal crossvein, when present, quite separate from any more basally located dark band or zone; two pairs of scutellar bristles present; ♂: shape of hind tibia not modified; ♀: abdominal tergites 4 and 5 large 60

—— Dark band from apex of vein 5 passing obliquely forward to costa on subcostal cell where it connects with more basally located dark band or zone (Figs. 13, 94); three pairs of scutellar bristles present; ♂: hind tibia usually strongly modified in shape; ♀: tergites 4 and 5 variable 62

60 Veins 3 and 4 apically convergent; subcosta with small ventral setulae before level of humeral crossvein; posterior bridge of hind coxa with small hairs; Bismarck Archipelago .... *Par* part

—— Veins 3 and 4 not apically convergent; subcosta without ventral setulae; posterior bridge of hind coxa hairless 61

61 Second section of vein 4 rather strongly concavely curved on distal part (Fig. 14); postgenal fold absent; height of cheek generally less than 0.2 of height of eye; antenna (without arista) about as long as face on median line, at least in male; widely distributed, but absent from New Zealand .... *Rivellia*

—— Second section of vein 4 with only slight curvature; deeply incised vertical postgenal fold present (Fig. 17, pf); height of cheek greater than 0.2 of height of eye; antenna much shorter than face; Australia, New Zealand .... *Zealandortalis*

62 Ground-colour of thorax almost entirely black; lateral occipital bristle absent; second costal cell partly hyaline; ♂: aedeagus without terminal filaments (Fig. 95); ♀: abdominal tergite 5 reduced; Australia ...... *Lenophila* part

—— Ground-colour of thorax largely orange-tawny; distinct but fine black lateral occipital bristle present; second costal cell entirely dark brown; ♂: aedeagus with pair of terminal filaments (Fig. 12, f); ♀: tergite 5 large; Australia ...... *Loxoneuroides*

63 Height of cheek immediately below eye less than one tenth height of eye; hind femur with anteroventral keel or slightly developed tooth at or near distal third; anterior crossvein meeting vein 4 before mid-length of discal cell (Fig. 53); widely distributed ...... *Pogonortalis*

—— Height of cheek below eye more than one tenth height of eye; hind femur without anteroventral keel or tooth; anterior crossvein generally meeting vein 4 at or beyond mid-length of discal cell 64

64 Antennal segment 3 rounded oval, not more than c. twice as long as deep on outer exposure (Fig. 11); mesoscutum scarcely longer than wide; ♂: prelabrum creamy, and either hypertrophied, anteriorly flattened and shield-like, or vestigial and largely desclerotised, in the latter case palpus much broadened; New Guinea, Australia ...... *Hysma*

—— Antennal segment 3 c. three times as long as deep or longer; mesoscutum variable in proportions; ♂: prelabrum with none of above modifications 65

65 Parafacial with fine socket-based hairs on central part, often in addition to pruinescence 66

—— Parafacial with hairs restricted to upper part near confluence with postfrons, or absent 68

66 Second section of vein 4 gently arched (Fig. 40); abdominal tergite 4 with broad lateral zone of dense non-directional white pruinescence; except in New Caledonian species, vein 1 ventrally near end of subcosta with a series of short black setulae, and alula largely bare; Queensland, New Guinea, Bismarck Archipelago, New Caledonia ...... *Eumeka*

—— Second section of vein 4 not arched, straight or with concave curvature; abdominal tergite 4 either without pale pruinescence, or with pale pruinescence not covering lateral marginal zone and usually unidirectional (i.e. pale zones not apparent from some angles); vein 1 without ventral setulae; alula entirely microtrichose 67

67 Mesoscutum extensively pale grey-pruinescent, with black dot at base of each hair; hind basitarsus distinctly less than half as long as hind tibia; wing, in Australasian species, without dark markings; ♀: ovipositor sheath not much longer than tergite 5; Australia, Oriental Region ...... *Rhytidortalis* part

—— Mesoscutum not extensively pale grey-pruinescent, sometimes with pale grey median stripe; hind basitarsus at least half as long as tibia; wing with apical brown mark; ♀: ovipositor sheath usually at least twice as long as tergite 5; New Guinea, etc. ...... *Pseudepicausta* part

68 Mid femur with one isolated preapical posterior bristle; a dorsocentral bristle situated almost halfway between scutellar suture and transverse suture, and usually, behind this, a bristle intermediate in position between dorsocentral and prescutellar acrostichal; anterior and discal crossveins enclosed in the one dark band (Fig. 72); New Guinea, Bismarck Archipelago, Queensland .... *Euxestomoea*

—— If mid femur with posterior bristles, then these merging with series of long hairs; dorsocentral bristle much closer to scutellar suture; wing markings various 69

69 Second section of vein 4 with sigmoid curvature on distal part; anterior crossvein meeting vein 4 well beyond middle of discal cell; capitellum of halter dark brown; mesoscutum without noticeable grey pruinescence; ♀: abdominal tergites 4 and 5 vestigial, usually concealed in dried specimens; New Guinea .... *Bama* part

—— Second section of vein 4 without sigmoid curvature; ♀: abdominal tergites 4 and 5 well developed, exposed; other characters not entirely as above 70

70 Mesoscutum without noticeable grey pruinescence between hairs, the interstices sometimes roughened; brown costal mark restricted to subcostal cell or absent; a shining median quadrate sclerite present between face and prelabrum (few aberrant species, e.g., Fig. 63); Australia .... *Duomyia* part

—— Mesoscutum with much grey pruinescence, often forming longitudinal bands; brown costal mark well developed at wing apex; sclerite between face and prelabrum absent or not distinctly developed 71

71 Section of costa on subcostal cell subequal in length to that on second costal cell; distal section of vein 4 not perceptibly curved forward apically (Fig. 38); posterior bridge of hind coxa hairless; scutellum with two or three pairs of major bristles, progressively longer posteriorly, and no setulae; Australia .... *Scotinosoma*

—— Section of costa on subcostal cell much longer than that on second costal cell; distal section of vein 4 curved forward apically, converging with vein 3 (Fig. 42); posterior bridge of hind coxa with fine hairs; scutellum with two pairs of major bristles and one or few setulae on each side; New Caledonia .... *Signa*

Subfamily Platystomatinae

This subfamily is much the largest of the family. It is here further expanded to include the subfamily Angitulinae, which becomes a synonym, for reasons discussed above and under genus *Terzia*.

The groundplan of the Platystomatinae includes the characteristic aedeagus, with sclerotised, capsule-like glans, and a pair of hollow terminal filaments, each with an apical gonopore, but it is not certain if the presence of paired terminal filaments is an autapomorphy for the subfamily, as it is also feasible that the condition may have been secondarily lost in taxa outside this subfamily. However, the only known platystomatine taxa without this condition have a structure clearly derived therefrom. For instance, some species of *Brea* and *Lamprogaster* have three instead of two terminal filaments; at least one species each of *Bromophila* Loew and *Duomyia* have the two filaments fused for all or most of their length, and in *Microepicausta* there is a single terminal filament.

Genus *Hysma* n.gen.

Type species: *Hysma lacteum* n.sp.

Description (♂, ♀). Small or moderately small robust flies, with legs of moderate proportions, as in stouter *Rivellia* spp.

Head much higher than long; face concave, without distinct median carina, with slightly sunken antennal grooves; facial ridge with single series of setulae on lower part only; parafacial narrowed on central part, without setulae; occipital region broadly convex below, slightly convex above; postgenal fold absent; cheek rather shallow or of moderate depth; the following bristles present: inner and outer vertical, small or vestigial postvertical, variably developed non-proclinate ocellar, two fronto-orbitals, postgenal; lateral occipital sometimes present. Antenna much shorter than face; segment 3 broadly oval, rounded distally; segment 6 with short pubescence of moderate density on entire length. Prelabrum sexually dimorphic, in female large or moderately large, in male very large with anterior surface flattened (*Hysma lacteum*), or reduced and apparently little sclerotised; palpus moderate to large, in males of species other than *H. lacteum* subtriangularly broadened.

Thorax. Mesoscutum c. as broad as long or slightly broader, extensively setulose,with surface between hairs varying from largely glabrous and glossy (*H. lacteum*) to extensively pruinescent; scutellum rounded in outline, dorsally convex, almost glabrous or pruinescent, without setulae; the following bristles present: poorly differentiated scapulars, humeral, 1+1 notopleurals, supra-alar, postalar, posterior intra-alar, one dorsocentral, prescutellar acrostichal, three pairs of scutellars, of which intermediate one slightly removed from margin, mesopleural, sometimes pteropleural. Posterior bridge of hind coxa without hairs; femora without ventral spines; fore femur with dorsal and anteroventral bristles; mid femur with or without a series of short posterior bristles; hind femur usually with distinct distal dorsal bristles; mid tibia with one large apical ventral spur. Wing generally similar to that of *Rivellia*; veins 3 and 4 distally slightly divergent; cell-4 index = c. 0.6–0.8; second section of vein 4 less curved than in *Rivellia*; distal section of vein 6 well sclerotised almost to margin, or sclerotisation discontinued at c. 0.7 of distance to margin; wing membrane, including costal cells and alula, microtrichose, except sometimes on much of second basal and anal cells; squama forming a very small lobe; axillary lobe slightly larger in area.

Abdomen. Tergite 5 unreduced in either sex, without strong bristles. Female abdomen: spiracles 4 and 5, where investigated, located in pleural membrane near posterior part of lateral margin of respective tergites; aculeus very slender, obtuse.

Distribution. Eastern Australia: high rainfall areas of north and south. Papua New Guinea: only known from Morobe Province.

Notes. There are three or, perhaps, four species in the available material of *Hysma*, but only the type species is described at present.

Probably all species have remarkable sexual dimorphism of the face, prelabrum, and palpus, which are much modified in males. In *H. lacteum* the male has the prelabrum enlarged, with flattened, conspicuously pale creamy anterior surface, and the face similarly coloured (these parts being brown in the female), the palpus brown-black but no larger than the tawny-orange palpus of the female. In the other two species for which the males are known, the face of the male is paler and foreshortened below, relative to that of female, so that the pale, translucent, anterior extension of the subcranial membrane is broadly exposed above the small, desclerotised, pale yellow prelabrum (these parts unmodified in female). Also, these males have the palpus conspicuously broadened and subtriangular, in contrast to the unmodified palpus of the females.

A series of *Hysma* sp. from Bulburin (Monto district, Queensland, AM) shows extraordinary difference in wing pattern between the two males and the 12 females. Without further study material I cannot be sure if this indicates unusual sexual dimorphism, or the presence of two species, each represented by one sex in the sample. In a pair of a very similar species from near Bulolo, Papua New Guinea (AM), the wing pattern of both sexes resembles that of the Bulburin females.

In general, *Hysma* spp. are found only in rainforest, but the specimen of *H. lacteum* from Bodalla State Forest was probably taken in wet sclerophyll forest. Several have been collected in faecal traps.

The generic name is Greek for rain, and is neuter.

Hysma lacteum n.sp.

Figs. 10, 11

Material examined. HOLOTYPE, ♀, New South Wales: Upper Allyn (Lister Park), near Eccleston, 9.iii.1970, G.A.H., D.K.M. (AM). PARATYPES, New South Wales: 1 ♂, Dorrigo National Park, Glades area, Jan. 1988, D.J.B. (AM); 2 ♀♀, Upper Allyn, Dec. 1969, Mar. 1970, G.A.H., D.K.M. (AM); 1 ♀, Mount Keira, near Wollongong, Jan. 1970, G.A.H. (AM); 1 ♀, Bodalla State Forest, near Narooma, Jan. 1982, B.J.D. (AM).

Other material. Queensland: Longland's Gap, near Atherton (AM); Sluice Creek, near Millaa Millaa (AM).

Description (♂, ♀). *Coloration*. Head of female largely tawny; upper orbits and sides of vertex dark brown; occiput largely blackish, with silvery pruinescence in part; cheek suffused with brown; face tawny. Head of male with postfrons largely dark brown; face pale cream. Antenna in male brown, with base of segment 3 tawny, in female segments 1–3 all tawny. Prelabrum of male pale cream on anterior surface, dark brown laterally, in female entirely brown; palpus brown-black in male, tawny in female. Thorax largely glossy black, with faintly blue-green tinged reflections. Legs, including coxae and tarsi, dark brown to black. Wing with brown to blackish markings, as in Fig. 10, which are slightly more extensive in male, particularly the suffusion behind vein 5; wing apex between veins 3 and 4 subopaque white. Halter dark brown, tawny-brown basally. Abdomen black to dark brown; tergites 1–5 largely glossy.

Head. Height of cheek c. 0.22 of height of eye; fronto-orbital and ocellar bristles small. Prelabrum in female large, slightly convex anteriorly, in male larger, nearly as deep as face, well sclerotised, with anterior surface vertically flattened; palpus of moderate size, not enlarged in either sex.

Thorax. Wing: vein 3 setulose dorsally for most of length, bare ventrally; cell-4 index = 0.69–0.76; second basal cell bare on c. basal three quarters; anal cell with longitudinal bare zone.

Abdomen. Male postabdomen: epandrium with few enlarged setulae near base of outer surstylus; outer surstylus moderately stout, its apex exceeding that of inner surstylus, produced into a slender point posteroapically; aedeagus broken in only available male.

Dimensions. Total length: ♂ 2.7 mm, ♀♀ 4.6–5.6 mm; length of thorax, ♂ 1.3 mm, ♀♀ 1.9–2.6 mm; length of wing, ♂ 3.3 mm, ♀♀ 4.5–5.2 mm.

Distribution. Queensland: only known from higher parts of Atherton Tableland. New South Wales: coastal and subcoastal areas from Dorrigo district to Narooma district.

Notes. *Hysma lacteum* is distinguished from other, undescribed species of *Hysma* by having the mesoscutum and scutellum shining black, almost without pruinescence, and the halter largely dark brown, instead of pale yellowish.

The specific epithet is a Latin adjective meaning milky, in reference to the opaque white wing apex.

Genus *Loxoneuroides* Hendel

Figs. 12, 13

Loxoneuroides Hendel, 1914a: 15, 80–81. Type species (original designation) *L. varipennis* Hendel.

Description. A detailed description has been given by Hendel, which I supplement as follows.

Male abdomen. Sternite 5 very deeply bilobed; base of preglans with elongate lobe, but preglans otherwise not much differentiated from stipe; glans short and stout, desclerotised on one side; bulb rather large and lobed; terminal filaments equal, tapered, each not much longer than glans, partly ensheathed by membranous bulb; cerci largely separate, lying in almost parallel planes.

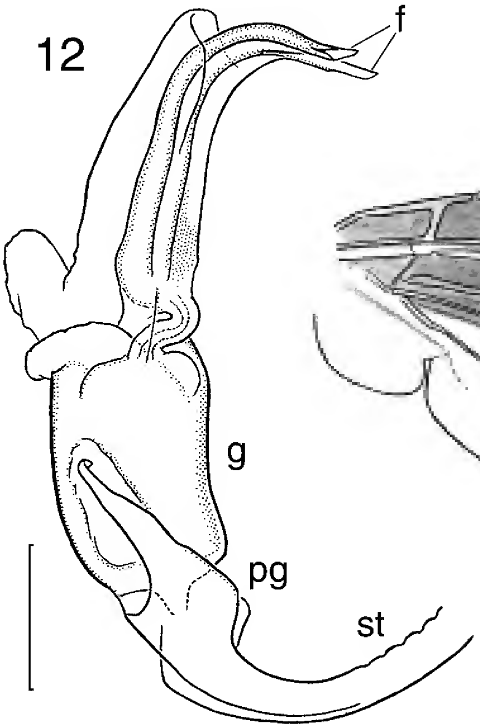
Female abdomen. Tergites 3 and 4 large; tergite 5 slightly shorter; tergite 6 vestigial; spiracles 4 and 5 larger than others, situated close to posterior part of lateral margins of respective tergites; ovipositor sheath short; aculeus slender, obtuse, not compressed.

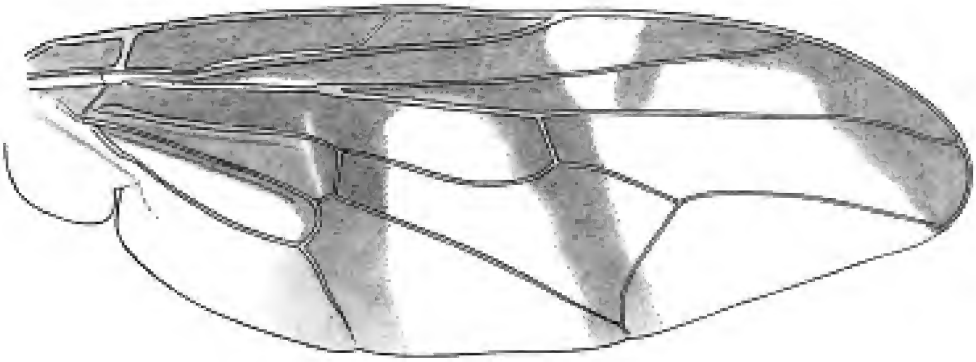
Distribution. Eastern Australia, from Cooktown district, Queensland, to Taree-Gloucester district, New South Wales.

Notes. *Loxoneuroides* includes at least three superficially similar species, of which only *L. varipennis* Hendel is described. Evenhuis (1989) used the spelling *L. variipennis* of the two original spellings given by Hendel (1914a). However, Hendel (1914b) consistently used the spelling *L. varipennis*, thus acting as first reviser under Article 24.2.4 of ICZN (1999).

These flies inhabit rainforest, including dryer rainforests in some areas, but are not recorded from littoral rain forests. They frequently rest on foliage (generally on the lower surface of leaves) or bark, with the wings fully extended laterally. They can be so conspicuous in this position, that aposematic display is suspected. Adults are attracted to mammalian faeces for feeding.

12





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Figures 12–13. *Loxoneuroides* "sp. 2" (Mulgrave River, AM). 12, distal part of aedeagus (scale = 0.2 mm). 13, wing. Abbreviations: f, terminal filaments; g, glans; pg, preglans; st, stipe.

Genus *Rivellia* Robineau-Desvoidy

Fig. 14

Rivellia Robineau-Desvoidy, 1830: 729. Type species (designated Rondani, 1869) *Musca syngenesiae* Fabricius.

See Soós, 1984 for details.

Description. The description by Hendel (1914a) remains largely valid. The generic and specific descriptions by Namba (1956) give a useful indication of the range of morphological variation in the species of America north of Mexico.

Distribution. Almost cosmopolitan. Australasian Region: Moluccas; New Guinea; Bismarck Archipelago; Solomon Archipelago; New Caledonia; Fiji; Samoan Islands; Austral (Tubuai) Islands; Norfolk Island; Australia—all states and Northern Territory (including central Australia). *Rivellia* has much the widest distribution of any platystomatid genus, both on a world basis and in the Australasian Region.

Notes. Namba (1956) gave an excellent review of the Nearctic species, and Lyneborg (1969) characterised the two European species. Taxonomic work on other faunas has a quite inadequate morphological basis, so that reidentifications and subsequent distribution records of described species should in general be queried. Future taxonomic studies should record details of male genitalia, including measurements of the glans, and positions of spiracles 4 and 5 in the female abdomen. Descriptions of additional species without this information are to be avoided.

Evenhuis (1989) listed 27 named species for the Australasian Region. Accumulated collections contain many undescribed species, but the number cannot be estimated without a thorough study. An arbitrary minimum of 45 species for the Region is here utilised.

Larvae of *Rivellia* spp. Are recorded as feeding on the nitrogen-fixing root nodules of leguminous plants in Australia (Diatloff, 1965) and several other countries (summary in Bibro & Foote, 1986). In Australia, the very general distribution of *Rivellia* spp. is probably related to a similar distribution of these plants (family Leguminosae or Fabaceae s. l.), perhaps particularly, but by no means exclusively, the genus *Acacia* (wattles, subjective synonyms *Zygmoloba, Racosperma*). Though I have no direct evidence of *Rivellia* larvae living on *Acacia* roots, adults are found on *Acacia* plants in many parts of Australia. For some years adults of a *Rivellia* sp. were plentiful in my back yard at Willoughby, Sydney, and seemed particularly to inhabit a large tree of *Acacia saligna*. When this tree died several years ago, the *Rivellia* population disappeared. The broad treatment of arthropods associated with *Acacia* by New (1984) seems to indicate that very little has been recorded of those infesting the root systems. Damage to the plants from injury to the roots has probably not been generally diagnosed, and there is a possibility that *Rivellia* spp. may have significant ecological impact on *Acacia* populations. Perhaps larvae of some other platystomatine genera frequently found in *Acacia*-dominated habitats, e.g., *Duomyia, Microepicausta, Rhytidortalis*, and *Zealandortalis*, are associated with *Acacia* roots.

A female specimen of *Rivellia* sp. from Jervis Bay, A.C.T. (AM), carries an ascoma of an ectoparasitic fungus of the order Laboulbeniales on its abdomen. I have seen a somewhat similar fungus on a female of *Senopterina foxleei* Shewell from British Columbia, Canada.

Genus *Zealandortalis* Malloch

Zealandortalis Malloch, 1930a: 243. Type species (original designation) *Z. interrupta* Malloch.

Description. Flies of medium to rather stout build and moderately small size, with legs of moderate length.

Head markedly or only slightly higher than long; facial carina distinct and narrow, or undeveloped; facial ridge with a distinct series of hairs only near lower end; parafacial haired only at upper extremity, or with few hairs extending to middle; occiput broadly convex below, slightly concave to planate above, with distinctly incised vertical postgenal fold; cheek relatively deep (its height 0.24–0.38 of height of eye in measured specimens); the following bristles

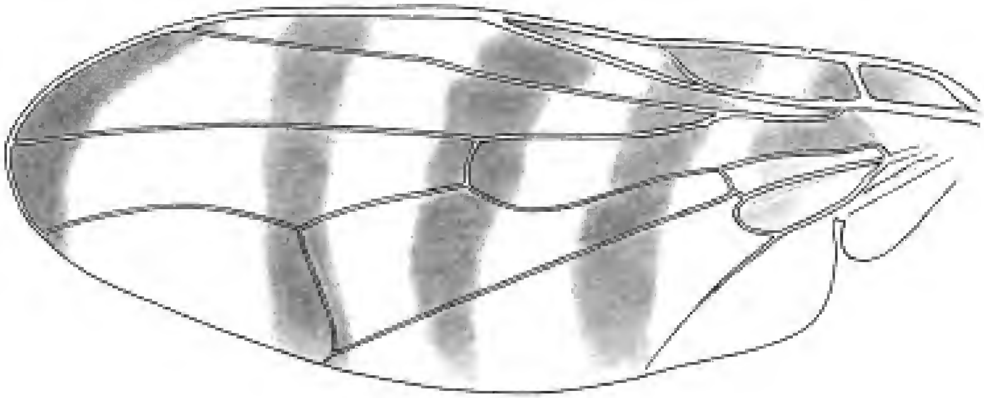


Figure 14. *Rivellia* "sp. A" (Iluka, AM), wing.

present: inner and outer vertical, strongly divergent postverticals, ocellar, two distinct fronto-orbitals, lateral occipital, postgenal. Antenna, excluding arista, much shorter than face; segment 6 minutely pubescent on most of length. Prelabrum of moderate size in female, markedly smaller in male; palpus and proboscis moderately developed.

Thorax. Mesoscutum c. 0.9–1.1 times as long as wide; scutellum rounded in outline, dorsally convex, setulose dorsally, with little or no pale pruinescence; the following thoracic bristles present: one or two scapulars, humeral, 1+1 notopleurals, supra-alar, postalar, posterior intra-alar, dorsocentral (sometimes reduced), prescutellar acrostichal (sometimes absent), two pairs of scutellars, mesopleural. Posterior bridge of hind coxa without hairs; femora without ventral spines; fore femur with dorsal and posteroventral bristles; hind femur with few dorsal bristles and, in Australian species only, one or more anteroventral bristles. Wing membrane, including anal cell and alula, largely microtrichose; section of costa on subcostal cell shorter than that on second costal cell; subcosta and vein 5 without setulae; anterior crossvein approximately transverse, meeting vein 4 slightly beyond mid-length of discal cell; second section of vein 4 with only slight curvature (compared with *Rivellia*); distal section of vein 4 slightly arched, not apically convergent with vein 3; anal crossvein slightly to rather strongly curved; axillary lobe small, with marginal hairs longer than on the narrower squama.

Abdomen ovoid; tergite 5 unreduced. Male postabdomen: apical part of outer surstylus much surpassing apex of inner surstylus; aedeagus either of simple platystomatine structure with short bulb and longer terminal filaments (New Zealand species), or with strap-like bulb many times as long as glans and terminal sclerotised lobe larger than either terminal filament (Australian species). Female abdomen: spiracle 5 located below lateral margin of tergite 5 (at least in Australian species); aculeus moderately or quite slender, obtuse.

Distribution. New Zealand: North and South Islands. Australia: temperate eastern areas and south-west.

Notes. *Zealandortalis* has been previously used to include two New Zealand species, and has been regarded as endemic to that country (Harrison, 1959). After careful consideration, I have decided to include the Australian *Z. gregi* (described below) in *Zealandortalis*, despite the number of differences from the New Zealand species. There is a reasonable probability, but no certainty, that the more broadly defined genus is monophyletic, and it is readily identified from key characters. The placement of *Z. gregi* in another monotypic genus, when cladistic considerations do not necessitate it, is undesirable. I do not consider that divergence in male genitalia characters is a stronger indication of phylogenetic remoteness than is divergence in other kinds of character, especially as it is possible that the full range of morphological variation in the New Zealand species is not yet recorded.

The Australian species is treated as belonging in a separate informal group from the New Zealand ones, characterised in the key given below. My limited material from New Zealand shows a combination of the characters for the two described species as given by Harrison, so that the number of New Zealand species and their distinguishing characters may need clarification.

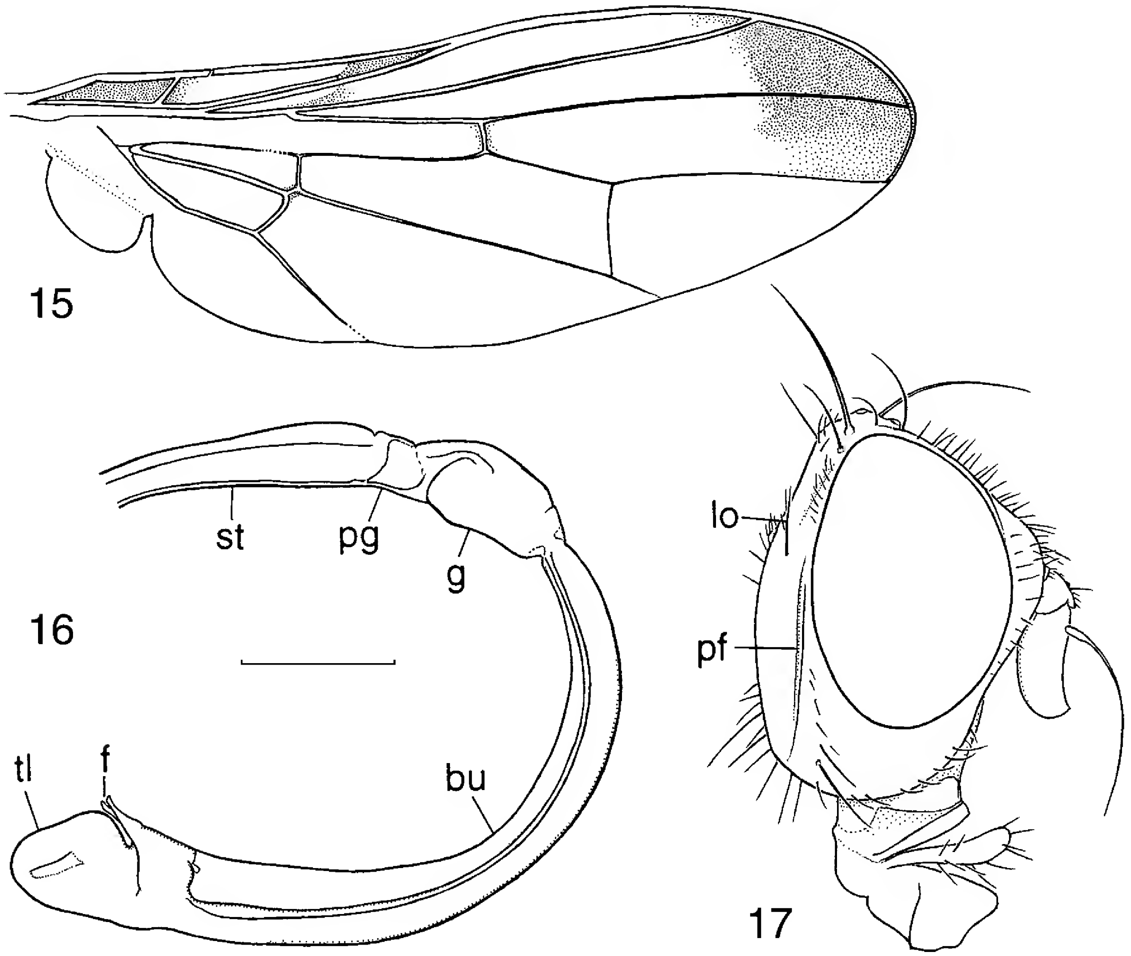
In temperate eastern Australia *Z. gregi* lives in a range of forest types from warm coastal lowlands to winter-cold highlands. Specimens of *Zealandortalis* sp. from South Island, New Zealand (B.J.S.), are labelled "ex nikau palms." I collected a specimen doubtfully referable to *Z. interrupta* from low vegetation in *Nothofagus fusca* forest on Banks Peninsula, there being no palms in the vicinity.

The female from Banks Peninsula was observed *in vitro* to walk with the wings folded in a horizontal plane largely, but not completely, overlapping. No wing-waving was observed over a period of about five minutes' activity. Though the above behaviour was observed comparatively briefly, it contrasts with that of *Z. gregi*, of which several specimens of both sexes from near Church Point, Sydney district, were observed in a plastic container over several days. When at rest, the wings were held in a horizontal plane, slightly spread in a V so as to avoid any overlap. But often there was an apparently alert attitude, with wings spread and vibrated rapidly between the fully spread and more flexed positions. When the fly was walking, the wings were sometimes held in a V-flexed position, but, for most of the time, there was no marked wing vibration. Two intermediate actions, not infrequent, were (1) vibrating one wing only, with the other almost still; (2) holding the wings in a very broad V and vibrating them with very small amplitude. A pair was observed apparently *in copula* several times. The male was clinging to the abdomen of the female in a position rather like that described for *Pogonortalis doclea* (see McAlpine, 1973b). The wings of the female were widely spread, while those of the male were almost fully flexed.

Key to groups in *Zealandortalis*

1 Ocellar bristle large, potentially reaching more than halfway to ptilinal suture; facial carina strongly raised, narrow, with steep sides; antennal segment 3 acute dorsoapically; hind femur with one or more long anteroventral bristles, stronger in male; vein 3 with setulae distributed over most of length; abdominal tergite 5 (both sexes) with long posterior marginal bristles; aedeagus with bulb strap-like, many times as long as glans, terminating in sclerotised lobe much larger than each terminal filament .... Australian group

—— Ocellar bristle smaller, not nearly reaching halfway to ptilinal suture; facial carina undeveloped; antennal segment 3 broadly rounded distally; hind femur without differentiated anteroventral bristles; vein 3 with few setulae, mostly near its base; abdominal tergite 5 without posterior marginal bristles; aedeagus (where known) with bulb little developed, lacking sclerotised lobe .... New Zealand group



Figures 15–17. *Zealandortalis gregi* n.sp. 15, wing. 16, distal part of aedeagus (scale = 0.2 mm). 17, head of male. Abbreviations: bu, bulb; f, terminal filaments (paired); g, glans; lo, lateral occipital bristle; pf, postgenal fold; pg, preglans; st, stipe; tl, sclerotised terminal lobe of aedeagus.

Zealandortalis gregi n.sp.

Figs. 15–17

Material examined. HOLOTYPE, ♂, New South Wales: Iluka rainforest reserve, 26.xi.1970, D.K.M. (AM). PARATYPES, New South Wales: 100 ♂♂, 18 ♀♀, Iluka, Nov. 1970, Jan. 1971, A.H., D.K.M. (AM, ANIC, UQ, BM, BPB, RMS, USNM).

Other material. Queensland: Blackdown Tableland, Expedition Range (AM); Bribie Island (AM, UQ). New South Wales: Mount Gibraltar National Park (AM); Tucker's Rock, near Repton (AM); Urunga (AM); Boonanghi State Forest, near Kempsey (AM); Cobark Picnic Area, Wilson River, Bellangry district (AM); Taree (AM); Timor Rock, Warrumbungle Range (AM); Lahey's Creek Road, 12 km NW of Gulgong (AM); Wongarbon Nature Reserve, 17 km SE of Dubbo (AM); "Tuglo", near Mount Royal (AM); Mungo Brush, near The Broadwater, Myall Lakes (AM); Mooney Mooney Creek, near Gosford (AM); Newnes, Lithgow district (AM); Mount Wilson (AM); Katoomba (AM); Wentworth Falls (AM); Yellow Rock Lookout, near Springwood (AM); Newport (AM); Church Point (AM); Vaucluse (AM); Royal National Park (AM); Heathcote (AM); Otford (AM); Stanwell Tops (AM); Bendalong, Conjola district (AM); Bodalla State Forest, near Narooma (AM). Australian Capital Territory: Condor Creek, Brindabella Range (AM). Western Australia: 15 mi. (c. 24 km) SE of Manjimup (AM).

Description (♂, ♀). Habitus and appearance suggestive of a stout, dark *Rivellia* species, with few wing markings. *Coloration*. Head fulvous to reddish brown; orbital plates shining blackish brown; entire occipital region blackish brown, with grey pruinescence. Antenna fulvous, with brown arista. Prelabrum tawny; palpus fulvous. Thorax black, largely shining, with dark grey pruinescence mainly on notopleural region, upper part of mesopleuron, and posterior parts of pleura, none on scutellum or a minute amount near scutellar bridge. Legs fulvous; hind tibia and sometimes fore femur suffused with brown; tarsi variably browned apically (flies in southern populations often with more extensively browned legs). Wing hyaline; first costal cell, base of second costal and stigmatal section of subcostal cell browned; also a small brown spot in marginal cell near fork of veins 2 and 3, and a large apical dark brown spot on vein 3, usually not or only indistinctly reaching to veins 2 and 4; axillary lobe and squama creamy, with fulvous margins. Halter creamy, with tawny scabellum. Abdomen black; preabdominal tergites without obvious pruinescence.

Head slightly higher than long; height of cheek 0.25–0.38 of height of eye; face with pair of moderately deep antennal grooves, separated by a high, narrow, steep-sided carina; parafacial narrowed near middle, haired at upper end, the hairs extending as a spaced single series to about middle; occiput with well marked postgenal fold almost from lower extremity of postgena to middle of posterior margin of eye; anterior fronto-orbital much larger than posterior one, both reclinate; ocellar bristle much longer than anterior fronto-orbital. Antennal segment 3 relatively narrow, acute dorsoapically.

Thorax. Hairing on scutellum and posterior part of mesoscutum markedly longer in male than in female. Hind femur of male with a series of c. four to seven well-developed black anteroventral bristles, sometimes reduced to one bristle in diminutives, in female with c. one to three finer, usually yellow, but sometimes quite long anteroventral bristles. Wing: vein 3 dorsally with well-developed spaced setulae on most of length; cell-4 index = 0.57–0.64.

Abdomen. Tergites 2 to 5 with longer hairs in male than in female; tergite 5 with several long posterior marginal bristles, in male this tergite particularly broad and giving preabdomen a broadly truncated outline; spiracle 5 located below lateral margin of tergite 5 in both sexes. Male postabdomen: distal section of outer surstylus considerably exceeding apex of inner surstylus, tapering to a slender apex; aedeagus with short, simple preglans; glans short, broadly ovoid; bulb consisting of elongate tubular section, c. five times as long as glans, and containing three pigmented longitudinal strips, and broad, darkly sclerotised terminal lobe almost as long as glans; terminal filaments very small, subequal, arising from a distinct sclerite at base of terminal lobe.

Dimensions. Total length, ♂♂ 2.9–3.9 mm, ♀♀ 2.4–3.9 mm; length of thorax, ♂♂ 1.1–1.7 mm, ♀♀ 1.1–1.7 mm; length of wing, ♂♂ 2.4–3.6 mm, ♀♀ 2.7–4.1 mm; length of glans of aedeagus 0.20–0.24 mm.

Distribution. Queensland: apparently widely distributed south of the tropic (few records). New South Wales: widely distributed in coast and tableland districts, inland to Dubbo district and Warrumbungle Range (common in many districts). Australian Capital Territory: Canberra district. Western Australia: far south.

The specific epithet refers to Greg Daniels who has collected much useful material.

Genus *Tarfa* n.gen.

Type species: *Tarfa bowleyae* n.sp.

Description (♀, ♂ unknown). Moderately small flies; habitus somewhat like that of *Rivellia*, but significantly more elongate, not subcylindrical as in *Eumeka, Microepicausta*, etc.; legs conspicuously longer than in the above-named genera.

Head markedly higher than long; face without median carina, concave in profile except towards lower margin; lower end of facial ridge with uniseriate fine hairs; parafacial very narrow, without hairs; occiput convex below, slightly concave above; the following bristles present: inner and outer vertical, small divergent postvertical pair, vestigial ocellar, one large fronto-orbital, moderately small postgenal; lateral occipital bristle absent. Antenna, excluding arista, slightly shorter than face on median line; segment 2 short and rather rotund; segment 3 narrowly ovate; segment 6 slender, with numerous short hairs on entire length. Prelabrum deep; palpus broad.

Thorax largely shining, with very little pruinescence; mesoscutum c. 1.2 times as long as wide, with many short non-seriate hairs; scutellum short, subtriangular, only slightly convex dorsally, with numerous dorsal hairs; zone between metathoracic spiracle and halter base with only micro-pruinescence, no pile-like pubescence or setulae; the following thoracic bristles present: one or two quite small lateral scapulars, 1+1 notopleurals, supra-alar, postalar, posterior intra-alar, two unequal pairs of scutellars, mesopleural; paramedian scapular, humeral, dorsocentral, and prescutellar acrostichal absent. Femora slender, without distinct bristles; mid tibia with one long apical ventral spur; tarsi long and slender, each with terminal segment depressed but not dilated. Wing much narrowed basally; membrane largely microtrichose, except for anal cell and limited bare zones in second basal cell and base of discal cell; both costal cells densely microtrichose; subcosta on distal part straight, well sclerotised, running close to costa; subcostal cell very narrow; vein 2 with sigmoid curvature, rendering marginal cell exceedingly narrow on distal half; vein 3 at its origin approximated to vein 4, arched distally, setulose on most of length dorsally; stem of veins 2 and 3 and vein 5 bare; anterior crossvein meeting vein 4 well before mid-length of discal cell; penultimate section of vein 4 arched, distal section with slight sigmoid curvature, strongly converging with vein 3 distally; anal cell extending much further basad than second basal cell, about half as long as discal cell; distal section of vein 6 much shorter than preceding section; alula quite narrow, entirely microtrichose; axillary lobe narrow; squama very narrow.

Abdomen moderately narrowed basally; preabdomen otherwise subovoid; tergite 5 well developed; tergite 6 quite small (not visible from above in dried material); aculeus slender, apically depressed and obtuse.

Distribution. New Caledonia: Loyalty Islands only.

Notes. The unusual combination of wing characters makes *Tarfa* easy to distinguish from other platystomatid genera: marginal cell much attenuated distally; first basal cell narrowed at origin of vein 3; anterior crossvein meeting vein 4 within basal third of length of discal cell; etc. (see Fig. 18). Determining its relationship to other genera is more difficult. The habitus and appearance suggest a large, elongate *Rivellia*-like fly, but *Tarfa* differs from *Rivellia* in the absence of humeral, dorsocentral, and fore femoral bristles, the single, large fronto-orbital bristle, the much longer legs, and quite different contour and relations of vein 4. Thus, there is hardly any morphological evidence of close relationship between these genera. A few features suggest relationship to the loosely defined alliance known as the cleitamiine genera (McAlpine, 1982). Of these, the somewhat slender species of *Cleitamoides* resemble *Tarfa* in the basally narrowed wing, narrow alula, narrow subcostal cell, devious contours of veins 2 and 3, apically convergent veins 3 and 4, partly concave face, absence of humeral and dorsocentral bristles, and slender femora with reduced bristling. *Cleitamoides* lacks the fronto-orbital bristle, but the probably related genus *Cleitamia* usually has one large fronto-orbital as in *Tarfa*. It is doubtful if these resemblances to cleitamiine genera indicate genuine relationship. *Cleitamia, Cleitamoides*, and *Laglaisia* seem likely to form a monophyletic group or the major components of such a group, and a deduced groundplan for such group may not include many *Tarfa*-like character states. *Tarfa* shows certain points of resemblance to *Aetha*, as mentioned under that genus, but differs in the slender thorax, elongate legs, more reduced bristling, more attenuated subcostal, marginal, and first basal cells, different relative positions of bases of second basal and anal cells, and more reduced alula and squama.

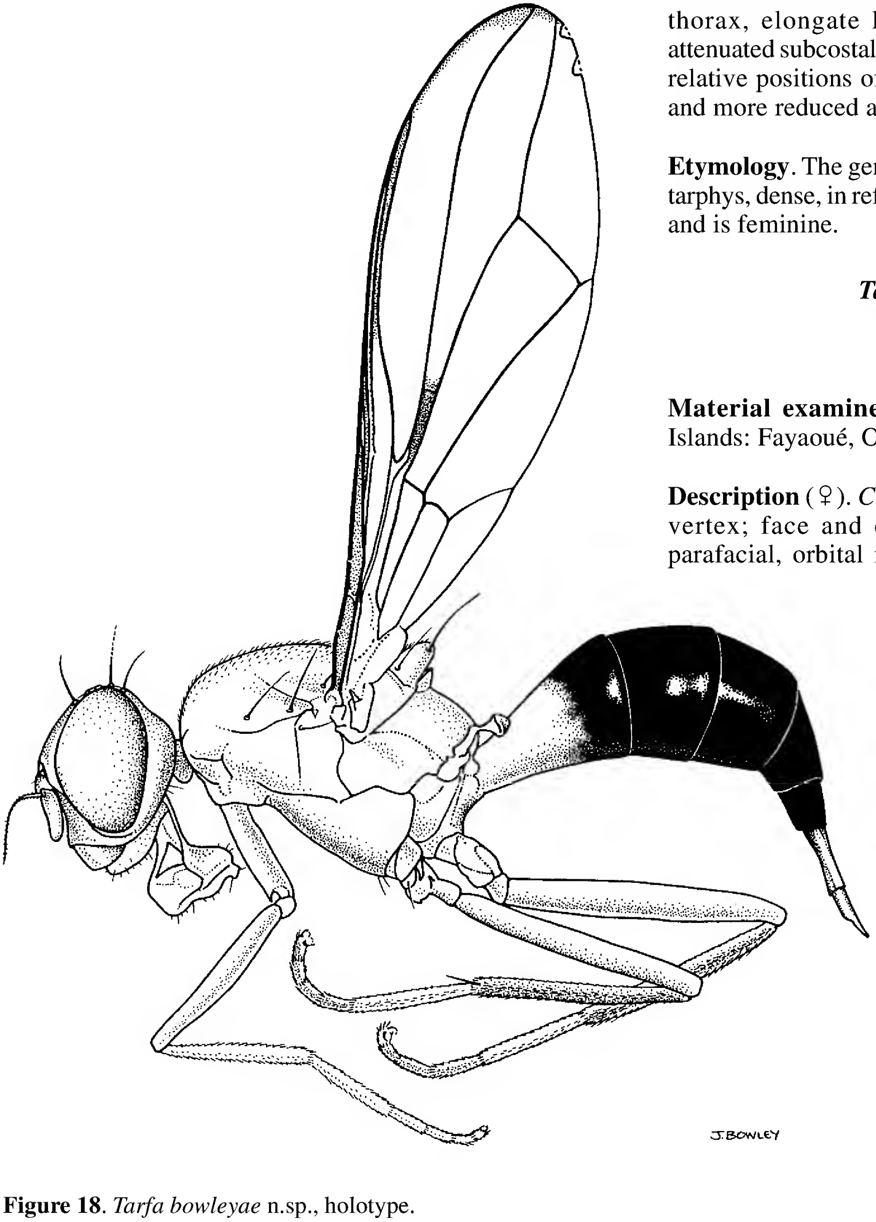


Figure 18. *Tarfa bowleyae* n.sp., holotype.

Etymology. The generic name is a contraction of the Greek tarphys, dense, in reference to the proximity of certain veins, and is feminine.

Tarfa bowleyae n.sp.

Fig. 18

Material examined. HOLOTYPE, ♀ (unique), Loyalty Islands: Fayaoué, Ouvéa, xii.1968, N.L.K (BPB).

Description (♀). *Coloration*. Head brown, darker towards vertex; face and cheek fulvous; upper part of face, parafacial, orbital margin of postfrons, and post-orbital margin whitish pruinescent. Antenna fulvous; arista brown. Prelabrum and palpus fulvous. Thorax shining orange-fulvous. Legs predominantly fulvous; fore coxa paler; mid and hind femora brown; mid and hind tarsi tawny. Wing clear, except for narrow brown costal band on entire length, which fills both costal cells, and brown zone in distal part of first basal cell, which extends over anterior crossvein. Halter fulvous, with largely brown capitellum. Abdominal tergites 2 and 5 shining black; tergite 1 fulvous; ovipositor sheath brown-black.

Head. Eye 0.66 as long as high; height of cheek c. 0.08 of height of eye. Longer hairs on antennal segment 6 slightly longer than basal diameter of segment.

Thorax. Mesoscutum and pleura almost devoid of pruinescence; scutellum slightly rugose and pruinescent on dorsal surface; metapleuron slightly encroaching on membranous postcoxal area. Wing: cell-4 index = 0.30.

Abdomen. Tergite 5 almost as long as tergite 4, with few differentiated bristles on posterior margin.

Dimensions. Total length 5.2 mm; length of thorax 1.8 mm; length of wing 5.0 mm.

Distribution. As given for genus.

Notes. *Tarfa bowleyae* superficially resembles a braconid or small ichneumonid, and may be a hymenopterous mimic.

The specific epithet refers to Janis Bowley, whose illustrations in this and other papers form a significant contribution to Dipterology.

Genus *Brea* Walker

Fig. 19

Brea Walker, 1859 (February): 117. Type species (designated Hendel, 1914a) *B. contraria* Walker.

Maria Bigot, 1859 (July): 311. Type species (monotypy) *M. caeruleiventris* Bigot (= *Brea contraria* Walker).

Description. A detailed description has been given by Hendel (1914a), to which the following notes are added.

Male postabdomen (examined in three species). Aedeagus with preglans undifferentiated from stipe; glans elongate-ovoid to elongate-subcylindrical; bulb very long and slender, terminating in either two or three terminal filaments.

Female postabdomen. Ovipositor sheath moderately short and broad; aculeus slender, obtuse.

Distribution. Moluccas: Kei Island. New Guinea: mainland; Aru; Normanby Island. Australia: Queensland, N of 14°S.

Notes. Hendel (1914b) gave a key to species, which was repeated in English by Malloch (1939a), but the status and limits of the species are not yet well understood. I included the Queensland population in *Brea contraria* Walker (as indicated by Evenhuis, 1989), but further, incomplete studies render this identification doubtful. Nine nominal species, as listed by Evenhuis, may perhaps claim validity, and there may be one or two undescribed species.

In my experience, *Brea* species have been found on foliage in or at the margin of rainforest in Papua New Guinea and Queensland.

Brea nouhuysi de Meijere has a remarkably broadened head in the male, but such sexual dimorphism is absent or barely noticeable in other species examined.

Genus *Pseudorichardia* Hendel

Fig. 20

Pseudorichardia Hendel, 1911: 21. Type species (original designation) *Richardia flavitarsus* Macquart.

Description. See Hendel (1914a: 123–124). In the available males from Tuvalu (AM), the long, paired terminal filaments are fused for the greater part of their length.

Distribution. Outer Melanesia: Vanuatu (New Hebrides); Fiji. Tropical Polynesia: Samoan Islands; Cook Islands; Society Islands; Marquesas; Pitcairn Island. Micronesia: Tuvalu.

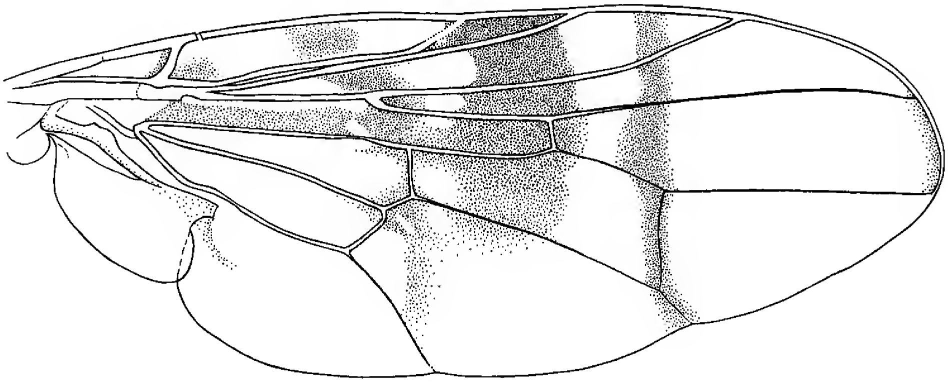


Figure 19. *Brea* sp. (Claudie River, AM), wing.

Notes. Steyskal (1952b) recognized four species and provided a key. It is evident from the small amount of material available to me that this is an over-simplification. Characters of the aedeagus, and, in the females, abdominal coloration and relative size of tergites, all omitted by Steyskal, should be utilised. The number of known species is likely to be increased by further collecting and study.

Almost no information on biology and behaviour is available, but Bezzi (1928) recorded material "bred from oranges" from Raratonga, Cook Islands.

Genus *Lamprogaster* Macquart

Figs. 21–26

Lamprogaster Macquart, 1843: 211. Type species (monotypy) *L. flavipennis* Macquart.

Cruphiocera Macquart, 1843: 212. Type species (monotypy) *C. violacea* Macquart.

Chromatomyia Walker, 1849: 801. Type species (designated McAlpine, 1973a) *C. formosa* Walker (= *Lamprogaster laeta* (Macquart)). Homonym (? senior) of *Chromatomyia* Hardy, 1849 (family Agromyzidae).

Ceratopelta Bigot, 1878b: 34. Type species (monotypy) *C. tricolor* Bigot (= *Lamprogaster patula* Walker).

Cryphiocera.–Hendel, 1914a: 104. Variant spelling for *Cruphiocera*, as syn. of *Lamprogaster*.

Liolamprogaster Enderlein, 1924: 128. Type species (original designation) *Liolamprogaster angusta* Enderlein (? = *Lamprogaster semicyanea* (Walker), see McAlpine, 1995a).

Description. Generic descriptions have been given by Hendel (1914a) and McAlpine (1973a), to which I add the following.

Male postabdomen. Aedeagus diverse; sometimes a long, partly sclerotised process arising from between preglans and glans; glans rounded-ovoid to elongate-cylindrical; bulb seldom complex; terminal filaments usually two, but three present in one group of species, usually of similar size, occasionally very unequal.

Female abdomen. Tergites 4 and 5 not reduced in size; spiracles 4 and 5 (where known) located in pleural membrane below lateral margins of tergites; ovipositor sheath usually broad, of moderate length; aculeus slender, obtuse.

Distribution. Australasian Region: Moluccas; New Guinea; Bismarck Archipelago; Solomon Archipelago; New Caledonia; Australia—all states. Some species, e.g., *Lamprogaster excelsa* McAlpine and *L. maculipennis* Macquart, live in winter-cold highlands of south-eastern Australia. Oriental Region: Sulawesi; Philippines. *Lamprogaster elegans* Frey, 1964, apparently the only species recorded from continental Asia (Burma), is here transferred to subfamily Trapherinae as *Eopiara elegans* n.comb., from examination of the holotype (HELS).

Notes. McAlpine (1973a) reviewed the Australian species; Malloch (1939a) keyed those of New Guinea and adjacent islands that were known to him. In the Australasian Region there are c. 38 valid described species, and a further 54 apparently undescribed species have been seen in collections. Centres of diversity are New Guinea (especially), eastern Australia, and New Caledonia.

Though *Lamprogaster* is generally a well defined taxon, it may not be monophyletic (see McAlpine, 1994). A few species have caused difficulty because of marginal agreement in morphology. A remarkable undescribed species or species complex (provisional coding "sp. BM" from several localities in Papua New Guinea mainland and on Normanby Island, AM and BPB) is a mimic of vespid wasps. It has a petiolate abdomen, and can crease the wings longitudinally as do those insects. I have decided to include it in *Lamprogaster* because (1) it possesses the elongate process on the aedeagus between preglans and glans, characteristic of a number of *Lamprogaster* species, (2) there is another little known New Guinea species morphologically intermediate between this and more typical *Lamprogaster* species, and (3) there is no reason for assuming that, phylogenetically, it is not just a highly derived *Lamprogaster*

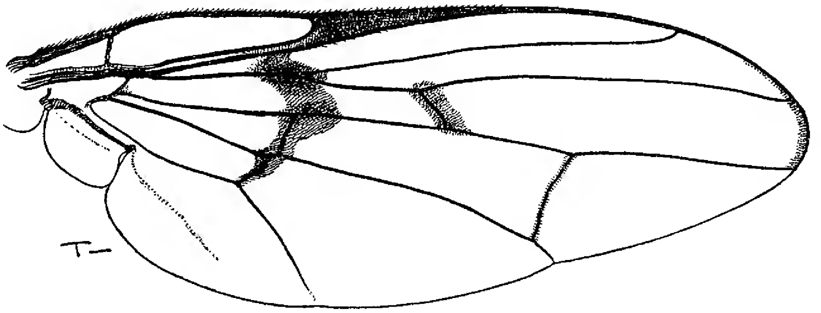
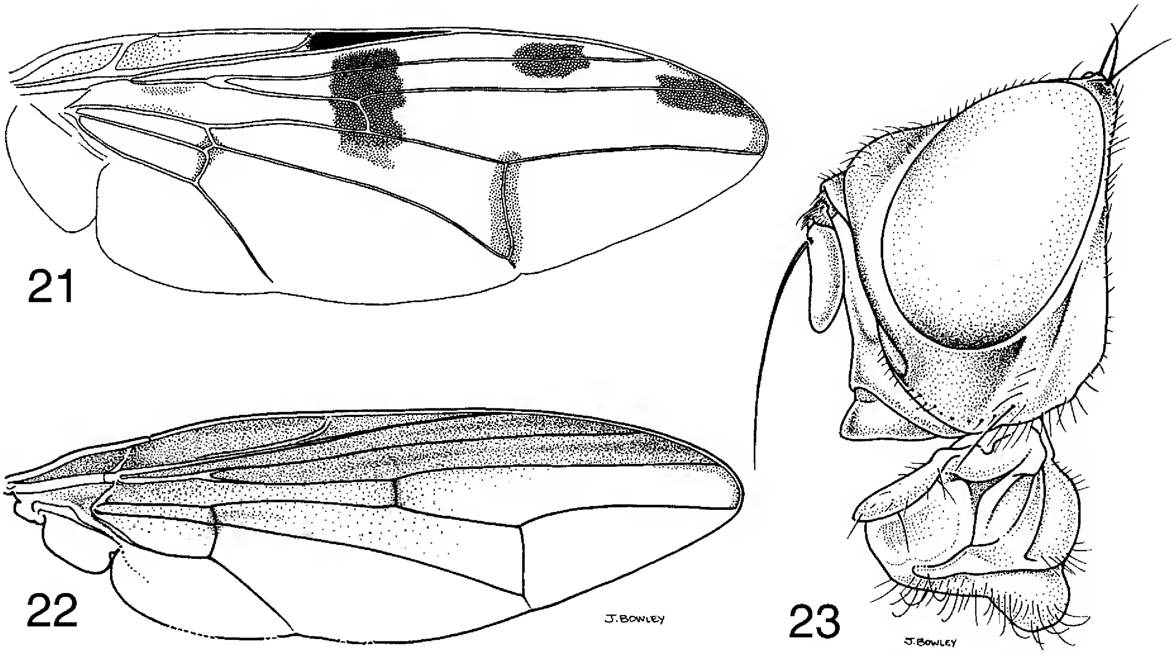


Figure 20. *Pseudorichardia interrupta* Bezzi, wing. After A.J.E. Terzi, in Bezzi (1928).



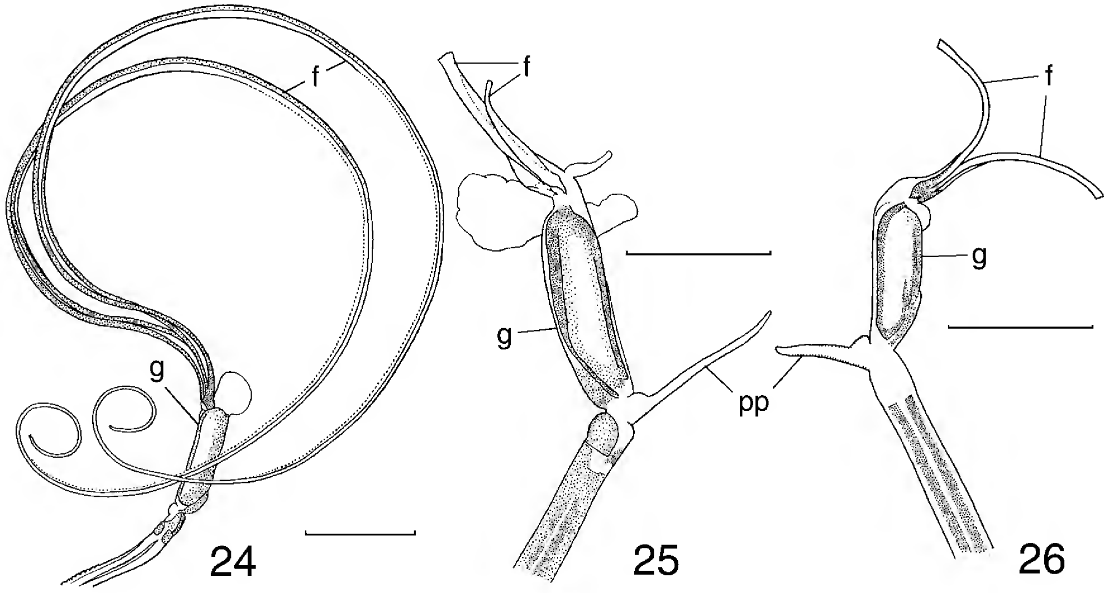
Figures 21–23. 21, *Lamprogaster viola* Malloch, wing. 22, *Lamprogaster* "sp. V" (Papua New Guinea, AM), wing. 23, *Lamprogaster* "sp. AN" (New Caledonia, AM), head.

species. These aberrant species are among the vey few *Lamprogaster* species without a mesopleural bristle, and should run to couplet 19 in my key to genera.

Though generally found in forested country, *Lamprogaster* species live in a wide range of habitats. Adults of some species rest on tree trunks, or on the lower surface of tree foliage. They are often collected in traps baited with mammalian dung.

I strongly suspect that *Lamprogaster macrocephala* Hendel, *L. nigrihirta* McAlpine, *L. patula* Walker, *L. pumicata* Wulp, and other species are Batesian mimics of blow flies (Calliphoridae), with which the adults may be associated at mammalian dung.

Previously (McAlpine, 1973a: 11), I recorded a specimen of *Lamprogaster corusca* attacked by the fungus *Empusa*. The name of the host is now corrected to *Lamprogaster* "sp.1" (AM), and the fungal genus is probably *Entomophthora* (Zygomycotina: Entomophthorales).



Figures 24–26. Distal part of aedeagus of *Lamprogaster* spp. 24, *L. relucens* McAlpine (scale = 1 mm). 25, *L. rugifacies* McAlpine (scale = 0.5 mm). 26, *L. imperialis* McAlpine (scale = 0.5 mm). Abbreviations: f, terminal filaments; g, glans; pp, process of preglans.

Genus *Montrouziera* Bigot

Figs. 27, 28

Montrouziera Bigot, 1860b: 224. Type species (monotypy) *M. lifua* Bigot.

Description. The most detailed description is that of Hendel (1914a), though based on meagre material. Further morphological study of the only included species is needed.

Distribution. New Caledonia: perhaps Loyalty Islands only. Evenhuis (1989) also mentions the main island of New Caledonia, but I think this may be due to misinterpretation of the term "New Caledonia", which may have been used in the broad sense to include the Loyalty Islands, which come under the same French administrative area. Fairly extensive modern collections from New Caledonia (main island) do not include *Montrouziera*.

Notes. Only the type species of *Montrouziera* is known. The wing pattern and venation (Fig. 28, based on Hendel's figure of type material) should enable ready identification of *M. lifua*.

Montrouziera is probably closely related to *Lamprogaster*, but differs from probably all species of that genus in having a quite large fronto-orbital bristle. Though *Lamprogaster* is represented in New Caledonia by numerous species (mostly undescribed), apparently all these differ from *Montrouziera* in the less hirsute lateral occiput, less developed hairing of the arista, and different placement of the anterior crossvein. The characters of *Lamprogaster* species of New Guinea are, however, more variable.

Genus *Achias* Fabricius

Figs. 7, 8, 29–33

Achias Fabricius, 1805: 247. Type species (monotypy) *A. oculatus* Fabricius.

Mystia Walker, 1861b: 249–250. Type species (monotypy) *M. attrahens* Walker.

Achiosoma Hendel, 1914a: 100–101. Type species (original designation) *Achias dacoides* Walker.

Description. See McAlpine (1994).

Distribution. New Guinea. Bismarck Archipelago. Northern Australia. Mainland New Guinea is the centre of diversity of the genus, but the limits of distribution in the west are Waigeo, Aru, and Melville Islands, in the north the equator, in the east New Britain and the Louisiade Group, and in the south the Townsville district of Queensland (see map, McAlpine, 1994: fig. 1).

Notes. The genus has been reviewed by McAlpine (1994). There are 96 probably valid described species, and I have seen about six additional species in collections.

The males of many species have the head capsule prolonged laterally to form eye-stalks. *Achias rothschildi* Austen probably has the widest head capsule of any insect (up to 55 mm). The rôle of eye-stalks in agonistic behaviour has been discussed by McAlpine (1979).

Several species are apparent Batesian mimics of vespid wasps. This has been confirmed by my field observations on *Achias nigrifacies* Malloch and *A. minax* McAlpine.

A female paratype of *Achias xyrion* McAlpine has a male strepsipteran pupa protruding from the abdomen (AM).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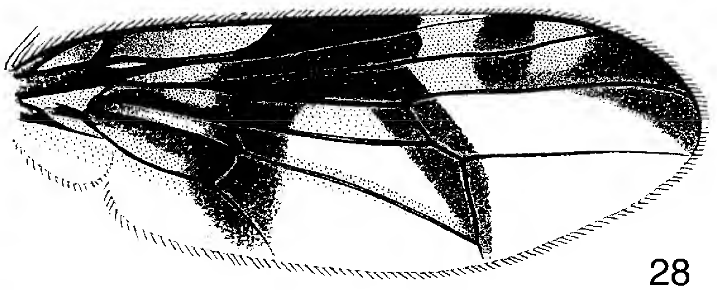
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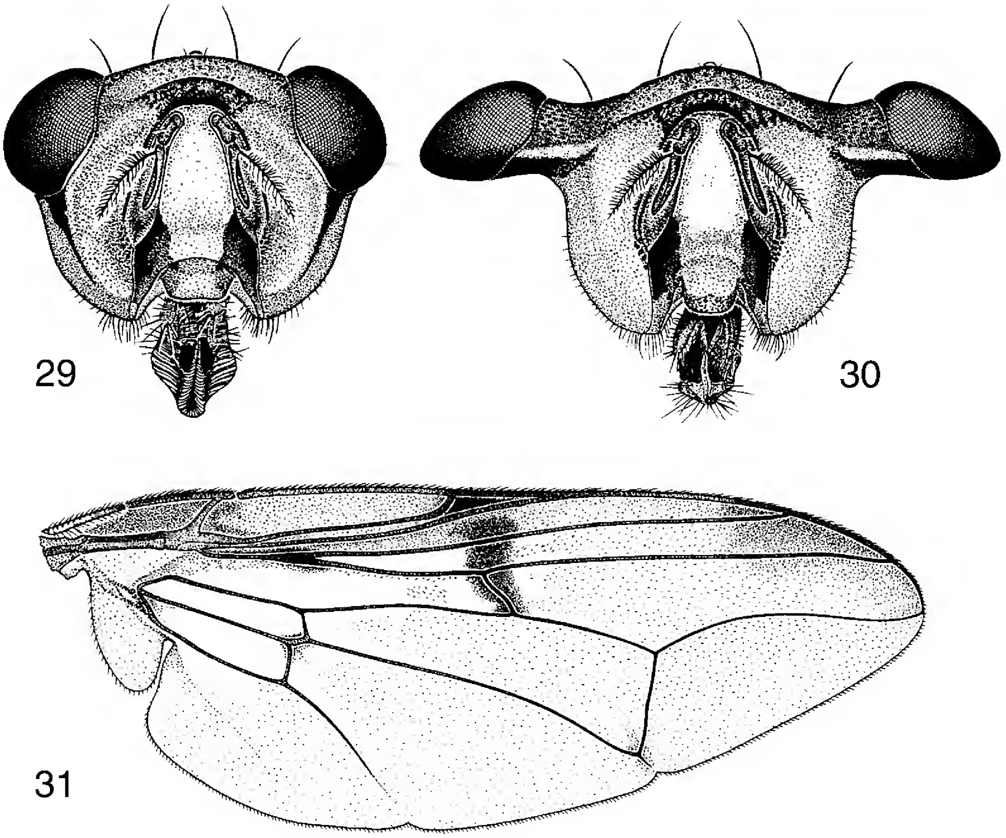
Figures 27–28. *Montrouziera lifua* Bigot. 27, head. 28, wing. After Hendel (1914a).



Figures 29–31. *Achias kurandanus* Hennig. 29, head of female. 30, head of male. 31, wing. Illustrations by S.P. Kim.

Genus *Inium* McAlpine

Figs. 34, 35

Inium McAlpine, 1995b: 252. Type species (original designation) *I. mariae* McAlpine.

Description. See McAlpine (1995b).

Distribution. North-eastern Queensland, from the Atherton Tableland to the vicinity of Cape York.

Notes. *Inium* includes three rarely collected species, one still undescribed (ANIC), of diverse appearance, though probably all Batesian mimics of ants. The most noteworthy common feature is the structure of the prelabrum, which departs from the usual horse-shoe shape and is much extended posteroventrally towards the proboscis and largely medially sclerotised. It thus somewhat resembles the beak of certain parrots. The two described species are morphologically dissimilar in many respects (McAlpine, 1995b: table 1), but the third species is intermediate in morphology, size, and geographic distribution.

Genus *Rhytidortalis* Hendel

Figs. 36, 37

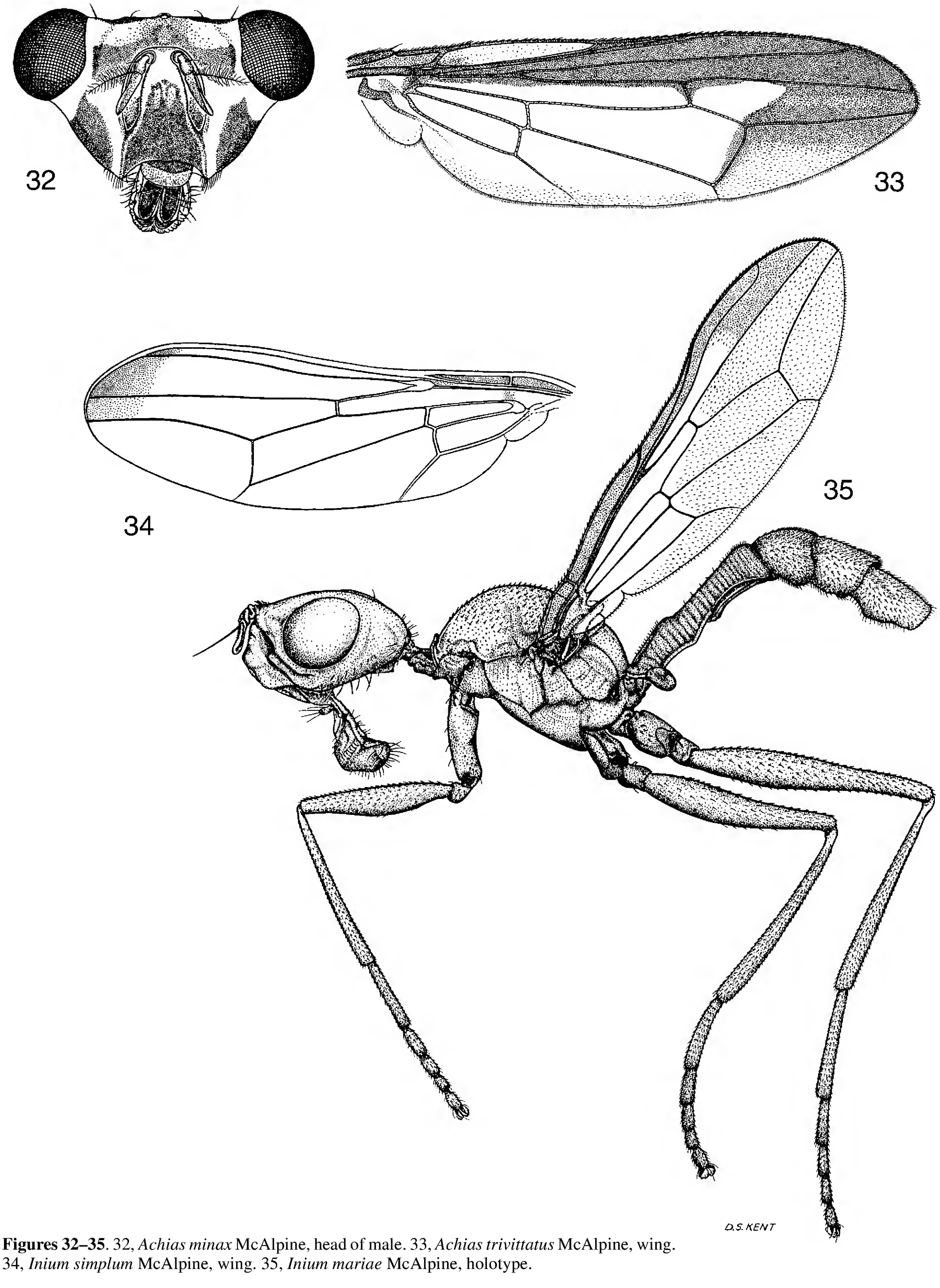
Rhytidortalis Hendel, 1914a: 14, 66–68. Type species (original designation) *R. cribrata* Hendel.

Description. See McAlpine (2000).

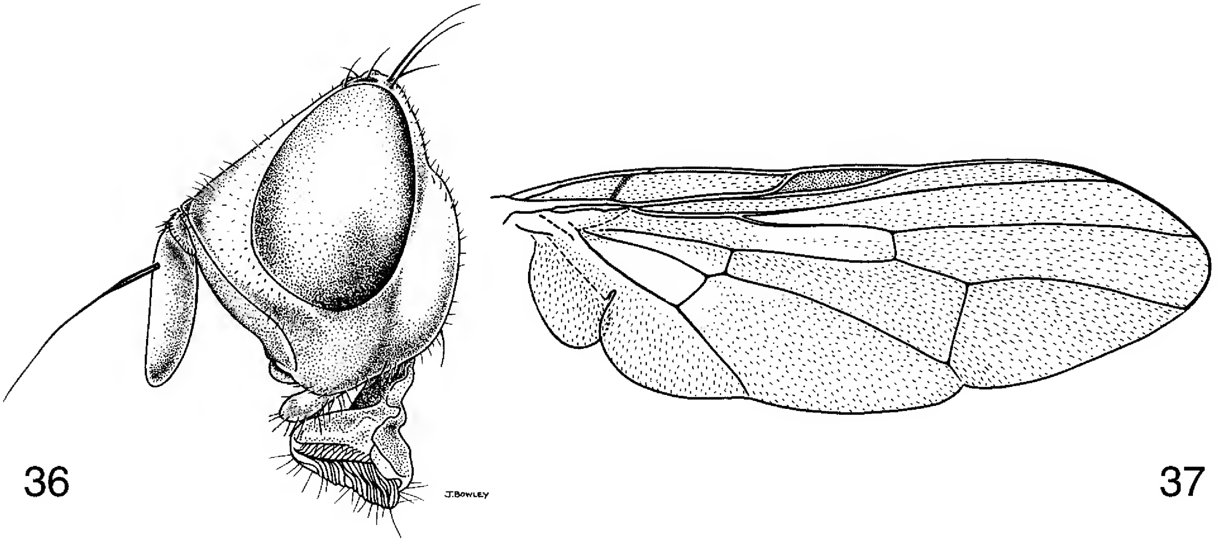
Distribution. Australasian Region: Australia—all states, including Northern Territory and Tasmania. Oriental Region: Taiwan; Vietnam. Palaearctic Region: Russian Far-east. Most species have strictly coastal distributions.

Notes. I have recently reviewed this genus (McAlpine, 2000), but omitted *R. nigripes* Korneyev from the Russian Far-east (Korneyev, 1991). The type species is the only known Oriental species, but seven species live in Australia. The Australian species originally described as *Senopterina rugifrons* Thomson and *Pseudepicausta solocifemur* Enderlein have been referred to *Rhytidortalis*, but are now placed in *Duomyia*.

Adults are usually found on low vegetation on sand near the sea shore.



Figures 32–35. 32, *Achias minax* McAlpine, head of male. 33, *Achias trivittatus* McAlpine, wing. 34, *Inium simplum* McAlpine, wing. 35, *Inium mariae* McAlpine, holotype.



Figures 36–37. *Rhytidortalis averni* McAlpine. 36, head of male. 37, wing, showing approximate distribution of microtrichia.

Genus *Scotinosoma* Loew

Fig. 38

Scotinosoma Loew, 1873: 45. No included species.
Scotinosoma Loew.–Hendel, 1914a: 16, 65–66. Type species (subsequent monotypy) *S. bistrigatum* Hendel.

Description. Hendel gave a detailed description based on the characters of the type species only. I add the following descriptive notes from an examination of the available species.

Head. Facial carina typically strongly elevated, rather narrow, and rounded, sometimes reduced and more or less flattened, always without hairs; facial ridge with few fine hairs below; parafacial usually pruinescent, without hairs except near upper extremity; lateral occipital and postgenal bristles present, sometimes duplicated. Prelabrum generally well developed, not joined to face by median shining quadrate sclerite, but sometimes its sclerotisation extended medially towards face, its lower anterior margin not markedly receding.

Thorax. Mesoscutum with extensive grey pruinescence, often in part forming a pale median stripe, less frequently generally distributed, not perforated by pattern of black spots as in *Rhytidortalis*; posterior part of mesopleuron with grey pruinescent zone, which extends forward on vicinity of sternopleural suture to fore-coxal cavity; usually only one true supra-alar bristle present (in contrast to most *Rhytidortalis* species), but bristling of this region sometimes modified in females; scutellum with two or three pairs of bristles and no hairs. Fore coxa broad; femora without spines; fore femur often with variably developed dorsal and posteroventral bristles; hind basitarsus slender, subcylindrical, as compared with *Rhytidortalis*. Subcosta and ventral surface of vein 1 without setulae; second basal cell less than half as long as discal cell; wing markings usually simple, including a dark costal mark, and, in two species, one or two obliquely transverse bands and a sub-basal mark.

Abdomen subcylindrical in males, usually more ovoid in females. Male postabdomen (where known): preglans forming separate sclerite from stipe; glans ovoid to cylindrical; terminal filaments subequal in length, not very long. Female abdomen: tergite 5 unreduced, with spiracles

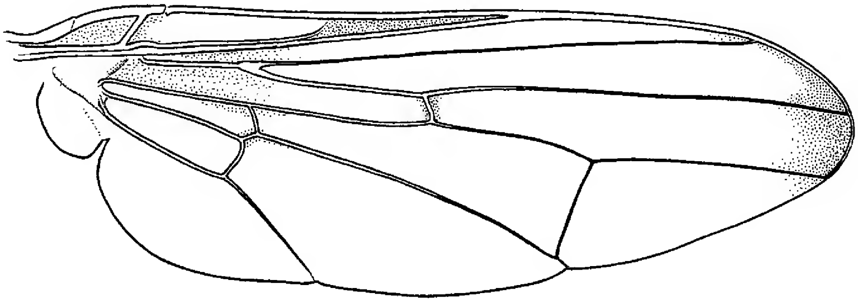


Figure 38. *Scotinosoma* sp. (near *S. erasum* Malloch, Mount Mowbullan, AM), wing.

close to its posterior margin; ovipositor sheath not much longer than tergite 5 (in contrast to typical *Pseudepicausta* species); aculeus slender, obtuse.

Distribution. Australia: eastern Queensland; north-eastern New South Wales—Richmond River district northwards. I am at present treating the one recorded Philippine species as probably generically misplaced, and the genus as perhaps endemic to Australia.

Notes. The first association of a specific name with *Scotinosoma* is that of *Dacus basalis* Walker, a junior synonym of *Plagiostenopterina aenea* (Wiedemann), by Hendel (1912b: 14), but, as this combination was inferred with doubt, it is not a valid type designation.

Four Australian species have been referred to *Scotinosoma* and a key to these was given by Malloch (1939a). From preliminary study of available material, I believe that there are likely to be at least 12 Australian species, and that use of secondary sexual characters not mentioned by Malloch will be necessary to characterise some of these.

The type locality for the type species, *S. bistrigatum* Hendel, 1914a, has been given as Cape York (Hendel, 1914b, Malloch, 1939a), but this is an error. The two original specimens collected by Thorey in Queensland and described by Hendel (1914b) in WM bear labels of similar format, but that on the male says "Thorey 1868 Port Denison", that on the female "Thorey 1868 Cap York". The supposition that both are from Cape York arose from Hendel's carelessness in checking the two similar-looking labels. The illustrations on which the original availability of *S. bistrigatum* depends (Hendel, 1914a: pl. 5, figs. 103, 104), were based on the male from Port Denison (now Bowen), which is therefore the holotype. The female from Cape York, which was also used in the subsequent description (Hendel, 1914b), is not a type specimen. There are slight obvious differences between the male and female, and, as far as can be determined without a detailed taxonomic study based on adequate material, they may well belong to different species. The collection sites are nearly 1200 km apart in a virtual straight line.

Scotinosoma species live mainly in rainforests, including dry rainforest and vine scrub. They are apparently absent from most of the littoral rainforests of north-eastern New South Wales and south-eastern Queensland. Adults have been collected in dung-baited traps.

Genus *Eumeka* n.gen.

Type species: *Eumeka hendeli* n.sp.

Description (♂, ♀). Medium-sized to moderately large elongate, dark flies, with legs of moderate length and wing lightly marked.

Head markedly higher than long; face with narrow flat-topped carina for most of its length (less elevated in New Caledonian species), without hairs; facial ridge with several or many fine hairs below; parafacial densely pruinescent, with scattered hairs on entire length; occiput moderately convex below, slightly concave above; the following bristles present: inner and outer vertical, small postvertical, minute ocellar, two medium-sized to small fronto-orbitals, small lateral occipital often distinguishable; postgenal bristle present or absent. Antenna, excluding arista, slightly shorter to slightly longer than face on median line; segment 3 c. four times as long as wide, apically rounded; segment 6 filiform, only slightly thickened basally, minutely pubescent on basal part only. Prelabrum rather small, coarsely rugose, its lower margin usually receding; palpus moderately small, coarsely setulose.

Thorax. Mesoscutum 1.2–1.3 times as long as wide, with pruinescent median stripe; scutellum moderately short and convex, without hairs; pleura with pruinescent zones; the following thoracic bristles present: a group of small lateral scapulars, humeral, 1+1 notopleurals, supra-alar, postalar, posterior intra-alar, small dorsocentral, prescutellar acrostichal, three pairs of scutellars, mesopleural; paramedian scapular absent. Posterior bridge of hind coxa without hairs; femora without ventral spines; fore femur with well-developed dorsal and posteroventral bristles; mid femur without bristles; hind femur with anterodorsal bristles near base (sometimes weak and pale) and dorsal bristles distally; tibiae unarmed, except for rather short apical ventral spur on mid one; tarsi elongate. Wing elongate, not significantly narrowed basally; membrane with extensive bare areas in first basal, second basal, and anal cells; subcosta separate from vein 1 for whole length beyond humeral crossvein; section of costa on subcostal cell slightly shorter than that on second costal cell, much longer than that on marginal cell; stem of veins 2 and 3 simple, nearly straight, without setulae on either surface; veins 3 and 4 subparallel or slightly divergent apically; anterior crossvein meeting vein 4 well beyond middle of discal cell; second section of vein 4 gently arched, penultimate section almost straight; second basal cell slightly over half as long as discal cell; basal crossvein transverse; anal crossvein curved; distal section of vein 5 slightly shorter than section on anal cell; alula well developed, rounded; squama forming distinct, narrowly rounded lobe, scarcely larger in area than the well-developed axillary lobe.

Abdomen in male subcylindrical, in female more ovoid, variably narrowed anteriorly, with tergite 5 unreduced; ovipositor sheath shorter than tergite 3; aculeus very slender, obtuse. Aedeagus, where known, with pair of moderately short, equal terminal filaments.

Distribution. Australia: Queensland—north-east coast as far south as Paluma. New Guinea: eastern and south-eastern mainland. Bismarck Archipelago: Lavongai (New Hanover). New Caledonia: main island.

Notes. *Eumeka* includes two very similar species or distinct populations in north Queensland, one of which also occurs in New Guinea. There is a probably distinct species on Lavongai in the Bismarck Archipelago (ZMC) and another more divergent species in New Caledonia (BPB), but I have only seen single specimens of the two latter.

Eumeka appears to be most closely related to *Pseudepicausta*, and perhaps to *Rhytidortalis* and *Conicipithea*. All these genera consist of more or less elongate, *Senopterina*-like flies (Senopterinini sensu Hendel, 1914a, as Stenoperinina), with veins 3 and 4 subparallel apically, the face hairless, the parafacial haired near centre, and often a distinct lateral occipital bristle. *Eumeka* species of Australia, New Guinea, and the Bismarcks are unique among these genera in having a series of setulae on the ventral surface of vein 1, which is usually most developed near the distal bend of the subcosta. Because vein 1 tends to lie in a deep groove, as seen from the ventral surface, the setulae are sometimes difficult to see in dried material, but I have detected them in all 12 available specimens of these species. *Eumeka* further differs from *Pseudepicausta* in having the cheek deeper, the second section of vein 4 longer and definitely arched, and the thick, non-directional, almost paint-like white pruinescence on the sides of tergite 4; also *Eumeka* differs from the typical species of *Pseudepicausta*, from New Guinea and nearby island groups, in having sternite 5 of the male compact and not deeply divided, and the ovipositor sheath of the female not much longer than tergite 5. From *Rhytidortalis, Eumeka* differs in its consistently larger size, vertically elongate eye, lack of the characteristic mesoscutal pattern of that genus, more elongate hind basitarsus, arched second section of vein 4, narrower anal cell, and characteristic microtrichiation pattern of tergite 4. *Eumeka* resembles *Conicipithea* in its more or less wasp-like appearance (both could be mimics of pompilids), the head prominently produced at the bases of the antennae, and the facial carina usually long and flat-topped; but it differs in the absence or slight development of setulae on antennal segment 3, the absence of setulae on the scutellum, the absence of erect hairs on the suprasquamal ridge, and the quite different venation; also the glans of the aedeagus is much shorter than in the one available male of *Conicipithea*.

The New Caledonian species (1 ♀, Mount Koghi, BPB) seems to form a distinctive group, distinguishable as indicated in Table 1.

I have collected two males of *Eumeka hendeli* feeding at sap exuding from recently cut stems of *Calamus* sp. (Arecaceae) in lowland rainforest near Babinda, Queensland.

The generic name is from the Greek *eumekes*, of good length, and is treated as feminine.

Eumeka hendeli n.sp.

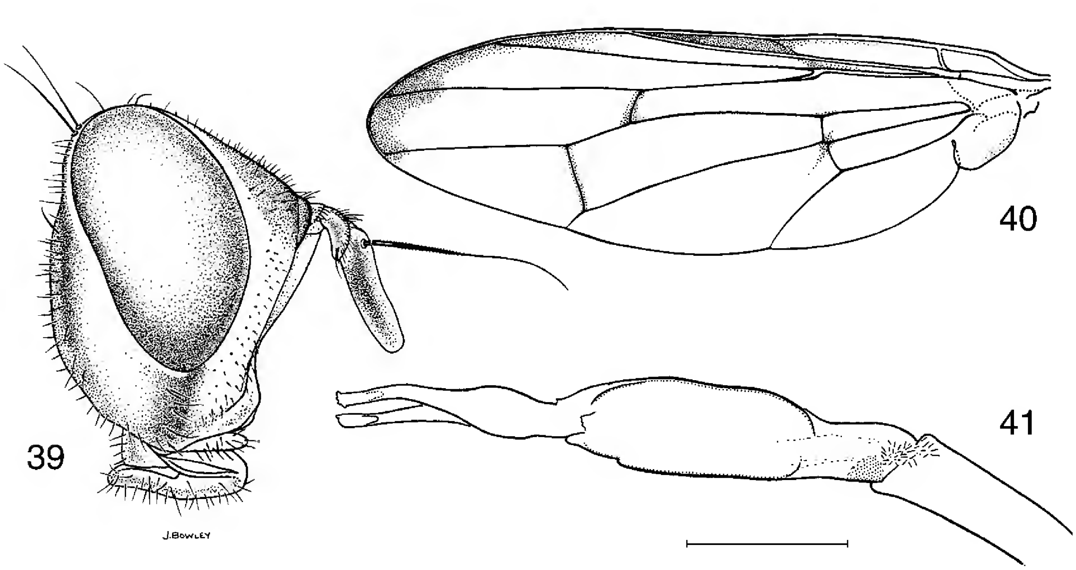
Figs. 39–41

Material examined. HOLOTYPE, ♂, Queensland: The Boulders reserve, near Babinda, 27.i.1991, B.J.D., D.K.M. (AM). PARATYPES, Queensland: 2 ♂♂, Whitfield Range, near Cairns, Feb. 1978, A.W-H. (AM); 1 ♂, The Boulders, Jan. 1991, B.J.D., D.K.M. (ANIC); 1 ♂, Paluma, 2925 ft (c. 890 m), Jan. 1970, G.A.H. (AM).

Description (♂, ♀ of type race unknown). *Coloration*. Head with ground colour largely brown; fronto-orbital margin (except posteriorly), parafacial, much of antennal groove, posterior orbits (narrowly), and postgenal region (diffusely) silver-grey pruinescent; facial carina with translucent pruinescence, not concealing ground colour, which is distinctly yellowish on upper part. Antenna tawny; segment 3 variably suffused with brown distally; arista brown basally, black elsewhere. Prelabrum brown or tawny-brown; palpus tawny-brown, somewhat paler distally. Thorax with dark brown or sometimes partly tawny-brown ground colour; mesoscutum with rather narrow pale grey-pruinescent median stripe, complete, except that it merges posteriorly with pale transverse stripe along scutellar suture, also with grey lateral presutural pruinescent zone, which is denser and paler between notopleural bristles; scutellum with thin greyish pruinescence dorsally; propleuron largely greyish white-pruinescent; mesopleuron shining anteriorly, with broad greyish-white pruinescent band on posterior margin; sternopleuron with central greyish-white pruinescent zone reaching sternopleural suture and expanded ventrally; a pale-pruinescent mark covering pleurotergite and part of meropleuron. Legs brown to tawny-brown; fore coxa extensively whitish-pruinescent, except on much of posterior surface. Wing: subcostal cell brown; brown costal band extending from end of vein 1 to just behind vein 4, narrowest near end of vein 2, broader and diffuse in first posterior cell; marginal cell with small brown mark at origin of vein 2; anterior and discal crossveins narrowly margined with brown; a small brown mark on vein 5 between basal and anal crossveins; axillary lobe and squama white. Halter brown. Abdomen dark brown to black; tergite 2 with transverse, medially narrowed, densely greyish white pruinescent band across whole width on or near posterior

Table 1. Comparison of groups in *Eumeka*.

Hendeli group	New Caledonian group
• Postgenal bristle absent or poorly differentiated	• Postgenal bristle well developed
• Prelabrum small, receding	• Prelabrum of moderate size, rather prominent
• Vein 1 setulose ventrally	• Vein 1 bare below
• Both costal cells and alula with extensive bare areas	• Both costal cells and alula almost entirely microtrichose
• Anterior and discal crossveins with inconspicuous separate brown marks, or none	• Anterior and discal crossveins enclosed in the one oblique brown mark
• Abdominal tergites 3 and 5 without whitish-pruinescent markings	• Abdominal tergites 3 and 5 with whitish-pruinescent markings



Figures 39–41. *Eumeka hendeli* n.sp. 39, head of male. 40, wing. 41, distal part of aedeagus (scale = 0.2 mm).

margin; tergite 4 with large triangular, densely greyish white-pruinescent zone on each lateral margin; tergites 3 and 5 without pale pruinescence.

Head. Facial carina strongly raised, especially on upper part, in centre markedly narrower than antennal groove, slightly depressed and broadened below, not reaching lower margin of face; height of cheek 0.33–0.40 of height of eye. Antenna potentially extending for 0.7–0.8 of length of face on median line.

Thorax. Cell-4 index = 0.70–0.75; alula microtrichose only on narrow posterior marginal zone, or entirely bare (except for marginal series of setulae).

Abdomen. Tergite 4 slightly longer than tergite 3; tergite 5 slightly shorter than tergite 3. Postabdomen: outer surstylus obtuse, its apex only slightly exceeding that of inner surstylus; stipe of aedeagus slender; preglans sharply differentiated from stipe, sclerotically continuous with glans; a small patch of pubescence on base of preglans, extending on to stipe; glans elongate-ovoid; terminal filaments rather short, of equal length, arising from a common sclerotised base, the whole structure c. as long as glans; cerci large, much exceeding surstyli, fused to proctiger for their whole length.

Dimensions. Total length 8.9–10.9 mm; length of thorax 3.2–4.0 mm; length of wing 7.5–9.1 mm; length of glans of aedeagus 0.24 mm.

Distribution. Queensland: Cairns district to Paluma district (typical populations). Populations in the Iron Range district, Queensland (AM) and the Central and Oro Provinces of Papua New Guinea (AM, BPB) appear to be morphologically distinct, probably at infraspecific rank.

Notes. *Eumeka hendeli* is here interpreted broadly to include populations in northern Cape York Peninsula and eastern mainland New Guinea, as well as the type population. On this interpretation, the species differs from the only other recognized species of the *hendeli* group (from Lavongai) in the complete but usually dorsally narrowed whitish-pruinescent posterior marginal band on abdominal tergite 2, and in having the facial carina not broadened near mid-length nor very sharply margined. The type population of *E. hendeli* differs from more northern populations in the markedly shorter antenna (at least in males), slightly shorter facial carina, and from at least some such populations in the less distinctly petiolate abdomen. From the little available material, I am not sure if all these populations are conspecific.

The specific epithet refers to Friedrich Hendel, master worker on platystomatid flies.

Genus *Signa* n.gen.

Type species: *Signa mouldsi* n.sp.

Description (♂, ♀). Flies of medium build or slightly elongate, of small to rather large size, with moderately short, rather slender legs.

Head markedly higher than long; face not very broad, minutely roughened or pruinescent, without hairs, with rather low, rounded, saddle-like carina; fine uniseriate hairs along lower parafacial suture scarcely extending on to facial ridge; parafacial with hairs near upper extremity only; occiput variably convex below, somewhat concave above;

the following bristles present: inner and outer vertical, small ocellar, generally two reclinate fronto-orbitals, of which anterior one is always well developed and at least slightly larger than posterior one, lateral occipital (sometimes reduced), large postgenal; postvertical bristle absent; antennal sockets narrowly separated. Antenna, excluding arista, slightly shorter than face on median line, slightly shorter in female than in male; segment 3 generally subacute dorsoapically; segment 6 long, filiform, but sometimes preapically dilated in males, with variable amount of basal pubescence. Prelabrum of moderate size, its lower margin slightly anteriorly prominent; palpus moderately large, elongate; proboscis stout.

Thorax. Mesoscutum c. 1.0–1.2 times as long as wide, largely with blackish ground-colour and extensive covering of grey pruinescence, a pair of variably developed black, non-pruinescent stripes on or near dorsocentral lines, sometimes broad and running almost full length of mesoscutum, sometimes narrow, disjunct at suture, or present only in front of suture; scutellum thick, rounded, dorsally pruinescent, with few hairs restricted to lateral margins, or sometimes quite hairless; pleura, except sternopleuron, extensively greyish-pruinescent; sternopleuron pruinescent along upper margin and along ventral median margin, with extensive smooth zone between, which extends broadly approximately to mid-coxal cavity; centre of sternopleuron with a haired zone, which is almost smooth between hairs, and isolated, except on dorsal margin, from other haired or pruinescent zones; the following thoracic bristles usually present: one short lateral scapular, humeral, 1+1 notopleurals (some of these reduced or modified in females of some species), supra-alar, postalar, posterior intra-alar, dorsocentral, two pairs of scutellars, mesopleural; paramedian scapular and prescutellar acrostichal absent. Posterior bridge of hind coxa with fine hairs; fore femur with well-developed dorsal bristles and a series of long posteroventral bristles on almost its entire length; mid femur with several posterior bristles distally, merging into long hairs, or posterior bristles scarcely differentiated from hairs; hind femur distally with few dorsal bristles. Wing: membrane microtrichose except for anal cell and much of second basal cell; section of costa on subcostal cell substantially longer than that on second costal cell and that on marginal cell; subcosta and vein 1 without ventral setulae; veins 3 and 4 converging apically; vein 4 terminating distinctly behind wing apex, its basal section often with weak point or flexure near distal end, its distal section slightly or strongly curving forward only on apical half or less; anterior crossvein meeting vein 4 near or slightly beyond mid-length of discal cell; vein 5 without setulae, its short distal section slightly bent towards posterior margin; second basal cell on vein 4 c. one third as long as discal cell or slightly less; anal crossvein curved on anterior part only; axillary lobe of moderate to small size, with moderate marginal fringe; squama forming a rounded lobe, slightly variable in size, but not noticeably larger in area than axillary lobe.

Abdomen ovoid, not much narrowed basally. Male: tergite 5 usually rather large; outer surstylus usually extensively spinulose on distal part (not examined in some species); aedeagus with subcylindrical glans, variably developed bulb, and pair of about equal-sized terminal filaments. Female: tergite 5 well developed but always shorter than tergite 4; spiracles 1 to 3 situated in pleural membrane; spiracle 4 situated in intersegmental membrane near lateral margins of tergites 4 and 5; spiracle 5 situated behind tergite 5, near its posterior margin; ovipositor sheath broad and rather short; aculeus slender, obtuse.

Distribution. New Caledonia: only known from main island.

Notes. *Signa* is represented by at least 10 species in available collections (mainly BPB, PM, and AM).

Signa belongs among the group of more or less elongate platystomatine genera with hairless face, apically convergent veins 3 and 4, distinct but rather small squamal lobe, non-setulose suprasquamal ridge, and no femora noticeably enlarged or ventrally spinose, this group including *Elassogaster, Microepicausta, Meringomeria*, and *Par*. *Signa* differs from *Elassogaster* in the presence of fronto-orbital bristles, the termination of vein 4 behind the wing apex, and the absence of a shallow groove connecting the transverse sutures of the mesoscutum. It differs from *Microepicausta* in the distinct fronto-orbital bristles, presence of small hairs on the posterior bridge of hind coxa and dorsal bristles on the fore femur, absence of hairs on the central part of the scutellum, and in having paired terminal filaments on the aedeagus. It differs from *Meringomeria* in the presence of fronto-orbital bristles, non-pruinescent central zone of the sternopleuron, slender aculeus, and, particularly from the Melanesian species of that genus, in the non-plumose arista and absence of a distinct series of anterior bristles on the hind femur. Perhaps the most closely related genus is *Par*, which, though also Melanesian, is apparently geographically isolated from *Signa*. *Signa* differs from *Par* in having larger fronto-orbital bristles, centrally grey-pruinescent mesoscutum, scutellum without dorsal setulae, sternopleuron centrally smooth, fore femur with dorsal bristles, subcosta without ventral setulae, anterior crossvein infuscated, abdominal pleura of female without dense, pile-like covering (? microtrichia or macrotrichia), outer surstylus extensively spinulose on distal part (not checked for some *Signa* spp.).

Signa species have been collected in both lowland and mid-mountain rainforest, while the long series of *S. mouldsi* was obtained in dry vine forest or sclerophyllous forest (M.S.M., pers. comm.). According to Jaffre *et al.* (1998), this is the most fragmented and vulnerable natural vegetation type in New Caledonia, and *S. mouldsi* is not represented among the many available specimens of *Signa* from other localities. Probably the numerous species occupy a wide range of natural habitats in New Caledonia.

The generic name is derived from the Latin *signum*, a sign or signal, and is feminine on account of the altered suffix.

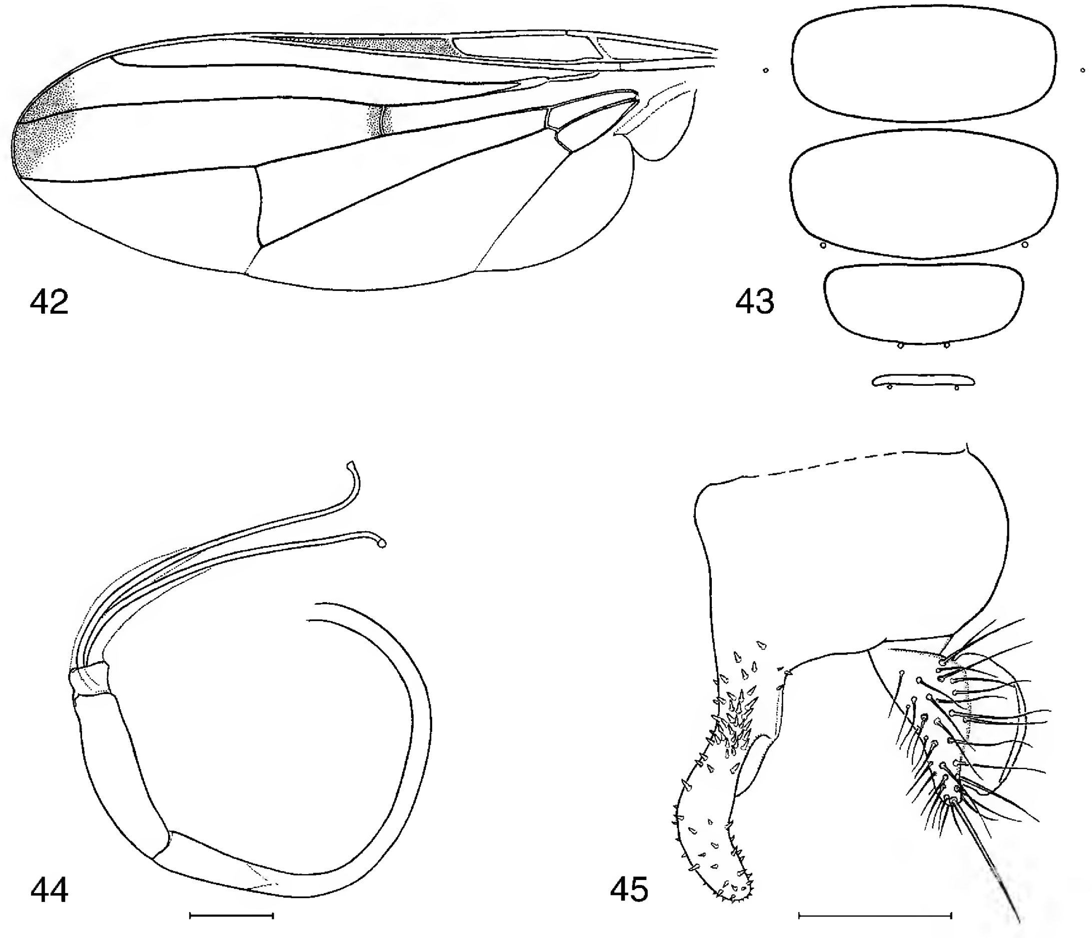
Signa mouldsi n.sp.

Figs. 42–45

Material examined. HOLOTYPE, ♂, New Caledonia: Pindai, Nepoui Peninsula, 11.vi.1996, M.S.M. (PM). PARATYPES, New Caledonia: 28 ♂♂, 38 ♀♀, same data as holotype (AM, BM, BPB, PM, RMS, USNM). Additional material in alcohol (AM).

Description (♂, ♀). Dark fly, small for the genus, with blackish apical wing spot. *Coloration*. Head tawny; antennal groove brown, with whitish pruinescence; upper part of face and parafacial yellow, with pale pruinescence; occipital region extensively blackish, with grey pruinescence thinner on upper part, tawny-yellow zone extending over centre of vertex on to central upper occiput, so that inner vertical bristle stands on tawny zone, while outer vertical stands on black zone. Antenna tawny; segment 3 largely greyish brown; segment 6 blackish brown. Prelabrum fulvous yellow, brownish only at posterolateral extremities; palpus fulvous-yellow, greyish brown on a relatively small area near base. Thorax black, with large part of cuticular surface covered with thin grey pruinescence; mesoscutum with pair of narrow anterior dorsocentral to intradorsocentral black stripes, and postsuturally a pair of narrow extradorsocentral black stripes; scutellum thinly grey-pruinescent dorsally, glabrous on free margins. Legs black to brown-black, including all tarsi. Wing: stigmatal section of subcostal cell blackish; apical blackish spot on vein 3 relatively compact, extending to vein 4, but not to vein 2; brown spot present on anterior crossvein; discal crossvein unmarked; marks on fork of veins 2 and 3 and on basal crossvein absent or barely perceptible; axillary lobe and squama white. Halter creamy. Abdominal tergites shining black.

Head. Height of cheek 0.11–0.14 of height of eye.



Figures 42–45. *Signa mouldsi* n.sp. 42, wing. 43, diagram of female abdominal tergites 3–6, showing positions of spiracles. 44, aedeagus (scale = 0.2 mm). 45, epandrium and associated structures (scale = 0.2 mm).

Thorax. Humeral and anterior notopleural bristles quite large in both sexes, the latter inserted well above level of humeral and posterior notopleural; usually one or few long setulae, better developed in female, just above anterior notopleural and in front of transverse suture; in female only, several long setulae on anterior slope of posterior notopleural callus; hairs on humeral callus fairly long and pale in male, short and mostly pale in female; hairs on mesopleuron pale and of moderate length in both sexes. Wing: distal section of vein 4 only slightly curved apically; cell-4 index = 0.49–0.58.

Abdomen. Male: tergites with moderately developed hairing, not much denser towards lateral margins; tergite 5 c. 1.3 times as long as tergite 4; outer surstylus only moderately elongate, with many unevenly distributed mostly black spinules, many of them directed basad, its distal section much surpassing apex of inner surstylus, very obtuse, obliquely compressed; inner surstylus with few, relatively minute spinules, in addition to the usual two stout apical prensisetae; preglans rather long, not very sharply demarcated from stipe, but more uniformly sclerotised, slightly expanding distally; glans moderately elongate, without lobe; bulb quite short, enclosed in short sclerotised tunic; each of two terminal filaments c. twice as long as glans, not tapering, very slightly expanded apically. Female: preabdomen broadly humped; tergite 5 not over half as long as tergite 4, with hairs mostly pale, a little more crowded than those on tergite 4, not especially developed on sides, those near anterior margin much shorter and more crowded, many of them reduced to minute stumps in relatively conspicuous sockets; spiracles of segment 5 closer to each other than to lateral margins of tergite; pleural membrane with rather short yellow to brown setulae on upper part on segments 2 to 5, also on segment 4 a few long setulae or bristles, largely pale yellowish, often some black.

Dimensions. Total length, ♂♂ 4.1–4.2 mm, ♀♀ 3.5–4.4 mm; length of thorax, ♂♂ 1.6–1.8 mm, ♀♀ 1.6–1.9 mm; length of wing, ♂♂ 3.7–4.3 mm, ♀♀ 3.8–4.2 mm; length of glans of aedeagus 0.41–0.47 mm.

Distribution. Only known from the type locality on the central west coast of New Caledonia.

Notes. A brief comparative survey of the available species of *Signa* indicates that *S. mouldsi* is distinguishable by the following character combination: small size; yellow palpus; filiform arista in both sexes; long humeral bristle in both sexes; high position of insertion of anterior notopleural bristle, which is unreduced in both sexes; quite short hairs on humeral callus in female (longer in male); quite narrow non-aligned presutural and postsutural pairs of black, non-pruinescent stripes on mesoscutum; compact apical wing spot, not touching end of vein 2; absence of shading on discal and anal crossveins; comparatively slight apical curvature of vein 4; also, in the female, the vestiture of tergite 5; and, in the male, the form and degree of spination of the outer surstylus, and numerous details of the aedeagus.

The specific epithet refers to Maxwell S. Moulds, who collected the type series.

Genus *Par* n.gen.

Type species: *Elassogaster evitta* Malloch.

Description (♂, ♀). Somewhat elongate flies, but more robust than most species of *Elassogaster* and *Microepicausta*, with ovoid abdomen and moderately short legs.

Head markedly higher than long; face not very broad, minutely roughened and pruinescent, but without hairs, with rather low, rounded, dorsally narrowed, saddle-like carina; facial ridge with a series of few fine hairs at lower end; parafacial with hairs as upper extremity only; occiput moderately convex below, concave and largely bare above; the following bristles present: inner and outer vertical, minute ocellar, one very small black fronto-orbital, large lateral occipital, large postgenal; postvertical bristle absent; antennal sockets very narrowly separated. Antenna, excluding arista, as long as face (male) or distinctly shorter (female); segment 3 moderately elongate, apically rounded; compound segment 5+6 much longer than rest of antenna, slender, with little basal pubescence and, in male only, spatulate apex. Prelabrum of moderate size, its lower margin not receding, with minute rugosity and pruinescence on anterior surface; palpus and proboscis moderately developed.

Thorax. Mesoscutum c. 1.2–1.3 times as long as wide, pruinescent laterally, but without noticeable pruinescence on broad median zone; scutellum thick, rounded, dorsally convex, in dorsal view longer than a semicircle, with rather dense hairs on entire dorsal surface, and pubescence-pruinescence towards scutellar suture; pleura extensively pruinescent; sternopleuron pruinescent and largely short-haired on at least posterior half; the following thoracic bristles present: scapulars (in a small group on each side), humeral (particularly long in male), 1+1 notopleurals, supra-alar, postalar, posterior intra-alar, dorsocentral, two pairs of scutellars, mesopleural; paramedian scapular and prescutellar acrostichal absent. Posterior bridge of hind coxa with fine hairs; femora without ventral spines; fore femur without dorsal bristles, with long posterior bristles, mainly on distal half; mid femur with posterior bristles intergrading with hairs; hind femur with few dorsal bristles. Wing: membrane almost entirely microtrichose, except for variable zone in anal cell; first basal cell with microtrichia in basal part much denser than those in distal part; section of costa on subcostal cell at least 1.5 times as long as that on second costal cell; subcosta with several small ventral setulae on basal part before humeral crossvein; vein 1 with dorsal setulae more numerous and crowded than in *Elassogaster* and *Microepicausta*; vein 4 terminating distinctly behind wing apex, its distal section curving forward only in c. apical third; anterior crossvein meeting vein 4 slightly before mid-length of discal cell; vein 5 without setulae, its short distal section longitudinally placed, approximately aligned with its penultimate section; second basal cell c. one third as long as discal cell; anal crossvein curved on anterior part only; axillary lobe small, with marginal fringe of hairs less developed than that on squama; squama not larger than axillary lobe.

Abdomen ovoid, its anterior part not narrowed; tergite 5 unreduced. Male postabdomen: surstyli of moderate length; preglans distinct, short and simple; glans subcylindrical, nearly three times as long as its greatest diameter; bulb undeveloped; terminal filaments two, of similar size, each nearly twice as long as glans; cercus large, c. three times as long as wide. Female postabdomen: spiracles not seen, evidently not enclosed in tergites; ovipositor sheath not much longer than wide; aculeus (apex only visible) obtuse, apparently not compressed.

Distribution. Bismarck Archipelago: New Britain; Makada Island, Duke of York Group.

Notes. The available material of *Par* (1 ♂, Tari Creek, near Kimbe, central northern New Britain, AM, 1 ♀, Mount Sinewit, eastern New Britain, BPB, and 1 ♀, Makada Island, assumed holotype of *Elassogaster evitta* Malloch, AM) possibly represents a single species. The only feature that suggests a difference at population level is the very largely bare anal cell of the male, as compared with the more extensively microtrichose anal cell of the two females.

I previously (McAlpine, 1973a) placed *Par evitta* in *Microepicausta*, but the latter is characterised by having only a single terminal filament on the aedeagus, a condition which I consider to be a generic autapomorphy, and *P. evitta* further differs in detail from *Microepicausta* as indicated in the key. *Meringomeria* is also rather similar, but has strong dorsal bristles on the fore femur, no dorsal hairs on the scutellum, and, typically, a compressed, blade-like aculeus. There is possibly close relationship to *Signa*, q.v. for comparison. The wing venation, scutellar vestiture, and, to a degree, the aedeagus resemble those of the Oriental and Lemurian genus *Icteracantha* Hendel, but *Par* lacks the ventral femoral spines of that genus, has a more nearly bare arista, the dorsal setulae near base of vein 3 much more crowded, and the aculeus not broadly compressed. *Par evitta* was originally described in *Elassogaster*, but it differs from typical taxa of that genus (including the two available Afrotropical species) in the absence of a transverse depression across the centre of the mesoscutum, in the extensive hairing on the mid-dorsal region of the scutellum, in the termination of vein 4 distinctly behind the apical extremity of the wing, and in having the apical section of vein 5 almost aligned with the previous section. *Par* also differs from these probably related genera in the series of small ventral setulae near the base of the subcosta. Among other taxa of Platystomatinae, I have noted this condition only in a few species of *Euprosopia*, including *E. impingens* (Walker). *Par* and *Euprosopia* are not very closely related, and the subcostal setulae must have been acquired independently in the two genera. *Par* has the arista 2-segmented through fusion of segments 5 and 6, whereas related genera, including *Elassogaster, Icteracantha, Meringomeria, Microepicausta* and *Signa*, generally show a suture between these segments.

Par is a Latin adjective meaning equal, in reference to the two similar terminal filaments of the aedeagus. As it is treated as a Latin noun of variable gender, it is masculine under Article 30.1.4.2 of the ICZN. The specific epithet *evitta*, though grammatically unusual, cannot be treated as an adjective with variable suffix.

Par evitta (Malloch) n.comb.

Fig. 46

Elassogaster evitta Malloch, 1939a: 116, 153, pl. 4, fig. 16.
Microepicausta evitta (Malloch).–McAlpine, 1973a: 30, 188.

Type material. APPARENT HOLOTYPE, ♀, Makada I. off New Britain, F.H.T. (AM, formerly in SPHTM), left wing mounted on slide.

Malloch described this species from "Type, male, and allotype, Makada Is." etc., and it is apparent from his description that he had both sexes. The only specimen of the type series that I have traced is a female, with a typical Malloch "Type" label, which should indicate a holotype, though, from the above, the type should be a male. However, the left wing of the female specimen is mounted on a slide and was used for Malloch's fig. 16, captioned as "*Elassogaster evitta*, n.sp. type". Lee *et al.* (1956: 316), in cataloguing types and other material of J.R. Malloch, listed only one specimen of *E. evitta*, which they categorized as holotype, in SPHTM, undoubtedly meaning this female specimen.

In view of (1) the contradictory statements in the original publication, (2) the fact that Malloch labelled the female as "Type", (3) the assumption by Lee *et al.* that the female was the holotype, and (4) the unknown fate of the original male, it is considered best to regard the above female specimen as the holotype.

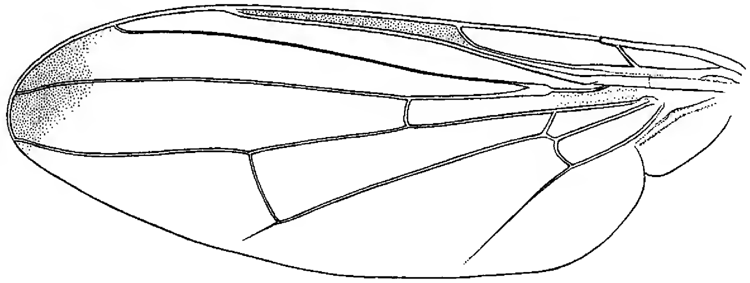


Figure 46. *Par evitta* (Malloch), wing of holotype.

Genus *Microepicausta* Hendel

Figs. 47,48

Microepicausta Hendel, 1914a: 52–54. Type species (original designation) *M. gracilis* Hendel.

Description. The description by Hendel gives much detail, though based on a limited sample of one species. The following statements supplement Hendel's description.

Head. Face without hairs; carina varying from very low to high and narrow, but not flat-topped; prelabrum large and prominent to small and receding.

Thorax. Mesoscutum largely dark, with or without pale grey-pruinescent median stripe, or largely grey-pruinescent; anterior notopleural bristle present or absent; scutellum haired dorsally across most of its width. Fore femur without strong dorsal bristles, with variably developed, sometimes undifferentiated, posteroventral bristles. Subcosta ventrally without setulae; distal section of vein 4 usually gradually curved forwards to meet costa at or slightly behind apex.

Abdomen. Male: aedeagus (where known) with short, compact glans and single, long terminal filament. Female: tergite 5 unreduced; spiracle 5 in membrane near posterior margin of tergite 5; aculeus slender, its apex compressed and very acute to relatively thick and obtuse.

Distribution. Australasian Region: New Guinea; Bismarck Archipelago—New Britain, New Ireland; Solomon Archipelago; Australia—eastern and southern coasts, including northern Tasmania. Oriental Region: ?far western Indonesia. In temperate Australia all records are from the sea coast.

Notes. I have seen at least nine species of *Microepicausta*. Described species known to me (not necessarily all valid) are: *M. albopilosa* (de Meijere, 1915), *M. gracilis* Hendel, 1914a, *M. marginalis* (Malloch, 1940), *M. lineata* (de Meijere, 1915), *M. terraereginae* (Malloch, 1928). *Elassogaster sangiensis* de Meijere, 1916 from western Indonesia (AMST) perhaps belongs in *Microepicausta*, but the aedeagus is undescribed. *Microepicausta evitta* (Malloch, 1939a) is no longer included in *Microepicausta* (see above under *Par*). There is no published key to species.

The single terminal filament of the aedeagus, now confirmed for almost all species, is a remarkable condition not known to me in other Platystomatinae. In one or two species of *Duomyia* and in some specimens of the African genus *Bromophila* Loew there appears to be a single terminal filament, but this structure has two separate lumina and is the product of fusion of the usual two filaments; this is not the case in *Microepicausta*. Reduction to a single terminal filament is probably a groundplan autapomorphy for the genus Microepicausta.

Adults of *Microepicausta* are usually found in sandy areas. In eastern Australia they are often found in coastal dune scrub or on the grass *Spinifex sericeus* on or near beaches. In northern Papua New Guinea I have found them on low herbage at sandy stream margins far from the coast. A specimen from New Britain, not determined to species, is labelled "coastal area, rainforest".

Genus *Elassogaster* Bigot

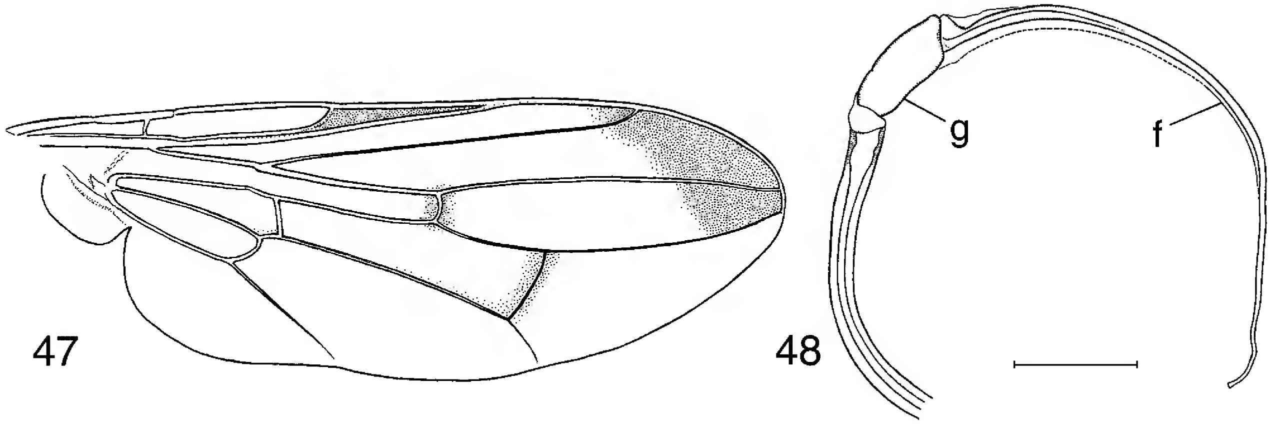
Fig. 49

Elassogaster Bigot, 1860a: 546. Type species (monotypy) *E. metallicus* Bigot.

Myiodella Rondani, 1873: 290. Type species (monotypy) *M. brachialis* Rondani.

Epicausta Loew, 1873: 46. Type species (designated Steyskal, 1980) *Epicausta nigra* Wulp (= *Myiodella brachialis* Rondani).

Description. With access to so few of the accepted species, I am not prepared to give a formal description. Hendel (1914a) simply listed the differences from *Plagiostenopterina* s.l., and quoted Bigot's uninformative original description.



Figures 47–48. 47, *Microepicausta* "sp. 2" (near Musgrave, AM), wing. 48, *Microepicausta* "sp. 1" (Nullica Beach, AM), distal part of aedeagus (scale = 0.2 mm). Abbreviations: f, terminal filament (single); g, glans.

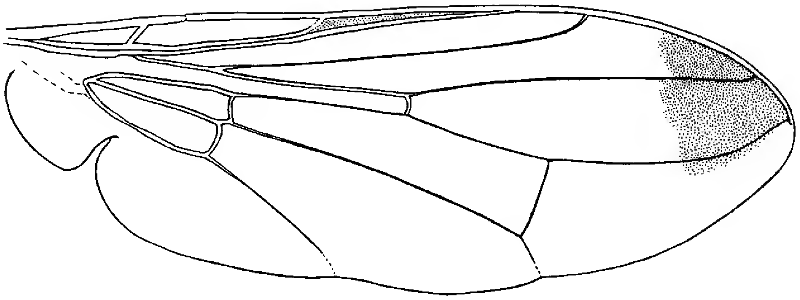


Figure 49. *Elassogaster linearis* (Walker), wing.

Distribution. Australasian Region: Moluccas—Buru (AMST); New Guinea; Bismarck Archipelago—New Britain; Solomon Archipelago; northern and eastern Australia. Afrotropical Region: Arabian Peninsula; Madagascar; Mascarene Islands; Africa—widely distributed. Palaearctic Region: Japan. Oriental Region: widely distributed.

Notes. The type species, *E. metallica* Bigot, is unknown to me (as it was to Hendel), but Hendel and all subsequent authors have interpreted *Elassogaster*, possibly correctly, as the generic concept that includes the well known *E. linearis* (Walker) (syn. *Dacus sepsoides* Walker) and some closely related African and Oriental species.

Elassogaster is much in need of a thorough taxonomic revision. Five species have been transferred from *Elassogaster* to *Microepicausta* (McAlpine, 1973a; Evenhuis, 1989), in accordance with my view on the limits of these genera, but *E. evitta* Malloch is now placed in *Par* (q.v.). Hardy (1959) transferred *Dacus sordidus* Walker to *Elassogaster*, and synonymised *Dacus varialis* Walker therewith from examination of type material of both nominal species (in BM). I am unable to evaluate this action at present. Evenhuis (1989) listed six Australasian species of *Elassogaster*, and I am not aware of any undescribed species in this Region.

Australasian species of *Elassogaster* differ from those of *Plagiostenopterina* in the absence of fine hairs on the face, the longer anal cell which is not or only slightly shorter than the distal section of vein 6, and the absence of a dark longitudinal stripe covering the first basal cell. These *Elassogaster* species differ from *Microepicausta* in having the scutellar hairs restricted to the sides or absent, and two terminal filaments instead of one on the aedeagus.

Larvae of *Elassogaster linearis* have been found consuming the eggs of the locust, *Locusta migratoria* (Linné) (Orthoptera: Acrididae), in the Philippines and Papua New Guinea (AM). However, specimens that may be conspecific have been reared from rotting potato tubers in Western Highlands Province, Papua New Guinea, and others are labelled as a secondary pest of taro roots (? rhizomes, *Colocasia esculenta*) in Milne Bay Province (AM), and larvae have also been found “in rotting asparagus crowns” near Katherine, Northern Territory, Australia.

Genus *Aetha* n.gen.

Type species: *Aetha cowanae* n.sp.

Description (♀, ♂ unknown). Flies of moderate build, with anteriorly narrowed but not petiolate abdomen and moderately short legs.

Head of moderate proportions, but markedly higher than long; face concave in profile, without median carina; facial ridge with few fine hairs only; parafacial pruinescent, without hairs; occiput entirely convex, with many fine, pale hairs on most of surface; the following bristles present: inner and outer vertical, weakly differentiated postvertical, two short fronto-orbitals, minute ocellar, postgenal; lateral occipital bristle absent without trace. Antenna (excluding arista) a little shorter than face on median line; segment 3 not attenuated, acute dorsoapically; segment 6 filiform, minutely pubescent. Prelabrum and mouthparts normal.

Thorax. Mesoscutum c. as long as wide; scutellum extensively haired dorsally; subscutellum with a well-developed series of setulae on each side; the following thoracic bristles present: scapular, humeral, 1+1 notopleurals, supra-alar, postalar, posterior intra-alar, dorsocentral, two pairs of scutellars, mesopleural; prescutellar acrostichal absent. Posterior bridge of hind coxa bare; femora not spinose; fore femur with weakly differentiated dorsal and long, fine posteroventral bristles; hind femur with few dorsal bristles distally. Wing: subcosta without ventral setulae, not strongly flexed near distal end; section of costa on subcostal cell shorter than that on either side of it; anterior crossvein located before mid-length of discal cell; terminal section of vein 4 on its entire length converging with vein 3; first basal cell entirely microtrichose; second basal cell more than half as long as discal cell; axillary lobe with marginal fringe of hairs not noticeably longer than those on squama; squama forming a rather small lobe, slightly less in area than axillary lobe.

Abdomen somewhat ovoid; tergite 1+2 somewhat narrowed anteriorly; tergite 5 unreduced; tergite 6 small and more or less concealed, well sclerotised; aculeus very slender, not much compressed, with rounded apex.

Distribution. Australia: tropical and subtropical Queensland and Northern Territory.

Notes. *Aetha* is apparently monotypic, and only females are known.

Aetha runs near *Pogonortalis* and *Microepicausta* in the generic key of McAlpine (1973a) and near *Pogonortalis* in that of Malloch (1939a). It differs from *Pogonortalis* in the absence of the lateral occipital bristle, the haired scutellum, the virtual absence of noticeable areas of thoracic pruinescence, the shorter stigmatal section of the costa (on subcostal cell), and in the termination of vein 4 before the wing apex. It differs from *Microepicausta* in the extensively pubescent arista, broader thorax, shorter stigmatal section of costa, more basally located anterior crossvein, and the termination of vein 4 before the wing apex.

Aetha cowanae was initially sorted as a species of *Elassogaster*, but it differs from that genus in its more uniformly convex occiput, presence of distinct fronto-orbital bristles, absence of the lateral occipital bristle, extensively pubescent arista, broader thorax, more extensively haired scutellum, relatively short fore coxa, and different contour of the terminal section of vein 4. *Aetha* also has some resemblance to *Tarfa* n.gen. of the Loyalty Islands, particularly in contour and relations of vein 4. See under that genus for comparison.

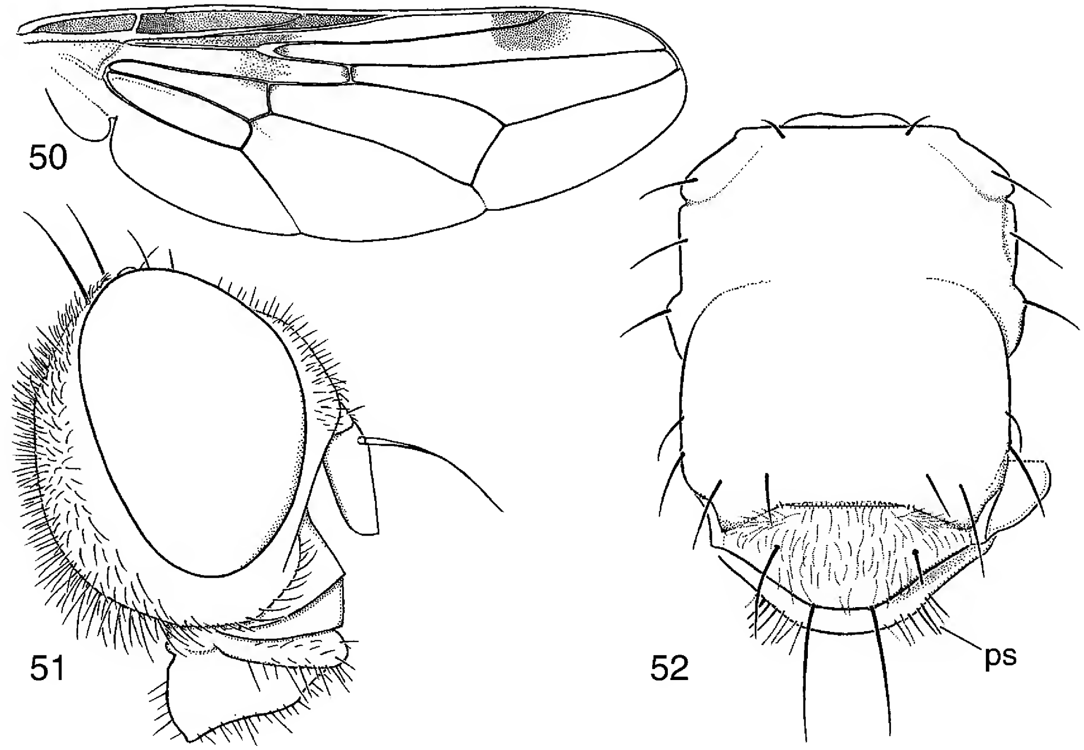
Aetha differs from all the above genera in possessing a group of setulae on each side of the postscutellum. The only other Australasian platystomatid taxon with setulae in this position is the subgenus *Plagiostenopterina* of *Plagiostenopterina*, but in the latter they are usually fewer and smaller. *Aetha* differs from *Plagiostenopterina* in the absence of the lateral occipital bristle, absence of hairs on the face, broader thorax, reduced thoracic pruinescence, shorter fore coxa, much longer second basal cell, largely unpigmented first basal cell, and more extensive pubescence on the arista. *Aetha* and subgenus *Plagiostenopterina* are not so close morphologically, and presumably phylogenetically, as to allow any probability that the setulosity of the postscutellum is a homologous condition in the two taxa.

The generic name is latinised from the Greek *aithos*, burnt, in reference to the dark coloration, and is feminine.

Aetha cowanae n.sp.

Figs. 50–52

Material examined. HOLOTYPE, ♀, Northern Territory: Mudginberri, near Jabiru, iii–iv.1971, Manitoba trap, A.L.D., H.A.S. (ANIC). PARATYPES, Northern Territory: 2 ♀♀, Black Point, Cobourg Peninsula, i, ii.1977, E.D.E., T.A.W. (AM, ANIC); 1 ♀, Wollogorang (Homestead), c. 17°13'S 137°57'E, ix.1930, T.G.C. (ANIC).



Figures 50–52. *Aetha cowanae* n.sp. 50, wing. 51, head. 52, thorax (setulae of mesoscutum omitted); ps, postscutellar setulae.

Other material. Queensland: 1 ♀, Peach Creek, near Coen, xi.1979, M.S.M., B.J.M. (AM); 1 ♀, Charleville–Bollon Road, 70 km SE of Charleville, 26°52'S 146°35'E, x.1991, G.D. (AM).

Description (♀). Appearance and habitus resembling those of the familiar *Pogonortalis doclea* (Walker). *Coloration* predominantly black and somewhat shining; major bristles of head and thorax black; hairs of most parts whitish. Postfrons, face, parafacial, anterior part of cheek, and antenna brownish-tawny; eye almost encircled by narrow whitish-pruinescent stripe. Prelabrum greyish brown; palpus brownish, with tawny apex, with mainly black hairs above and more numerous white hairs below. Pleurotergite largely grey-pruinescent; thorax otherwise almost without pale pruinescent zones. Legs black to blackish brown. Wing hyaline; both costal cells, base of marginal cell, large blotch at end of vein 2, and lighter zone near middle of first basal cell brown; axillary lobe and squama white. Halter dark brown. Abdomen without pale pruinescent zones on tergites.

Head. Eye 0.67–0.71 as long as high; height of cheek 0.17–0.18 as high as eye; occipital region extensively haired, but postocular setulae undifferentiated.

Thorax. Mesoscutum, humeral callus, notopleural region, mesopleuron, pteropleuron, sternopleuron, and dorsal surface of scutellum extensively haired. Wing: cell-4 index = 0.34–0.37.

Abdomen. Tergite 5 only slightly shorter than tergite 4.

Dimensions. Total length 5.2–6.3 mm; length of thorax 2.0–2.4 mm; length of wing 4.1–4.7 mm.

Distribution. Northern Territory: widely distributed in less arid districts; Queensland: Cape York Peninsula and Charleville district in southern inland (isolated records).

Notes. *Aetha cowanae* resembles *Pogonortalis doclea* in superficial appearance, at least as dried material. In the field it should be easily distinguished by the large preapical dark wing spot and lack of an apical spot.

Locality data indicate at least seasonally dry habitats. The Peach Creek locality includes riverine forest (M.S. Moulds, pers. comm.).

The specific epithet refers to Sally Cowan who has assisted in many of my dipterous projects.

Genus *Pogonortalis* Hendel

Fig. 53

Pogonortalis Hendel, in de Meijere, 1911: 370 (footnote). Type species (monotypy) *Pogonortalis uncinata* de Meijere.

Pogonortalis.–Hendel, 1914a: 16, 84–85. Type species given twice in error as *Pogonortalis barbifera* Hendel (not originally included) = *Trypeta doclea* Walker.

Pogonortalis.–Hendel, 1914b: 6. Type species given in error as *Pogonortalis barbata* Hendel, sic (not originally included) = *Trypeta doclea* Walker.

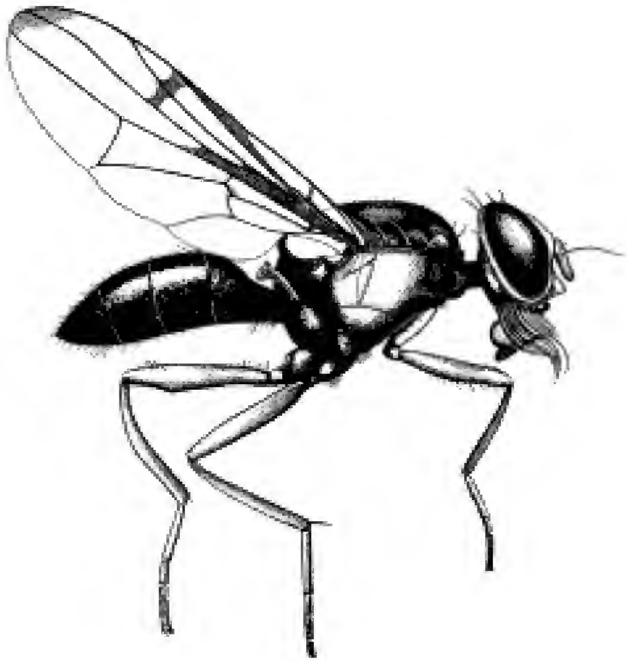


Figure 53. *Pogonortalis doclea* (Walker), male. After Hendel (1914a), retouched.

Description. Hendel (1914a) gave a detailed description, but the particular characters of *Pogonortalis similis* Hendel should be discounted, as that species is now placed in *Plagiostenopterina* (see McAlpine, 1973a). The following notes supplement Hendel's description.

Male abdomen. Surstyli short; preglans sharply defined, separated from the more strongly sclerotised stipe by a constriction; glans simple, short, stoutly ovoid; bulb little developed; paired terminal filaments long, subequal.

Female abdomen. Tergites 4 and 5 large; tergite 6 very short and generally concealed; spiracles 3, 4, and 5 in pleural membrane close to lateral margins of tergites; ovipositor sheath rather short; aculeus slender, obtuse, not compressed.

Distribution. Australasian Region: Micronesia—Guam; Australia—southern and eastern parts, Lord Howe Island; Norfolk Island. Oriental Region: Java. Nearctic Region: California (introduced).

Notes. I regard Hendel, not de Meijere, as the author of *Pogonortalis*, because the latter quoted the descriptive statements for the genus from a letter from Hendel, who originated the name.

Previously (McAlpine, 1973a: 31) I expressed doubt as to the relationships of the type species, *Pogonortalis uncinata* de Meijere. Since then I have examined type material (AMST) and confirmed its close relationship to *Pogonortalis doclea* and the consequent stability of the generic name.

A key to the species was given by Paramonov (1958), but he included *Pogonortalis similis* Hendel, now placed in *Plagiostenopterina*, and the species *Pogonortalis hians* Schneider & McAlpine, 1979 should be added. Six species are described, and I am not aware of any undescribed species. *Pogonortalis commoni* Paramonov is still only known to me from the holotype.

All the species have a low anteroventral keel at about the distal third of the hind femur, but this may be little developed in diminutive specimens. The male genitalia of *Pogonortalis doclea* are illustrated by Steyskal (1961).

Pogonortalis doclea is very common in gardens in Sydney and other Australian towns. Adults of *P. doclea* and *P. howei* Paramonov are attracted to fresh mammalian dung for feeding.

Some observations on sexual behaviour of *Pogonortalis doclea* have been made (McAlpine, 1973b), and fighting between males of this species has been recorded (McAlpine, 1975).

Genus *Apactoneura* Malloch

Fig. 54

Apactoneura Malloch, 1930b: 223. Type species (original designation) *A. flavicornis* Malloch.

Description. Medium-sized to rather large, moderately elongate flies, reminiscent of *Plagiostenopterina* in habitus, largely black, with heavy dark wing markings.

Head slightly higher than long; face with slight development of median carina on upper part only, with low, rounded, saddle-like median elevation, without hairs; facial ridge almost without hairs, except where it meets peristomial series; parafacial without hairs, but with well-developed pubescence-pruinescence; the following bristles present: inner and outer vertical, small postvertical and ocellar, two moderately small reclinate fronto-orbitals, postgenal; lateral occipital bristle absent. Antenna, excluding arista, much shorter than face; segment 3 little more than twice as long as wide; segment 6 with sparse, minute pubescence on basal part only, in male apically spatulate. Prelabrum moderately developed; palpus rather long and narrow.

Thorax. Mesoscutum c. 1.2 times as long as wide, without pruinescent median stripe; scutellum slightly longer than a semicircle, slightly flattened dorsally and finely rugose, without hairs, pubescent on free margins; mesopleuron pruinescent on upper part only; sternopleuron with pale pruinescent stripe along upper margin, extending to fore-coxal cavity; pteropleuron and posterior pleural sclerites pruinescent; the following thoracic bristles present; humeral, 1+1 notopleurals, supra-alar, postalar, posterior intra-alar, small dorsocentral (near scutellar suture), prescutellar acrostichal, three long scutellars, mesopleural; scapular bristles absent. Posterior bridge of hind coxa haired; fore femur with an extensive series of thick posteroventral spines and at most rudimentary anteroventral ones; mid femur with few anteroventral and posteroventral spines distally; hind femur longer and thicker than other femora, with a well-developed series each of anteroventral and posteroventral spines not extending to base. Wing: setulae on veins (other than costa) restricted to dorsal surfaces of vein 1 (beyond humeral crossvein) and vein 3; section of costa on subcostal cell c. as long as that on second costal cell and c. twice as long as that on marginal cell (Fig. 54); supernumerary crossvein dividing first posterior cell meeting vein 4 just beyond discal crossvein; anterior crossvein meeting vein 4 slightly beyond apical third of discal cell; basal cells and alula entirely microtrichose; squama forming a rounded lobe, only slightly greater in area than axillary lobe.

Abdomen. Male: tergite 5 as long as tergite 4; preglans little differentiated; glans stoutly subcylindrical; bulb little developed; paired terminal filaments subequal, each less than half as long as glans. Female: spiracle 5 located in pleural membrane, well below lateral margin of tergite 5; tergite 6 small but well sclerotised; ovipositor sheath moderately long, with long posterior marginal bristles; aculeus slender, obtuse.

Distribution. Tropical Polynesia: Samoan Islands.

Notes. *Apactoneura* has one recognized species, but possible differences between the populations on Savaii and Upolu are yet to be evaluated.

Apactoneura is readily recognizable from its wing venation and ventral spination on all femora, combined with the enlargement of the hind femur. No other platystomatid genus in this Region has a regular crossvein dividing the first posterior cell. This condition is consistent in the five specimens known to me, from both island populations.

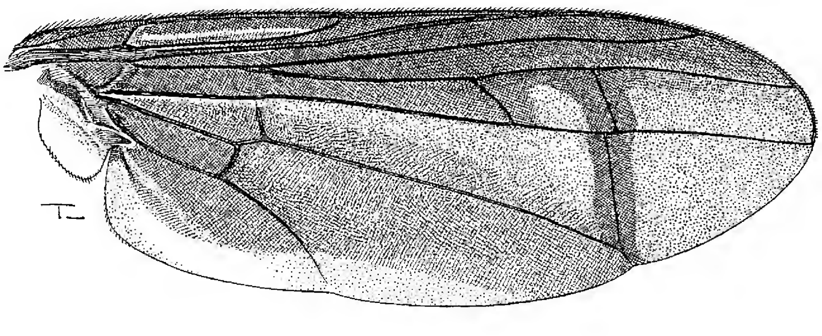


Figure 54. *Apactoneura flavicornis* Malloch, wing. After A.J.E. Terzi, in Malloch (1930b).

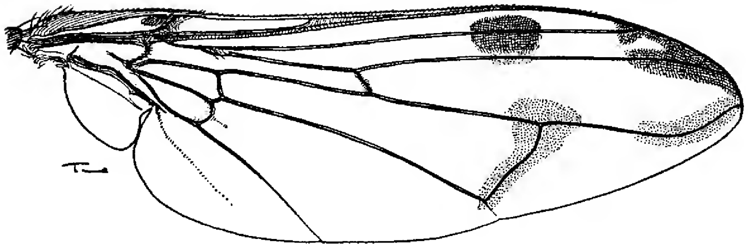


Figure 55. *Meringomeria neurostigma* (Bezzi), wing. After A.J.E. Terzi, in Bezzi (1928).

However, the relationship to other platystomatine genera is obscure. *Apactoneura* resembles the Oriental genus *Icteracantha* Hendel in the presence of stout ventral spines on all femora, presence of well-developed hairs on the posterior bridge of the hind coxa, and in the general habitus, but differs in the lack of forward curvature in the distal section of vein 4, the presence of three instead of two pairs of bristles and the absence of dorsal hairs on the scutellum. The genus also resembles *Lamprogaster*, but no *Lamprogaster* species known to me has well-developed femoral spines or so well-developed posterior hairing on the hind coxa; also the squama is consistently larger in *Lamprogaster* and the facial carina is distinctly margined on each side. *Apactoneura* differs from *Plagiostenopterina* in the lack of hairing on the face, and absence of apical forward curvature of vein 4.

Genus *Meringomeria* Enderlein

Fig. 55

Meringomeria Enderlein, 1924: 108. Type species (original designation) *Dacus trivittatus* Walker.

Charax Walker, 1861a: 325 (preocc. *Charax* Gronovius, 1763). Type species (monotypy) *C. planidorsum* Walker.

Stenopterella Malloch, 1931: 13, 16 (as subgenus of *Plagiostenopterina*). Type species (original designation) *Dacus trivittatus* Walker.

Description. Flies of elongate habitus, with rather slender legs of moderate length.

Head markedly higher than long; face pruinescent, without hairs, typically with rounded, saddle-like carina, which is depressed near middle (Oriental species), or with carina broadly almost flat-topped on upper part (Fijian species); facial ridge with fine uniseriate hairs near lower extremity only; parafacial without hairs; occiput moderately convex below, concave to almost flat above, haired mainly on dorsolateral and lower parts; the following bristles present: inner and outer vertical, minute ocellar, lateral occipital, postgenal; fronto-orbitals minute or absent; postvertical absent. Antenna about as long as face on median line, or slightly longer in some males (Oriental species), or distinctly shorter than face (Fijian species, females only known); segment 3 elongate, usually distally tapered but not pointed; segment 6 filiform, usually with basal pubescence (Oriental species), or plumose on basal part (Fijian species). Prelabrum moderately large and prominent, pruinescent and often also finely rugose (Oriental species), or almost smooth and shining (at least one Fijian species); palpus moderately developed, broadly rounded at apex.

Thorax. Mesoscutum longer than wide, extensively pruinescent, with or without pair of broad, dark, shining longitudinal stripes (Oriental species), or with relatively little pruinescence and largely shining (Fijian species); mesopleuron extensively rather thinly pruinescent (Oriental species), or with dense pale pruinescence restricted to posterior part (Fijian species); scutellum somewhat convex, more or less pruinescent, with few lateral hairs only; the following thoracic bristles present: one well-developed lateral scapular (Oriental species), or several small such bristles (at least one Fijian species), humeral, 1+1 notopleurals, supra-alar, postalar, posterior intra-alar, dorsocentral, two pairs of scutellars, mesopleural; paramedian scapular present or absent. Posterior bridge of hind coxa with fine hairs; fore femur with dorsal bristles, with long posteroventral bristles (Oriental species), or latter scarcely differentiated (one Fijian species); mid femur without bristles; hind femur with dorsal bristles beyond mid-length; mid tibia with apical ventral spur. Wing with dark markings quite restricted to costal region (Oriental species), or (in Fijian species) either with more extensive markings (Fig. 55) or completely without dark markings; membrane largely microtrichose, except for variable bare zones in basal and anal cells; section of costa on subcostal cell considerably longer than that on second costal cell (Oriental species), or scarcely longer (Fijian species); anterior crossvein meeting vein 4 near or slightly beyond mid-length of discal cell; distal section of vein 4 strongly curved forward near distal extremity to meet costa at or slightly behind apex of wing; vein 3 also curved to a smaller extent near apex to converge with vein 4; vein 5 without setulae, its distal section short (Oriental species), or very short (less than one quarter length of discal crossvein) in Fijian species; second basal cell c. one quarter to one third as long as discal cell; anal crossvein curved, sometimes more strongly so on anterior part; axillary lobe moderately developed; squama forming a short lobe, scarcely greater in area than axillary lobe.

Abdomen ovoid to subcylindrical, not significantly narrowed anteriorly. Male abdomen (unknown for Fijian species): surstyli elongate, straight, apex of outer surstylus not extending much beyond that of inner one; aedeagus with preglans differentiated but simple; glans rather stoutly subcylindrical; bulb little developed; paired terminal filaments present; cerci moderately large. Female abdomen (Oriental species): spiracles 4 and 5 situated within respective tergites and at least the latter visible dorsally; ovipositor sheath well developed, scarcely tapered posteriorly; aculeus very broad and compressed, obtuse. Female abdomen (available Fijian specimen): spiracles not situated in tergites, those of segment 5 somewhat approximated close behind posterior margin of tergite 5; ovipositor sheath very like that of Oriental species, but aculeus not visible.

Distribution. Australasian Region: Fiji. Oriental Region: southern China (Guangdong = Kwangtung Province; Taiwan) and Sikkim to Palawan and Western Indonesia. There appear to be no records from localities between Wallace's Line and Fiji.

Notes. Although *Meringomeria* (or *Stenopterella*) has often been included as a subgenus of *Plagiostenopterina*, Malloch (1931) found difficulty in defining such a diffuse genus, and more recently *Meringomeria* has been given generic status (McAlpine, 1973a; Evenhuis, 1989). Steyskal (1966) provided a useful key to species, but it seems to me that one or two of the categories keyed may be complexes of species rather than single species. This is suggested by the wide distributions accepted for some species, and a study of limited material, representing c. six Oriental species now available to me.

There would seem to be at least two species, one undescribed, in Fiji, as the only Fijian specimen at present available differs from *Meringomeria neurostigma* (Bezzi, 1928) in the absence of wing markings (and perhaps in several other characters, as suggested by Bezzi's description). These Fijian species are more similar to each other than to the Oriental species, as indicated by my comparisons in the above redescription, but to what degree they need taxonomic segregation can only be decided when better study material is available.

Genus *Plagiostenopterina* Hendel

Figs. 56, 57

Plagiostenopterina Hendel, 1912a: 3. Type species (original designation) *Dacus aeneus* Wiedemann.

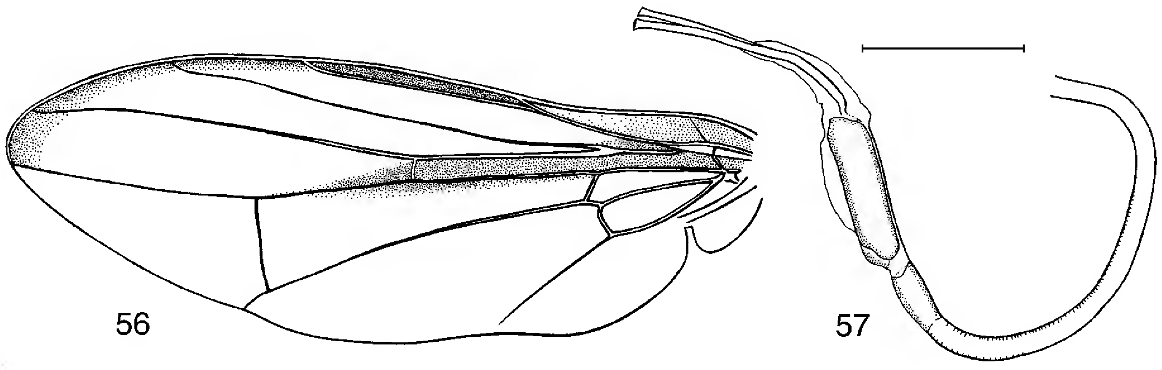
Stenopterosoma Malloch, 1939a: 114. As subgenus of *Plagiostenopterina*. Type species (monotypy) *P. orbitalis* Malloch (= *Dacus lativentris* Walker).

Description. See McAlpine (1973a).

Distribution. Very widely distributed in the tropics of the Old World. Australasian Region: extending from the Moluccas to the Solomon Archipelago; Tropical Polynesia—Samoan Islands; tropical Australia—coastal and subcoastal districts of Queensland and Northern Territory.

Notes. In accordance with McAlpine (1973a) the taxa *Carolimyia* Malloch, *Meringomeria* Enderlein, and *Peronotrochus* Enderlein, which are sometimes given as subgenera of *Plagiostenopterina*, are now excluded from the genus. See Steyskal (1977) for synonymy of these taxa. Steyskal (1980) has corrected the original citation of the genus and the means of type designation. McAlpine (1973a) reviewed the Australian species of the genus, but I am now very doubtful if populations in New Guinea, Solomon Archipelago, and Australia are correctly referred to *P. enderleini* Hendel. Of the two subgenera represented in Australasia, *Plagiostenopterina* s.str. is also widely distributed in the Afrotropical and Oriental Regions, while *Stenopterosoma* Malloch is known only from New Guinea and northern Queensland.

Adults of subgenus *Plagiostenopterina* are often numerous in disturbed vegetation or the interface of forest and cultivation. Those of subgenus *Stenopterosoma* are found mainly in rainforest. Adults of both subgenera are attracted to fresh mammalian dung.



Figures 56–57. *Plagiostenopterina (Stenopterosoma) claudiana* McAlpine. 56, wing. 57, aedeagus (scale = 0.5 mm).

Key to Australasian subgenera of *Plagiostenopterina*

1 Scutellum extensively setulose; postscutellum with fine setulae on each side; fronto-orbital bristles absent .... *Plagiostenopterina* s.str.

—— Scutellum and postscutellum without setulae; two pairs of fronto-orbital bristles present .... *Stenopterosoma*

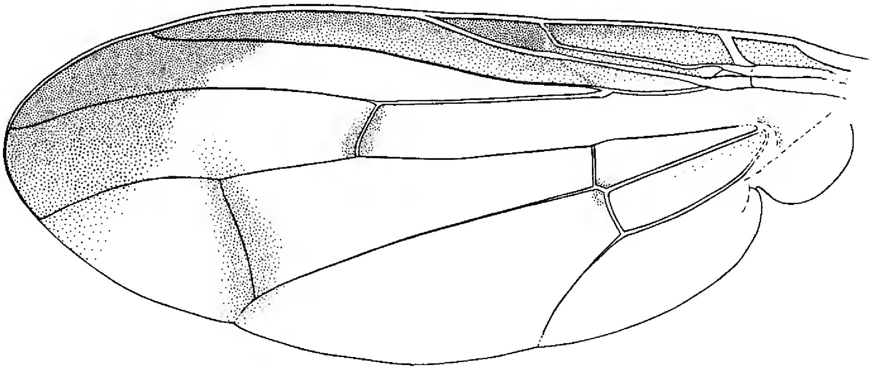


Figure 58. *Pseudepicausta chalybea* (Doleschall), wing.

Genus *Pseudepicausta* Hendel

Fig. 58

Pseudepicausta Hendel, 1912b: 14. Type species (designated Hendel, 1914a) *Herina chalybea* Doleschall.

Description. See Hendel (1914a). That description, together with characters cited above in my key, should enable identification of the Australasian and Oriental species.

Distribution. Australasian Region: Moluccas; New Guinea; New Britain; Solomon Archipelago. Also Oriental and Afrotropical Regions.

Notes. *Pseudepicausta* seems to be a well defined genus within the Australasian and Oriental Regions. Some Afrotropical material (e.g., from Madagascar) is slightly less typical, e.g., in having better developed fronto-orbital bristles and shorter ovipositor sheath. However, I do not have sufficient Afrotropical species available for investigation of their relationships.

Malloch (1939a) gave a key to species of New Guinea and nearby islands, but included *P. lagarosia* Hendel, which belongs in *Pseudocleitamia* (q.v.). Evenhuis (1989) listed nine Australasian species, but the list includes *P. rufitarsis* (Macquart, 1847, as *Tephritis*). The latter is not recognizable from the brief description, and the type locality (Nouvelle Holland = mainland Australia) is beyond the known range of *Pseudepicausta*. The holotype (Bigot collection, OX, examined by author September 1998) is in exceedingly poor condition with almost no significant features visible, but is very doubtfully referred to the genus *Rivellia*. Without a thorough revision of the genus, it is difficult to estimate how many of the other listed species are valid. I have seen at least one probably undescribed species from southern Papua New Guinea (AM).

Genus *Pseudocleitamia* Malloch

Fig. 59

Pseudocleitamia Malloch, 1939a: 104. Type species (original designation) *P. setigera* Malloch.

Description. A brief description was given by Malloch, and the description of *Pseudepicausta lagarosia* Hendel (1914b: 118–119), now included in *Pseudocleitamia*, indicates some characters of the male. I do not have on hand enough material for a redescription. The genus is not represented in BPB and Australian collections.

Distribution. New Guinea: Aru Islands; Papua New Guinea—mainland (Madang and Oro Provinces).

Notes. The nominal species *Dacus pompiloides* Walker, 1859, *Pseudepicausta lagarosia* Hendel, 1914a, and *Pseudocleitamia setigera* Malloch, 1939a, are referable to this genus. I have examined the types of *D. pompiloides* and *Pseudocleitamia setigera* (BM). Hendel (1914a: pl. 6, fig. 121) and Malloch (1939a: pl. 4, fig. 5) each illustrated the wing of their holotypes, showing the quite distinctive pattern and venation of *Pseudocleitamia*. Among the more distinctive characters mentioned by Malloch for the genus are "mesopleura, sternopleura, pteropleura with numerous short stout bristles", and "the very narrow upper portion of the frons". The latter condition is not atypical of *Pseudepicausta* species, but the multiple bristling of the pleura is not recorded in that genus, nor is it present in the type of *Pseudocleitamia pompiloides* (and probably that of *P. lagarosia*), in which the thoracic pleura have slender hairs and only the usual bristles. The type of *P. lagarosia* has a series of broadened, lanceolate posteroventral bristles on the fore femur, but the fore femoral bristles of *Pseudocleitamia setigera* and *P. lagarosia* are not thus modified. The types of *P. pompiloides* and *P. lagarosia*

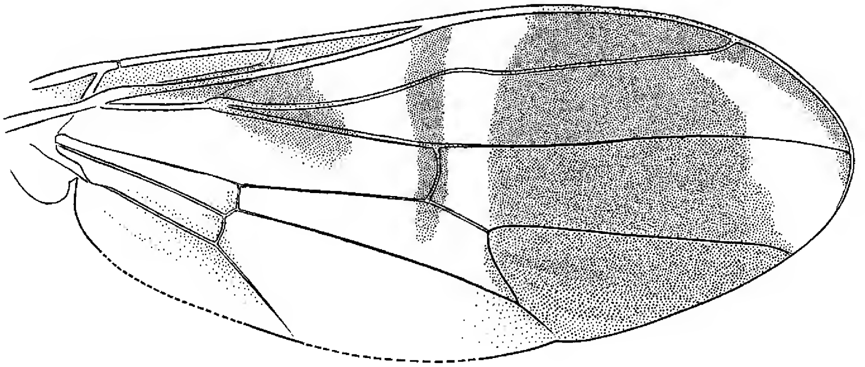


Figure 59. *Pseudocleitamia setigera* Malloch, wing of holotype.

are males, whereas that of *Pseudocleitamia setigera* is a female. Hardy (1959) examined the type of *D. pompiloides* and placed it in *Pseudepicausta*, but he did not make comparison with *Pseudocleitamia lagarosia* nor mention the genus *Pseudocleitamia*. Evenhuis (1989) made the combination *Pseudocleitamia pompiloides* (on my suggestion) and gave *P. lagarosia* as a junior synonym, leaving *P. setigera* as a separate species.

From my studies of morphology of many platystomatine taxa, I think that the presence of numerous stout pleural bristles as in the type of *Pseudocleitamia setigera* is likely to be female-restricted, whereas the presence of compressed, lanceolate femoral bristles, as in the type of *P. lagarosia*, is likely to be male-restricted. On the other hand, there are differences which suggest that these species and *P. pompiloides* are distinct from one another. *Pseudocleitamia setigera* differs from the other two species in having a marked sinuosity in vein 2 just before mid-length (not very clearly shown in Malloch's fig. 5, but see my Fig. 59 based on same specimen). *Pseudocleitamia setigera* differs from *P. pompiloides* in having the hyaline prediscal band quite bare from the costa to halfway across the discal cell; also the sub-basal hyaline zone in the submarginal cell, smaller adjacent zone in marginal cell, and a substantial adjacent zone in discal cell are bare, whereas these zones are entirely microtrichose in the type of *P. pompiloides*. The type of *P. pompiloides* lacks the modified lanceolate femoral bristles present in that of *P. lagarosia* (confirmation by J. Chainey in litt.), though both specimens are males.

With each of the apparent species of *Pseudocleitamia* known to me from only one specimen, it is not possible adequately to describe the range of morphological variation in the genus nor fully to characterise the species.

Genus *Lamprophthalma* Portschinsky

Lamprophthalma Portschinsky, 1892: 16–17, pl. 1, figs. 7, 7a. Type species (monotypy) *L. metallica* Portschinsky.

Description. The annotated description by Hendel (1914a: 45, largely quoted from Portschinsky) is probably adequate for identification of this marginally or doubtfully Australasian genus. I can add that the frontal tubercle is quite variable in development among Oriental species, but this variation may not indicate that these species are not closely interrelated. The face has fine hairs (macrotrichia) in some species, but not in others. The putative hind coxal spine, figured and described by Portschinsky, is probably really on the trochanter and male-restricted. It is absent in some species. The statement "nervi omnes inermes" does not apply to veins 1 and 3.

Distribution. Australasian Region: Moluccas—?Seram, see below. Afrotropical Region. Palaearctic Region: Iran; China; Japan. Oriental Region: widely distributed.

Notes. The only Australasian record for *Lamprophthalma* known to me is that of the type specimen of *Dacus sepedonoides* Walker, which I have not examined. Hardy (1959: 181) corrected the type locality from "Waigiou" Island to Ceram (Seram), and made the combination *Lamprophthalma sepedonoides* in accordance with the placement of the type in the BM collection. As this supposed type is possibly not from the given type locality, and as Hardy did not appear to vouch for its generic placement, the Australasian occurrence of this genus needs confirmation.

I transfer the two following Oriental species from *Plagiostenopterina* to *Lamprophthalma* from study of type material (AMST): *Lamprophthalma egregia* (de Meijere, 1924: 41–42) n.comb.; *Lamprophthalma medionotata* (de Meijere, 1924: 40–41) n.comb.

Genus *Conicipithea* Hendel

Fig. 60

Conicipithea Hendel, 1912b: 14. Type species (monotypy) *Dacus addens* Walker.

Description. Hendel (1914a) gave a fairly detailed description, which I supplement from a specimen of *C. addens* from Kendari, south-east Sulawesi (AM).

Head. Face without hairs; parafacial with several short setulae on central part.

Wing. Costa much narrowed but not broken at end of subcosta.

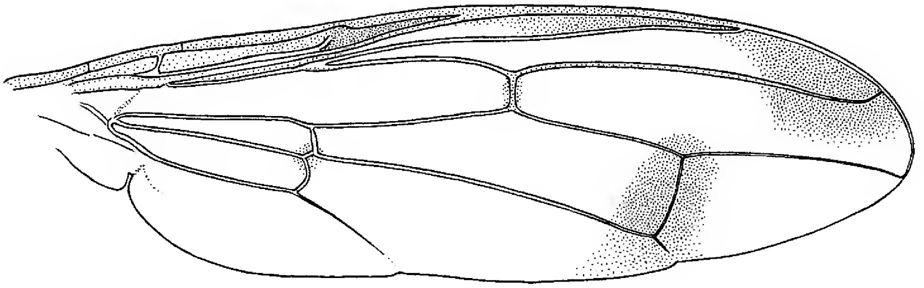


Figure 60. *Conicipithea addens* (Walker), wing of male (Sulawesi, AM).

Male postabdomen. Preglans differentiated, but not separated from stipe by a constriction; glans narrowly elongate, subcylindrical; paired terminal filaments very short.

Distribution. Australasian Region: Moluccas—Ambon. Oriental Region: Sulawesi (Celebes).

Notes. *Conicipithea* is a little known but easily recognized genus, the very long antenna with black setulae on segment 3 and the relatively long hairs on the suprasquamal ridge provide a unique character combination among Australasian platystomatids. The haired suprasquamal ridge and flat facial carina suggest a relationship to *Duomyia*, but *Conicipithea* differs from that diverse purely Australian genus in the setulose antennal segment 3, the much more extensively haired segment 6, the narrowed costa at the end of the subcosta, and the relatively large mesopleural bristle.

It has been assumed that all available material of *Conicipithea* represents *C. addens*, but no direct comparison seems to have been made between Sulawesi and Ambon specimens. The wing venation of my single specimen from Sulawesi (Fig. 60) looks a little different from that in Hendel's figure of a specimen from Ambon (1914a: pl. 4, fig. 73).

Genus *Antineura* Osten Sacken

Figs. 61, 62

Antineura Osten Sacken, 1881b: 134. Type species (designated Hendel, 1914a) *A. stolata* Osten Sacken.

Antineura.–Hendel, 1914a: 12, 40–42.

Adantineura Hendel, 1914a: 41 (as subgenus of *Antineura*, no included species). Type species (designated Evenhuis, 1989) *Antineura biroi* de Meijere.

Adantineura.–Hendel, 1914b: 32–34 (four included species).

Description. Hendel (1914a) gave a detailed description, but this is based mainly on species of subgenus *Adantineura*, because the two species of *Antineura* s.str. from the Philippines were known to him only from Osten Sacken's descriptions, as evidenced from the fact that he only quoted Osten Sacken's (1882) descriptions, without citing material examined (Hendel, 1914b: 32–33). The following supplementary data are derived from species of both subgenera, but I only have females of subgenus *Antineura*.

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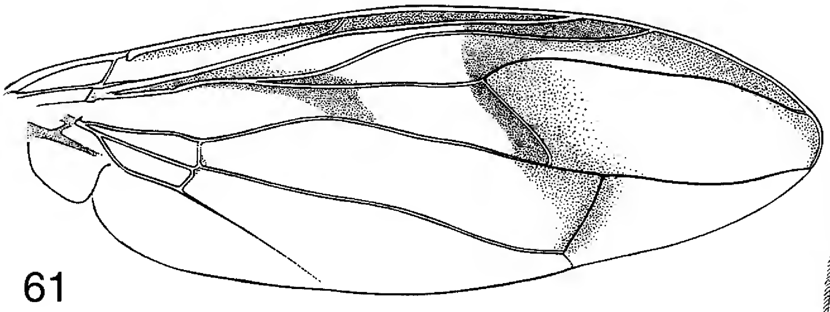

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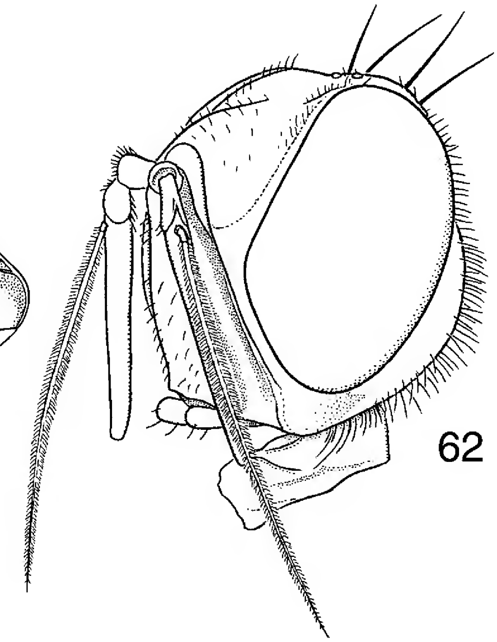


Figures 61–62. 61, *Antineura (Adantineura)* sp. (Wewak, AM), wing. 62, *Antineura (Adantineura) biroi* de Meijere, head.

Head. Postfrons broadly convex on anterior part, depressed behind convexity; face with broadly rounded, transversely grooved, finely haired carina for whole length.

Thorax. Humeral bristle absent; mesopleural bristle well developed (subgenus *Antineura*), reduced or absent (subgenus *Adantineura*). Wing: veins 3 and 4 distally convergent; stem of veins 2 and 3 (base of radial sector) with distinct flexure before (subgenus *Antineura*) or beyond (subgenus *Adantineura*) mid-length, section beyond flexure thicker and armed with a series of long setulae.

Male postabdomen. Aedeagus relatively simple, with slender stipe, no differentiated preglans, simple rather compact glans, and pair of rather short, equal terminal filaments.

Female postabdomen. Tergite 5 large; spiracle 5 located laterally below margin of tergite; tergite 6 small and separate, or relatively well developed and sometimes laterally fused with sternite 6 to form an annular tergosternite; segment 8 slender; aculeus small, flat, obtuse, with rounded preapical expansion on each side and pair of ventral bristles.

Distribution. Australasian Region: Moluccas; New Guinea. Oriental Region: Philippines.

Of the two subgenera, *Antineura* is recorded only from the Philippines. The subgenus *Adantineura* lives in the Moluccas and New Guinea. Williston (1908: fig. 107) published a photograph of a fly determined as "*Antineura* sp. Brazil." This is apparently a richardiid of the genus *Setellia* Robineau-Desvoidy.

Notes. There are six nominal species of subgenus *Adantineura* listed as Australasian (Evenhuis, 1989), but the status of those recorded from the western part of the range needs reassessment. I have sorted five distinct species from Papua New Guinea (mainland), apparently including *A. biroi* de Meijere and *A. kerteszi* de Meijere. Specimens determined by Malloch as *A. kerteszi* (see Malloch, 1939a: 104; pl. 4, fig. 4) are probably not that species.

Hendel (1914b) inadvertently referred *A. sericata* Osten Sacken to *Adantineura*, though it was correctly excluded from this subgenus in his key to species. Enderlein (1924: 110) treated *Adantineura* as a separate genus, but has not been followed by others.

The appearance of *Antineura* species suggests mimicry of pompilid wasps. The species of subgenus *Antineura* are particularly large, conspicuous flies.

Genus *Duomyia* Walker

Figs. 63–67

Duomyia Walker, 1849: 800. Type species (designated Hendel, 1914a) *D. obscura* Walker.
Campigaster Macquart, 1855: 142. Type species (monotypy) *C. testaceus* Macquart.
Euchalcota Loew, 1873: 40. Type species (monotypy) *Senopterina decora* Macquart.
Helocnemia Enderlein, 1924: 128. Type species (original designation) *Chromatomyia apicalis* Walker.
Duomyza Malloch, 1929: 507 (as subgenus of *Duomyia*). Type species (original designation) *Duomyia tomentosa* Hendel.

Description. See McAlpine (1973a).

Distribution. Australia: all states, including Torres Strait Islands and Lord Howe Island—apparently endemic.

The species are very generally distributed. Numerous species, mostly locally endemic, live in south-western Australia, two in the Snowy Mountains of the south-east, one in central Australia, one in the Torres Strait Islands, and one on Lord Howe Island.

Notes. *Duomyia* was revised by McAlpine (1973a), but I have now seen at least 106 species, including two species formerly placed in *Rhytidortalis* (McAlpine, 2000) and more than 30 undescribed species. Although *D. rugifrons* (Thomson) and *D. solocifemur* (Enderlein) are not morphologically typical of *Duomyia*, the intermediate characters of several species prevent generic separation on the basis of present knowledge. These few aberrant species could be mostly excluded by restricting *Duomyia* to species with erect hairs on the suprasquamal ridge, but (1) I am satisfied that the relationships of the species thereby excluded are not with *Rhytidortalis*, and (2) I am not prepared to introduce a new genus for such an arbitrary group of species.

Contrary to the use of Evenhuis (1989), the name *Duomyia punctifrons* Malloch, 1929, is invalid under Articles 10.6 and 59.1 of the ICZN (1999). The replacement name *D. montium* McAlpine, 1973a, should be used.

The genus occupies a greater range of habitats than do most other Australian platystomatid genera. Many species inhabit seasonally wet to moderately dry *Eucalyptus* forest or woodland. Some live only in sandy coastal vegetation, and populations may be at risk from habitat destruction. Littoral rainforests harbour more species than upland rainforests.

Adults of some species visit myrtaceous flowers for feeding, e.g., *D. decora* (Macquart) at *Leptospermum, D. rugifrons* (Thomson) at *Kunzea*, and *D. lutea* McAlpine at *Astartea*. Adults of several species have been taken at fresh mammalian dung, and many have been collected at light.

Genus *Euprosopia* Macquart

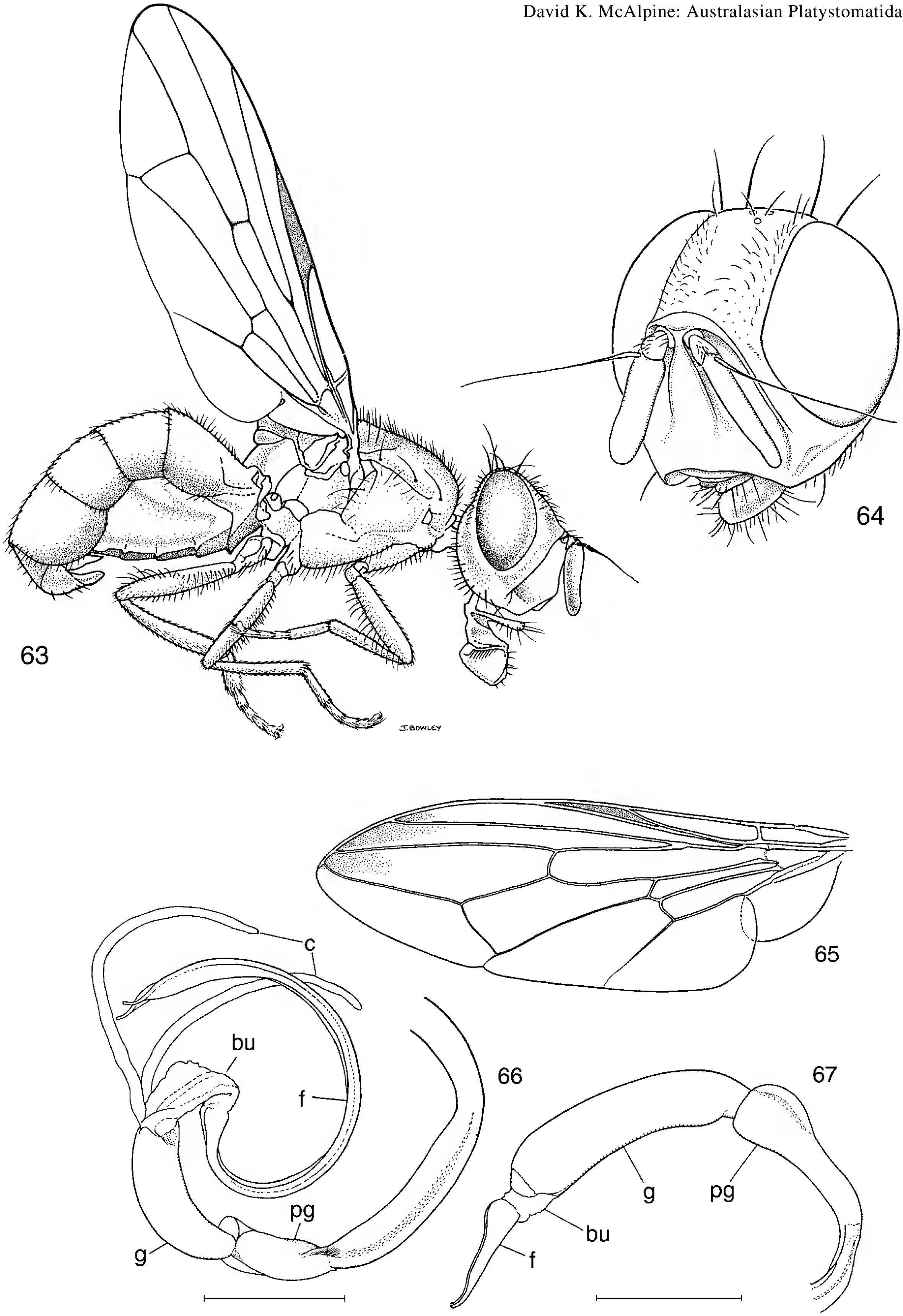
Figs. 1, 68–71

Euprosopia Macquart, 1847: 89–90. Type species (monotypy) *E. tenuicornis* Macquart.
Pachycephala Doleschall, 1859: 115–116 (43–44 in reprint), (preocc. *Pachycephala* Vigors, 1825). Type species (designated Enderlein, 1924 for replacement name *Oncoscelia*) *Pachycephala mohnikei* Doleschall.
Oncoscelia Enderlein, 1924: 136. New name for *Pachycephala* Doleschall.

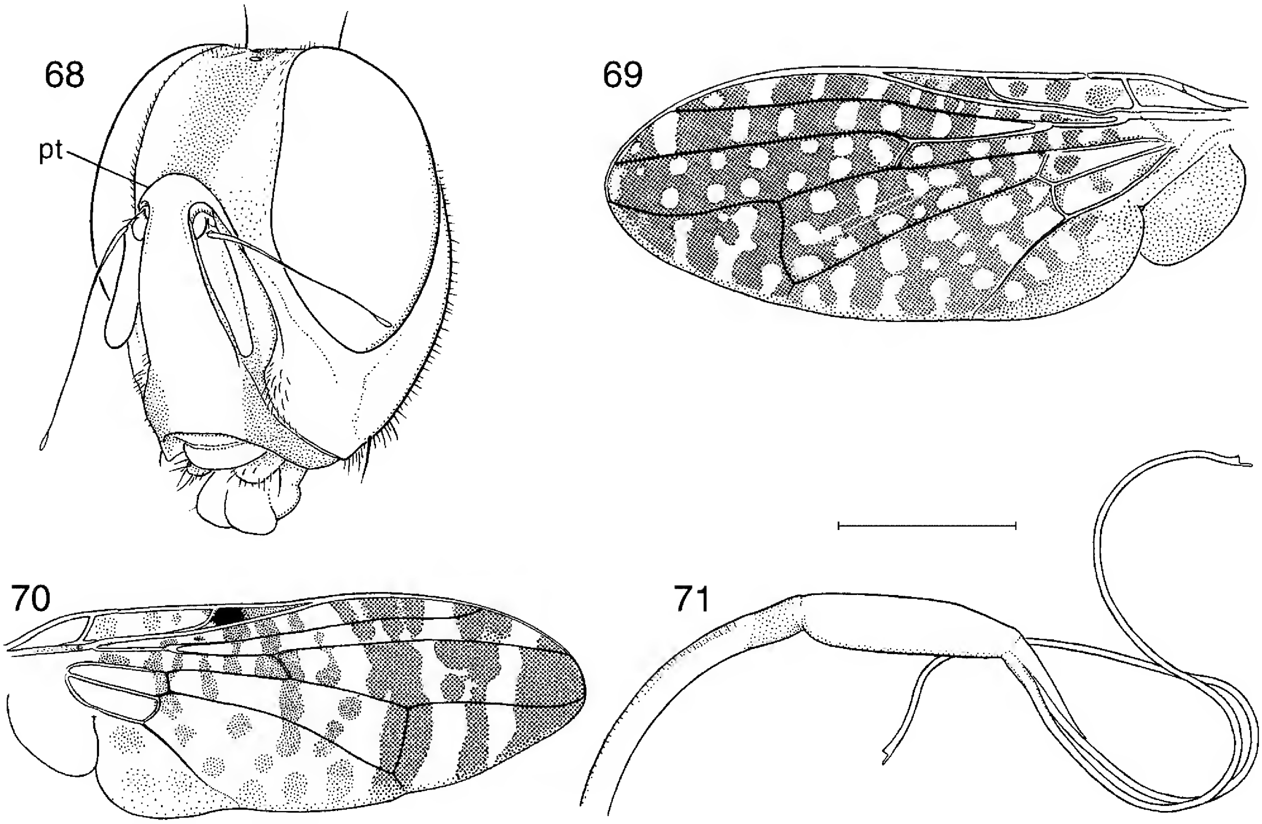
Additional synonymy given by McAlpine (1973a: 132).

Description. See McAlpine (1973a).

Distribution. Australasian Region: Moluccas; New Guinea; Bismarck Archipelago; Solomon Archipelago; Vanuatu;



Figures 63–67. 63, *Duomyia rugifrons* (Thomson), male. 64, *Duomyia* "sp. 17" (Shoal Bay, AM), head of male. 65, *Duomyia* sp. (Binnaway State Forest, AM), wing. 66, *Duomyia chaetostigma* McAlpine, aedeagus (scale = 0.5 mm). 67, *Duomyia lonchaeina* McAlpine, distal part of aedeagus (scale = 0.5 mm). Abbreviations: bu, bulb; c, membranous caeca; f, terminal filaments (paired); g, glans; pg, preglans.



Figures 68–71. 68, *Euprosopia armipes* McAlpine, head of male; pt, ptilinal fissure. 69, *Euprosopia rete* McAlpine, wing. 70, *Euprosopia kurandae* McAlpine, wing. 71, *Euprosopia acula* McAlpine, distal part of aedeagus (scale = 0.5 mm).

Australia—all states, but absent from arid and subarid areas, and in Western Australia restricted to far north. Oriental Region: widely distributed. Palaearctic Region: eastern provinces only.

Notes. The *Euprosopia* species of New Guinea were revised by Malloch (1939a), those of the Solomon Archipelago by Malloch (1940), and those of Australia by McAlpine (1973a).

This is one of the largest platystomatid genera. Evenhuis (1989) lists 69 species of *Euprosopia* for Australasia. I have sorted 38 undescribed species of New Guinea-Melanesia and a further 15 undescribed Australian species. Steyskal (1977) recorded 26 species for the Oriental Region, to which should be added *Euprosopia robusta* de Meijere, 1916, from Sumatra. Soós (1984) listed four species for the Palaearctic Region, two of which are also in Steyskal's Oriental list. Thus 151 species (including undescribed ones) have been recognized, of which 122 are Australasian, but numerous others undoubtedly exist.

The only species common to the published Oriental and Australasian lists is *E. sexpunctata* (Osten Sacken, 1882, as *Notopsila* sp.) from the Philippines, with which Hendel (1914b) synonymised *Platystoma atomaria* Walker, 1861c, described from Batchian (Bacan, Moluccas). The latter is a primary junior homonym of *Platystoma atomarium* Walker, 1860, from "Makessar" (Sulawesi), a synonym of *Euthyplatystoma rigidum* (Walker, 1856). Hendel, from his listed material, appears only to have seen material of *E. sexpunctata* from the Philippines, and his synonymy of the Moluccan *P. atomaria* was inferred from Walker's inadequate description, which omits many morphological data relevant to species diagnosis in *Euprosopia*. I therefore consider that there is at present no case (1) for assuming the synonymy of *P. atomaria* under *E. sexpunctata*, and (2) for recording any one species of *Euprosopia* for both the Oriental and Australasian Regions.

There is confusion in the listing of *Euprosopia miliaria* Hendel in the Australasian catalogue (Evenhuis, 1989: 490). The lectotype of this species (McAlpine, 1973a: 141) is the holotype of *Platystoma pectoralis* Walker, 1862 (a preoccupied name), and *E. miliaria* is **only** reliably reported from the Moluccas (Gilolo or Halmahera), despite the additional distribution given by Evenhuis. Other material, recorded by Hendel (1914b) and Malloch (1939a) as *E. miliaria*, is referable to other species (see McAlpine, 1973a). Evenhuis also gave *E. diminutiva* de Meijere (1913) as a new synonym of *E. miliaria*. However, de Meijere established no such name; he simply misapplied the name *E. diminutiva* (Walker) to material from West New Guinea, which Hendel (1914a, 1914b) erroneously thought to be conspecific with *E. miliaria*. The material mentioned by de Meijere (1 ♂, 1 ♀, Heuvelbivak, Lorentz River, West New Guinea, AMST) is probably referable to *E. rete* McAlpine.

Sexual behaviour and its relation to sexual dimorphism were described for a few *Euprosopia* species by McAlpine (1973b).

Genus *Euxestomoea* de Meijere

Fig. 72

Euxestomoea de Meijere, 1913: 377. Type species (designated Hendel, 1914a) *Ortalis prompta* Walker.

Description. The description by Hendel (1914a) remains largely valid, though the genus is now restricted by transference of *E. bipunctata* Hendel to *Bama*. The principal differences between *Euxestomoea* and *Bama* are listed under the latter genus. Also, *Euxestomoea* consistently has the base of vein 1 bare dorsally, and the second section of vein 4 without sigmoid curvature.

Distribution. New Guinea: widely distributed, including Karkar Island. Bismarck Archipelago: New Ireland. Australia: Queensland—Iron Range district (*E. prompta* (Walker), AM).

Notes. The last published key to species is that of Malloch (1939a). In addition to the described species *E. prompta* (Walker) and *E. discifera* de Meijere, I have seen an undescribed species from New Ireland (AM). Material from mainland Papua New Guinea shows variation which is not yet assessed taxonomically. *Euxestomoea discifera* appears to have no prescutellar acrostichal bristle and two pairs of dorsocentrals, but it is possible that the posterior dorsocentral is the homologue of the apparent acrostichal of the other species, which has migrated laterad.

Genus *Bama* n.gen.

Type species: *Xiria papuana* Hennig.

Description (♂, ♀). Flies of rather stout to slightly elongate build, with legs of moderate length. General appearance and morphology reminiscent of species of *Cleitamia, Laglaisia* (females), or *Euxestomoea*. Cuticle of thorax and abdominal tergites sparsely or thinly pruinescent, largely shining.

Head considerably higher than long, a little wider than high but not sexually dimorphic in this respect; face bare, without carina, in profile concave near or above middle, often slightly convex below; facial ridge with minute hairs in a single series; occiput slightly concave above, moderately convex below; the following cephalic bristles present: inner and outer vertical, two moderately large fronto-orbitals, postgenal; postvertical and ocellar bristles small or poorly differentiated. Antenna, excluding arista, much shorter than face; segment 2 largely bare on medial surface; segment 3 usually apically rounded; segment 6 short-haired for most of length, the hairs either irregularly placed or with tendency to be aligned in a dorsal and a ventral series. Prelabrum well developed but not very deep, its lower margin not receding; palpus moderately to conspicuously long; proboscis stout, with broad prementum and labella.

Thorax. Scutellum slightly longer than a semicircle, without ventral marginal hairs; pleurotergite and postscutellum without hairs or setulae; the following thoracic bristles well developed: humeral, 1+1 notopleurals, supra-alar, postalar, posterior intra-alar, dorsocentral, prescutellar acrostichal, three pairs of scutellars, mesopleural; scapular bristle absent or vestigial. Mid coxa with variable armature, which is sometimes specifically distinctive; fore femur with posterodorsal and posteroventral bristles, the latter sometimes enlarged and spinescent; other femora without ventral bristles and spines; mid femur without posterior bristles; hind femur with some weak dorsal bristles; mid tibia with one long apical spur, secondary ones less than half as long; other tibiae without special armature. Section of costa on subcostal cell shorter than to somewhat less than twice as long as that on marginal cell; base of vein 1 (stem-vein, base of R), before humeral crossvein, often with group of dorsal setulae (smaller than in *Euprosopia*, absent in two species); vein 3 with few fine ventral setulae and more numerous dorsal setulae; anterior crossvein often longer than penultimate section of vein 4 (some exceptional species); second section of vein 4 usually with sigmoid curvature, this curvature sometimes very slight; anal crossvein curved to variable degree on anterior part only; squama forming a very short to moderate-sized lobe, its

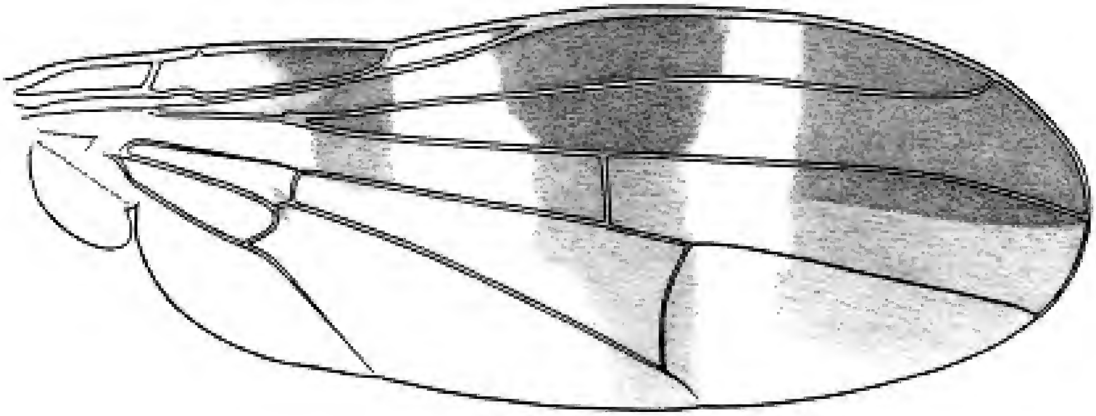


Figure 72. *Euxestomoea prompta* (Walker), wing.

marginal fringe usually longer than that on distal half of axillary lobe, but fringe on sinus between lobes conspicuously longer.

Abdomen in male typical of Platystomatinae, rather narrowly ovoid, with tergites 3, 4, and 5 all large, in female with tergite 3 medium-sized to very large and tergites 4, 5, and 6 much reduced, often concealed in dried specimens. Male postabdomen (where known): surstyli rather elongate, typical of the Platystomatinae; aedeagus with short, more or less ovoid glans, membranous lobe on bulb, and two short, unequal terminal filaments. Female postabdomen: aculeus slender, obtuse.

Distribution. New Guinea: apparently mainland only. All records and available material are from the eastern half of the island, i.e. mainland Papua New Guinea. I expect that a similar number of species lives in West New Guinea, where the montane Diptera are little known.

Notes. This genus includes three previously described species, viz. *Bama bipunctatum* (Hendel, 1914a) (as *Euxestomoea* sp.) n.comb., *Bama papuanum* (Hennig, 1940b) (as *Xiria* sp.) n.comb., and *Bama strigatum* (Hennig, 1940b) (as *Xiria* sp.) n.comb. I have seen type material of all three species. An additional species is described below, and I have also seen seven undescribed species belonging in *Bama*.

Euxestomoea differs from *Bama* in having longer, strongly divergent postvertical bristles, lateral occipital bristle present, the medial surface of antennal segment 2 extensively setulose, segment 6 bare on distal half, the mesopleuron and sternopleuron conspicuously pruinescent in part, the dorsocentral and intermediate scutellar bristles differently placed, the mid femur with one stout, isolated preapical posterior bristle, the mid tibia with two slightly unequal apical ventral spurs, the anal cell almost entirely microtrichose, tergites 4 and 5 of the female abdomen well developed and exposed, the aedeagus with relatively short preglans and two terminal filaments of similar length. *Bama* may be less closely related to *Euxestomoea* than to *Cleitamia* and *Laglaisia*, but the two latter have only one fronto-orbital bristle, antennal segment 6 long-haired, no prescutellar acrostichal bristle, more extensive setulae or hairs on the scutellum and pleurotergite, base of vein 1 always without dorsal setulae, the anal crossvein generally more abruptly bent near mid-length, and, in the female, tergites 4 and 5 unreduced.

Hennig (1940b) referred two *Bama* species to *Xiria* Walker. The latter genus has the diagnostic characters of the subfamily Trapherinae as stated by McAlpine (1973a), whereas *Bama* is undoubtedly referable to the Platystomatinae. *Xiria* is not otherwise recorded from east of Wallace's Line, and is readily distinguished from *Bama* in having the facial convexity much more prominent and complex, antennal segment 2 setulose on its medial surface, antennal segment 6 very long-bipectinate, the scutellum extensively haired dorsally, vein 5 setulose dorsally, anal cell entirely microtrichose, in the male the aedeagus without glans and terminal filaments, and, in the female, abdominal tergites 4 and 5 unreduced and the aculeus broad, blade-like.

The species *B. shinonagai* is so different from the majority of *Bama* species, that I initially intended to place it in a separate genus. Though it perhaps constitutes a sister group to the other known species, some of its unusual features occur singly among other *Bama* species, and it has the distinctive aedeagal features of *Bama*. I therefore place it in a separate subgenus of *Bama*.

A series of an undescribed *Bama* species (Moro, Madang Province, BM) was obtained by M.E. Bacchus (pers, comm.) at a point where the nearly dry stream bed is closely roofed over by trees. A newly eclosed specimen of *B. shinonagai* (Myola, Oro Province, J.W.I., AM), is labelled "bamboo".

The generic name is Greek for dye, in reference to the usually conspicuous pigmentation of the wing. It is neuter.

Key to subgenera of *Bama*

1 Scutellum without setulae, dorsally subshining, with covering of fine pubescence; antennal segment 3 rounded distally; squama forming very short lobe, its area scarcely larger than that of axillary lobe .... *Bama*

—— Scutellum setulose laterally, dorsally glossy, without pubescence; antennal segment 3 distinctly angular dorsoapically; squama larger, almost semicircular .... *Polimen*

Subgenus *Bama* s.str.

Figs. 73–75

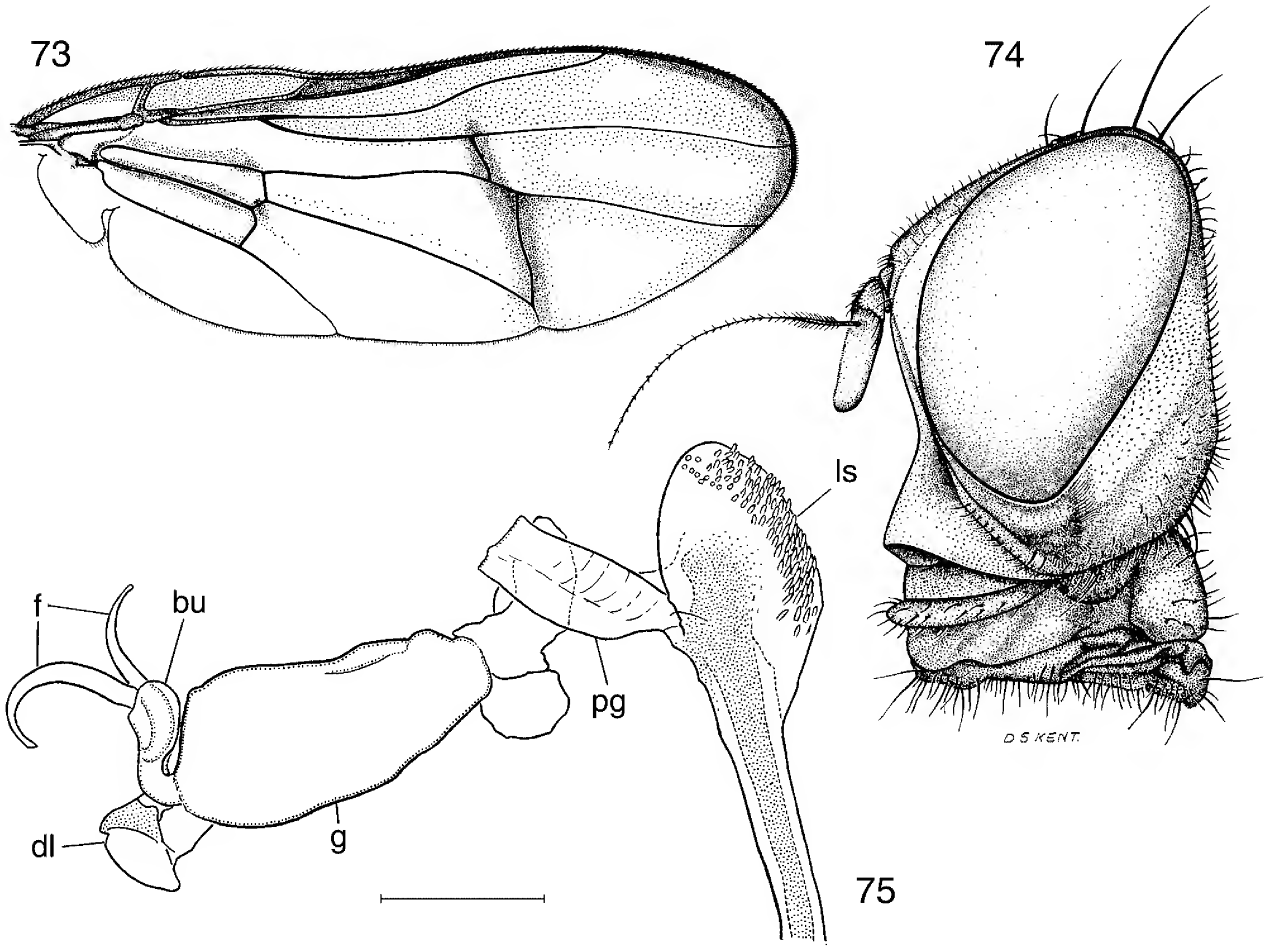
Diagnostic description. Scutellum with dorsal fine, translucent pubescence, without setulae; intermediate scutellar bristle not shorter than anterior scutellar; base of vein 1 with fine dorsal setulae (except in one undescribed species); squama forming a a very short lobe, its area not or only slightly larger than that of axillary lobe. Female: abdominal tergite 4 greatly reduced, usually more or less concealed in dried material (less reduced, dorsally exposed, c. one sixth as long as tergite 3 in one undescribed species).

This subgenus includes all known species of *Bama*, described and undescribed, except *B. shinonagai*, described below.

Subgenus *Polimen* n.subgen.

Type species: *Bama shinonagai* n.sp.

Diagnostic description. Scutellum setulose dorsolaterally, bare medially, glossy, without dorsal pubescence or pruinescence; intermediate scutellar bristle much smaller than anterior scutellar; base of vein 1 without dorsal setulae; squama forming a well-developed lobe, almost as full as a



Figures 73–75. *Bama (Bama)* "sp. A" (near Bulolo, AM). 73, wing. 74, head. 75, distal part of aedeagus (scale = 0.2 mm). Abbreviations: bu, bulb; dl, distal lobe; f, terminal filaments; g, glans; ls, terminal sclerotised lobe of stipe; pg, preglans.

semicircle. Female: abdominal tergite 4 c. one fifth as long as tergite 3, dorsally exposed; tergite 5 shorter.

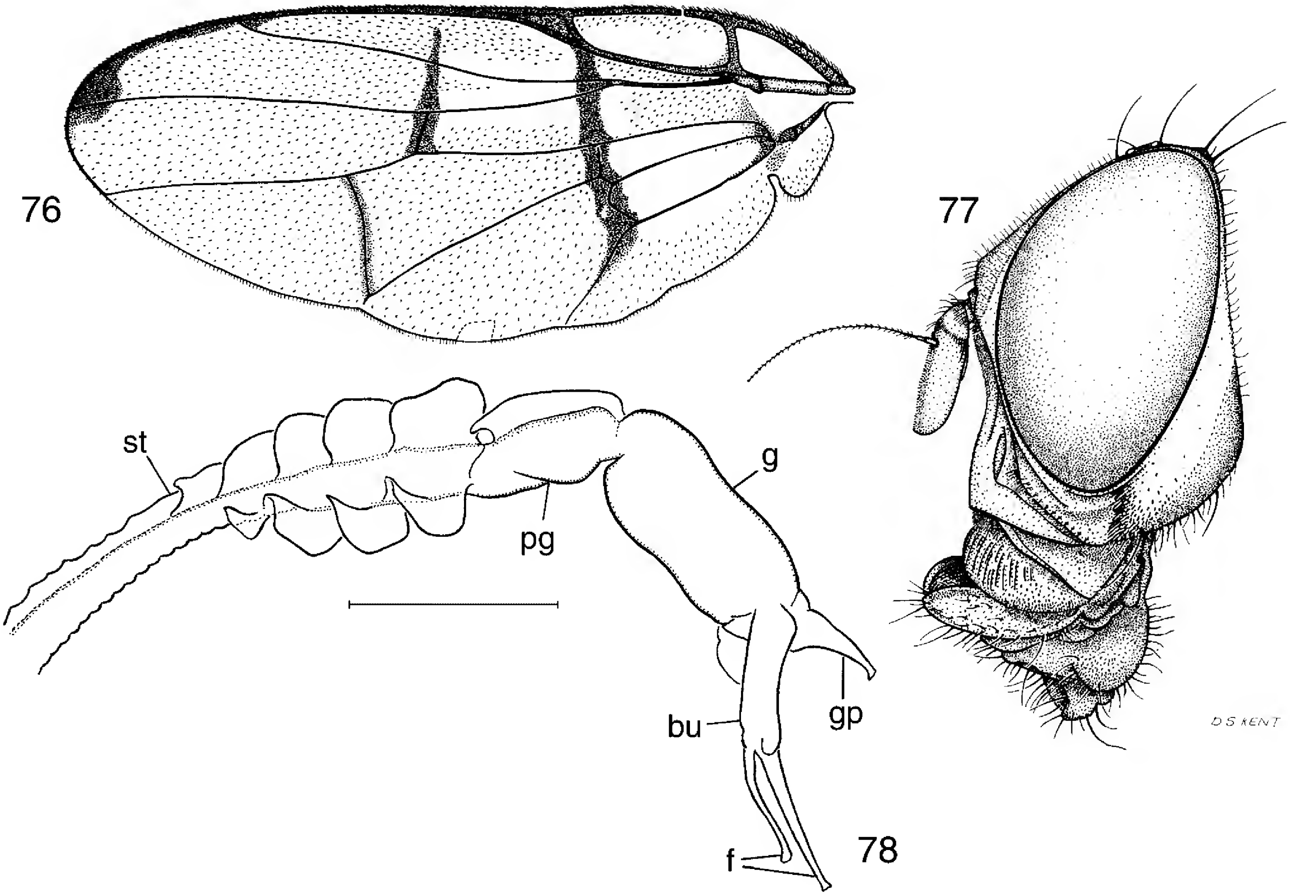
Notes. The subgeneric name is a Latin noun meaning polish, in reference to the glossy thorax, particularly the scutellum. It is neuter.

Bama (Polimen) shinonagai n.sp.

Figs. 76–78

Material examined. HOLOTYPE, ♂, Papua New Guinea: Gumi near Bulolo, Morobe Province, 2010 m, 6.viii.1979, H.R. (AM). PARATYPES, Morobe Province: 1 ♀, same data as holotype (AM); 1 ♂, Mount Kaindi, near Wau, 1500–2200 m, 19.viii.1965, J.S., M.S. (BPB); 4 ♀♀, Nami Creek, near Wau, 10.vi.1962, 30.xii.1981, J.S., S.S. (AM, BPB, NSMT). Eastern Highlands: 1 ♀, 22 km SE of Okapa, 2100 m, 28.viii.1964, J.S., M.S. (BPB). Western and Southern Highlands: 1 ♀, Mount Wilhelm, 14.x.1957, J.H.B. (AM); 1 ♀, Mount Giluwe, N side Malgi, 2500 m, 25–30.v.1961, J.L.G. (BPB). Oro (Northern) Province: 1 ♂, 2 ♀♀, Myola, 2080 m, 13.ix.1985, 28–31.iii.1986, J.W.I. (AM, BM).

Description (♂, ♀). A stouter and somewhat smaller fly than most *Bama* species. *Coloration* largely blackish, with blue-tinted reflections. Postfrons largely dull brown-black; upper half of face, parafacial, and an extensive postorbital zone with greyish white pruinescence. Antenna tawny, with variable brown suffusion; segment 6 largely brown. Prelabrum dark brown; palpus orange tawny. Legs dark brown to blackish. Wing largely hyaline; stigmatal section of subcostal cell dark brown; a brown stripe along costa from just before end of vein 2 to a little behind end of vein 3, narrow near vein 2, broadened where it crosses vein 3; base of first basal cell with brown mark; a dark brown transverse stripe covering anal and basal crossveins and extending forward to vein 1 near level of end of subcosta; a brown stripe covering anterior crossvein and, in female, usually extending forward to about confluence of vein 1 with costa, in male generally discontinuous in front of vein 3; a pale or indistinct brown stripe covering discal crossvein; squama pale creamy-translucent. Halter pale brown basally, largely blackish brown distally. Abdomen black; tergites 1–5 largely glossy, with bluish reflections.



Figures 76–78. *Bama (Polimen) shinonagai* n.sp. 76, wing. 77, head. 78, distal part of aedeagus (scale = 0.2 mm). Abbreviations: bu, bulb; f, terminal filaments; g, glans; gp, process of glans; pg, preglans; st, stipe.

Head 1.4–1.6 times as long as as wide; postfrons almost parallel-sided, c. 1.6 times as long as wide; height of cheek 0.16–0.18 of height of eye. Antenna: segment 3 mucronate or at least somewhat angular dorsoapically; segment 6, except at apex, with numerous hairs, many of them as long as its basal diameter, but not regularly seriate. Palpus of moderate length, rather broad.

Thorax. Mesoscutum c. as long as wide; scutellum more rounded and convex than in other species. Fore femur with numerous non-seriate posterior to posterodorsal bristles and long setulae and a series of large but not spinescent posteroventral bristles; mid femur with hairs on posteroventral surface much longer than elsewhere. Wing: section of costa on subcostal cell about as long as that on marginal cell; first costal cell almost bare; second costal cell microtrichose to variable extent, particularly so anteriorly and distally; first posterior cell largely microtrichose, often with narrow bare zones; submarginal cell with bare zone just beyond base; first basal cell with a bare zone on each side of sub-basal band; first posterior and discal cells entirely microtrichose; second basal and anal cells largely bare, except on pigmented areas; alula microtrichose, except on an anterior zone of variable size; cell-4 index = 0.65–0.68; second section of vein 4 with slight concave curvature; anal crossvein with abrupt but not angular bend approximately at anterior third; distal section of vein 6 with sigmoid curvature.

Abdomen. Male: tergite 4 slightly shorter than tergite 3; tergite 5 at least as long as tergite 3; sternite 5 transverse, not medially cleft. Female: tergites as given for subgenus. Male postabdomen: surstyli elongate; outer surstylus with broadly rounded, setulose terminal section beyond apex of inner surstylus; the two prensisetae of inner surstylus with numerous parallel ridges; distal part of stipe of aedeagus with two series of overlapping foliose lobes, each with free margin minutely serrulate; preglans distinct, sclerotised, with a smooth-margined membranous wing on its whole length; glans stoutly ovoid-cylindrical, distally with a membranous lobe; the two terminal filaments very unequal, longer one slightly shorter than glans; cerci much shorter than surstyli, joined for their whole length.

Dimensions. Total length, ♂♂ 4.8–5.4 mm, ♀♀ 5.0–6.0 mm; length of thorax, ♂♂ 2.5–2.6 mm, ♀♀ 2.5–3.0 mm; length of wing, ♂♂ 6.2–6.7 mm, ♀♀ 6.4–7.2 mm; length of glans of aedeagus 0.23 mm.

Distribution. New Guinea: highlands of mainland Papua New Guinea up to 2500 m (specimen labelled “Mount Wilhelm” perhaps from significantly greater altitude).

Notes. *Bama (Polimen) shinonagai*, the only known species of its subgenus, is distinguished from other species by the subgeneric characters given above. It is the only species of *Bama* that runs to couplet 55 in the key to genera.

The specific epithet refers to Dr S. Shinonaga, who collected material of this species.

Genus *Laglaisia* Bigot

Figs. 5, 79

Laglaisia Bigot, 1878a: 25. Type species (monotypy) *L. caloptera* Bigot.

Description. See Hendel (1914a). An additional feature of all species available to me is the presence of fine setulae ventrally on the free margin of the scutellum, as in *Cleitamia*. In the few species for which the aedeagus is known, the preglans is simple, the tunic is elongate, and the paired terminal filaments are moderately short.

Distribution. New Guinea: mainland only. These flies are widely distributed and occur through a considerable range of altitudes, but most seem to be narrowly localised and are infrequent in collections.

Notes. The generic name was introduced as new several times by Bigot with variable spelling. Evenhuis (1989) has determined the earliest description and spelling as given above, though I have previously used the spelling *Laglaizia* (McAlpine, 1973a; 1982).

The key to species by Malloch (1939a) is an elaborated translation of that of Hendel (1914b). *Laglaisia* includes six described species, and I have seen c. nine additional species.

Males of *Laglaisia* generally have the head-capsule laterally produced into eye-stalks, which are usually less attenuated than in Fig. 5. An undescribed species (1 ♂, BPB) is exceptional in lacking eye-stalks.

The habits and biology are almost unknown, but Parsons (1984) records *L. biroi* Hendel as resting on the uppersides of leaves of low-growing plants in well shaded primary forest, and provides excellent colour photographs of the living flies.

Genus *Cleitamoides* Malloch

Figs. 80–82

Cleitamoides Malloch, 1939a: 106–107. Type species (original designation) *Cleitamia kerteszi* Hendel.

Description. This genus was briefly characterised by Malloch. Osten Sacken (1881a) and Hendel (1914a) did not separate the group from *Cleitamia*, though Hendel noted several points of disagreement of *C. kerteszi* and *C. lituratus* (Walker) with other *Cleitamia* species. Because there are numerous diagnostic differences between *Cleitamoides* and *Cleitamia* not mentioned by Malloch, I indicate these in Table 2.

Male postabdomen of type species (*C. kerteszi*): outer surstylus of moderate length, its free apical section moderately slender, obtuse, slightly exceeding apex of inner surstylus; aedeagus with rather long, glabrous stipe; preglans complex, well sclerotised; glans moderately long, irregularly subcylindrical, at apex with large, elongate, partly sclerotised lobe sheathing a slender process; tunic well sclerotised, with short, pubescent terminal lobe; terminal filaments subequal, stout, distally tapered, each slightly shorter than glans; cercus broad, apically emarginate, extensively setulose on outer surface, with anteroapical graduated comb of rather short to long setulae.

Distribution. New Guinea: mainland; Aru; Normanby Island.

Notes. Three species of *Cleitamoides* are listed by Malloch (1939a) and by Evenhuis (1989). To these is now added *Cleitamoides trigonalis* (de Meijere, 1913) n.comb. (from *Cleitamia*). This generic position is clear from the description and comparison given by de Meijere. There appear to be two additional probably undescribed species in Papua New Guinea (Oro Province; Normanby Island; both in AM), but a careful study of individual and geographic variation and sexual dimorphism will be necessary to determine more precisely the number of valid species.

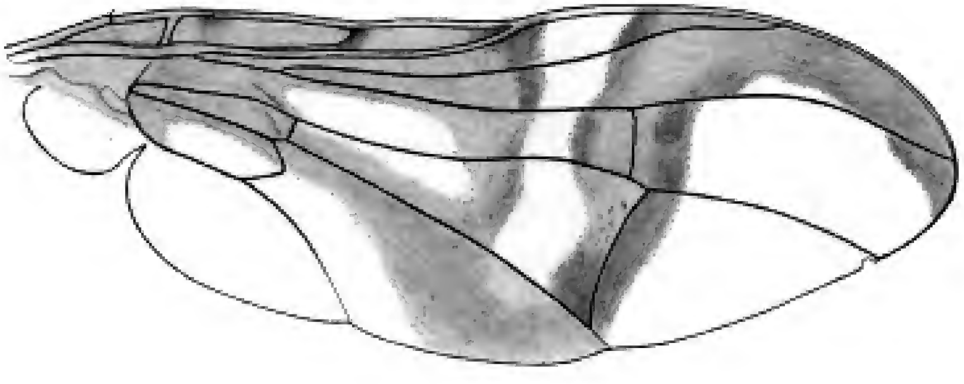
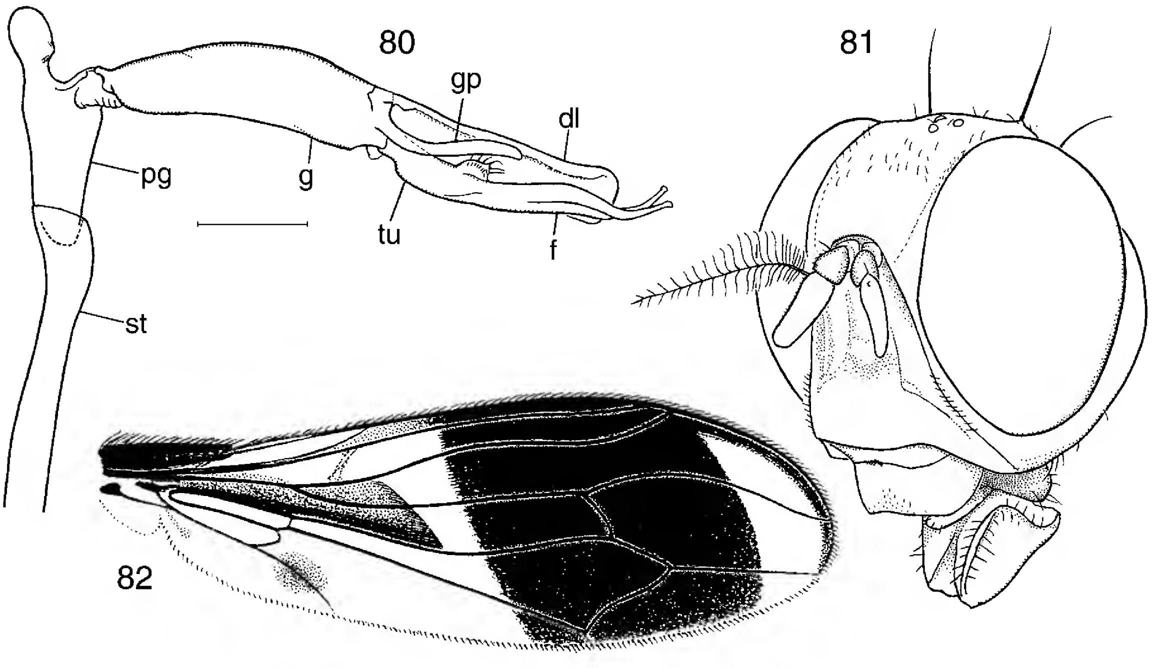


Figure 79. *Laglaisia* "sp. 5" (Gumi, AM), wing.

Table 2. Characters separating *Cleitamia* and *Cleitamoides*.

Cleitamia	*Cleitamoides*
• Fronto-orbital bristle present	• Fronto-orbital bristle absent
• Humeral bristle present	• Humeral bristle absent
• Mesopleural bristle present	• Mesopleural bristle absent
• Scutellum with two or three pairs of large bristles	• Scutellum with one pair of large and one of small bristles
• Scutellum with minute setulae below free margin	• Scutellum without setulae below margin
• Membranous zone between hind coxae and abdominal sternite 1 broad	• Membranous zone between hind coxae and sternite 1 narrow
• Vein 2 distally converging with vein 1, but most closely approximated to vein 1 shortly **before** terminating in costa	• Vein 2 most closely approximated to vein 1 where it meets costa (most males), or not closely approximated to vein 1 distally (females)
• Anal crossvein strongly bent at or only slightly in front of mid-length	• Anal crossvein strongly bent at about anterior third of length
• Male: basal part of costa not swollen	• Male: basal part of costa inflated, obliterating first costal cell
• Male: posterior margin of tergite 5 with two pairs or more extensive fringe of curved bristles, some at least half as long as tergite	• Male: posterior margin of tergite 5 with slightly differentiated fringe of small bristles less than a quarter as long as tergite



Figures 80–82. *Cleitamoides kerteszi* (Hendel). 80, distal part of aedeagus (scale = 0.2 mm). 81, head. 82, wing of male. Abbreviations: dl, distal lobe; f, terminal filament; g, glans; gp, process of glans; pg, preglans; st, stipe; tu, tunic. Fig. 82 after Hendel (1914a), retouched.

Genus *Cleitamia* Macquart

Figs. 83, 84

Cleitamia Macquart, 1835: 440. Type species (monotypy) *Ortalis astrolabei* Macquart (note that Boisduval's publication of the name *O. astrolabei* is slightly later than that of Macquart, see Evenhuis, 1989).
Poticara Walker, 1861b: 248–249. Type species (monotypy) *P. triarcuata* Walker (= *Ortalis astrolabei* Macquart).

Description. The description by Hendel (1914a) is largely adequate, providing that the particular characters attributed to *Cleitamia liturata* (Walker) and *C. kerteszi* Hendel are excluded, as these are now placed in *Cleitamoides*. See also Table 2 for some additional characters.

Male postabdomen. Aedeagus (where examined) with glabrous stipe; preglans sharply differentiated from stipe, without lobes; glans ovoid, with terminal lobe long or vestigial; terminal filaments short, equal or subequal, with basal tunic.

Distribution. New Guinea: widely distributed, but apparently endemic.

Notes. *Cleitamia* includes more than 20 species, several of which are undescribed. The last published key to species is that of Malloch (1939a). *Cleitamia trigonalis* de Meijere does not belong in this genus (see under *Cleitamoides*). *Cleitamia astrolabei* (Fig. 83) is a widely distributed and conspicuous insect of New Guinea forests.

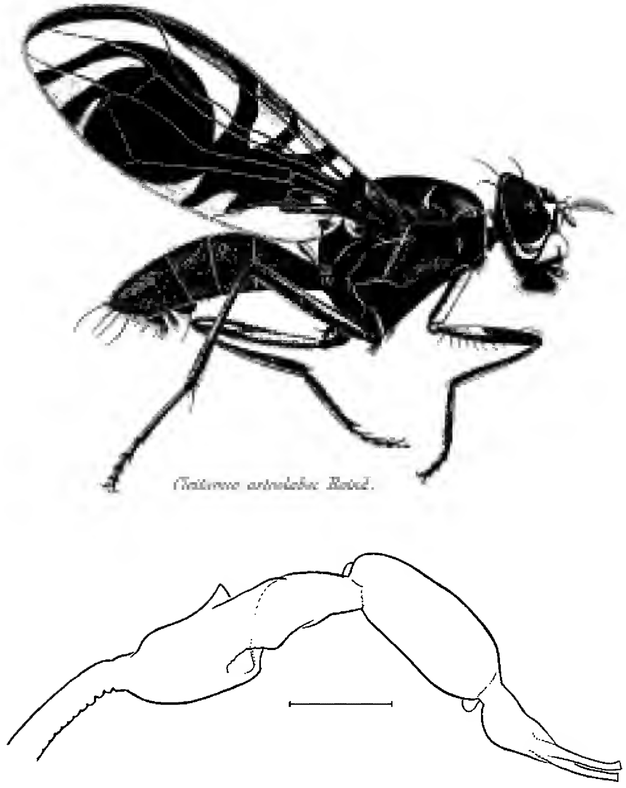


Figure 83, 84. 83 (above), *Cleitamia astrolabei* (Boisduval), male; after Hendel (1914a), retouched. 84 (below), *Cleitamia astrolabei*, distal part of aedeagus (scale = 0.2 mm).

Genus *Loriomyia* Kertész

Fig. 85

Loriomyia Kertész, 1899: 567. Type species (monotypy) *L. guttipennis* Kertész.
Loriomyia.–Hendel, 1914a: 75–76.

Description (♂, ♀ unknown). Hendel's description is excellent, and, as no material is available to me, I can only add that the stem vein (base of vein 1) is bare dorsally (L. Papp, in litt.).

Distribution. New Guinea: only known from Moroka (Meroka), E of Sogeri, Central Province, Papua New Guinea.

Notes. The type and only included species is, to my knowledge, not represented in recent collections, and is only known from the type material (MNM). This is surprising, as the insect is of conspicuous appearance, and the Sogeri district is one of the entomologically better known parts of Papua New Guinea.

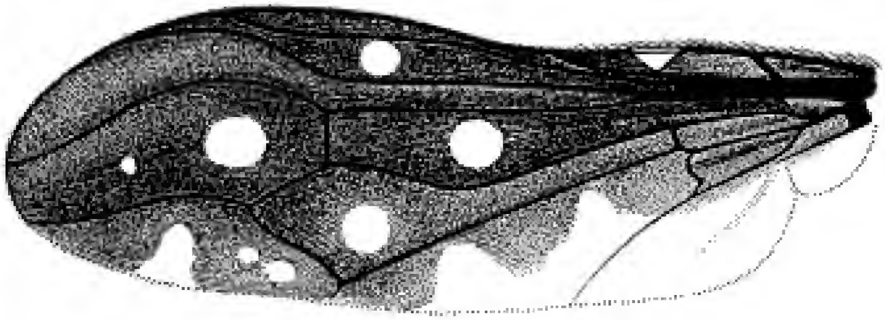


Figure 85. *Loriomyia guttipennis* Kertész, wing. After Hendel (1914a).

Despite the resemblance to certain tropical tephritids in coloration and the contour of the anal crossvein, I think that Hendel (1914a) was probably correct in placing *Loriomyia* near *Cleitamia* in the Platystomatinae. *Loriomyia* differs from *Cleitamia* in having two pairs instead of one pair of fronto-orbital bristles, much reduced outer vertical bristles, a pair of prescutellar acrostichal bristles, no setulae on the scutellum, and the anal cell acutely produced. In these features of thoracic vestiture, *Loriomyia* resembles *Bama*, but differs from the latter in having only two pairs of scutellar bristles, no posteroventral bristles on fore femur, veins 1 and 2 approximated shortly before their distal ends, and the anal cell acutely produced. In some undescribed *Bama* species the anal crossvein has a somewhat sigmoid course, which suggests an early stage in the development of the condition present in *Loriomyia*. However, these *Bama* species have the characteristic dorsal setulae on the stem vein, which are absent in *Loriomyia*, and the venation is not otherwise very like that of *Loriomyia*.

Loriomyia guttipennis should be readily distinguishable from other Australasian platystomatids by the wing markings (Fig. 85).

Genus *Terzia* n.gen.

Type species: *Terzia saigusai* n.sp.

Description (♂, ♀ unknown). Medium-sized, quite elongate, rather long-legged flies.

Head slightly higher than long, with generally reduced hairing; face concave in profile, without median carina; lower end of facal ridge with few minute hairs; parafacial narrow, without hairs; occipital region broadly, strongly convex; the following bristles present: well-developed inner vertical, one very small fronto-orbital, small postgenal; the following bristles absent: outer vertical, postvertical, ocellar, lateral occipital. Antenna, excluding arista, about as long as face on median line; segment 2 short and subconical; segment 3 narrowly ovate; segment 6 slender, with short pubescence near base only. Prelabrum moderately large, anteriorly convex; palpus moderately large.

Thorax deep and rather narrow, largely shining, with very little pruinescence and reduced hairing; mesoscutum with almost all hairs restricted to five longitudinal series; humeral callus with one or two small hairs only; scutellum moderately small, slightly convex dorsally, with few fine hairs; postscutellum very deep; metathoracic postcoxal bridge deep and well sclerotised; zone between metathoracic spiracle and halter with pile-like pubescence and several setulae other than those on margin of spiracle; the following bristles present: pair of outstanding, approximated paramedian scapulars, 1+1 notopleurals, postalar, large apical and small sublateral scutellar, one ventral sternopleural in front of mid coxa; other thoracic bristles absent. Legs all quite long, fore one least so; femora slender, but less so than in *Angitula*, with reduced hairing, except towards apices. Wing elongate, slightly narrowed basally; membrane bare on much of first costal cell, smaller basal zone of submarginal cell, anal cell, alula; section of costa on subcostal cell much shorter than that on first costal cell or marginal cell; humeral break of costa very indistinct; second basal cell more than half as long as discal cell, towards its distal end wider than either first basal or anal cell; vein 3 with scattered dorsal setulae, more crowded basally; anterior crossvein meeting vein 4 slightly before mid-length of discal cell; distal section of vein 4 arched, converging with vein 3 from level of discal crossvein, but slightly diverging from vein 3 apically; vein 5 without setulae; axillary lobe undeveloped; squama vestigial, without lobe.

Abdomen slender, only slightly narrowed basally. See under *Terzia saigusai* for further details.

Distribution. Solomon Archipelago: New Georgia.

Notes. *Terzia* is known to me from a unique male example of the type species. This is unfortunate, as the taxon is of unusual phylogenetic interest (Saigusa, unpublished note in BPB cabinet).

My study of the general morphology of *Terzia* indicates that it is a moderately derived taxon of the subfamily Platystomatinae. If one were to eliminate the more obvious apomorphies (discussed below), the resulting character combination would be not very different from that of the genus *Rivellia*, with, perhaps, *Tarfa* occupying an intermediate stage. Though I have not examined the aedeagus, the outer surstylus of *Terzia*, with its elongate, subtriangular apical section, is remarkably like that found in numerous platystomatine species (e.g., in the genera *Achias, Bama, Duomyia, Laglaisia, Plagiostenopterina*, etc.), but I have seen no similar condition in other subfamilies.

Terzia is remarkable for the number of character states that it shares with the "angituline" genus *Angitula* (now including *Angituloides* and *Giraffomyia*), including absence of the outer vertical bristle, great reduction of the hairing of the humeral callus, mesoscutum, and mesopleuron, the deep, glossy metathoracic postcoxal bridge, the virtual absence of the axillary lobe, and the presence of both pile-like pubescence and setulae on the narrow sclerite between the metathoracic spiracle and base of the halter. These conditions I judge to be all or nearly all synapomorphies indicating close relationship of *Terzia* to *Angitula*. However it lacks certain of the peculiar features of *Angitula*, viz. the very prolonged occipital region of the head (though it has a more convex occiput than most platystomatine genera), the loss of the normal anterior convexity of the mesoscutum, the enlargement of the pronotum, the presence of a pair of elongate setiferous horns on the scutellum, the ventral prolongation of the membranous cleft in an almost straight line, and the greater attenuation of the femora. This constitutes a set of distinctive apomorphic character states defining the clade formerly known as "Angitulinae" (e.g., Malloch, 1939b, Hennig, 1940a, McAlpine, 1973a).

From the above combinations of apomorphic character states, I deduce that *Terzia* is the sister group of the genus *Angitula* s.l. (including *Angituloides* and *Giraffomyia*). But the general morphology of *Terzia* does not admit of its removal from from the Platystomatinae. Therefore the "angituline" genera, including *Terzia*, are considered to form a subordinate group within the subfamily Platystomatinae.

The generic name recalls A.J. Engel Terzi, formerly of the British Museum (Natural History), whose illustrations are a significant contribution to dipterology.

Terzia saigusai n.sp.

Figs. 86, 87

Material examined. HOLOTYPE, ♂ (unique), Solomon Archipelago: Munda, New Georgia Island, 1–30 m, 20.vii.1953, J.L.G. (BPB).

Description (♂). *Coloration*. Head and thorax orange-fulvous. Vertex with large dark brown semicircular median blotch, immediately behind ocelli. Thorax without dark markings. Legs fulvous; tarsi brownish tawny, slightly darker distally. Wing hyaline, with uniform yellowish tinge; distal section of subcostal cell yellowish brown; large brown apical spot on costa extending from vein 2 to vein 4. Halter fulvous with brown apical spot. Abdomen shining fulvous; tergite 5 dark brown on about posterior two-thirds.

Head. Eye c. 0.71 as long as high; height of cheek c. 0.18 of that of eye.

Thorax. Fore femur with two stoutly spinescent postero-ventral bristles on distal third; mid tibia with elongate apical ventral spur c. 1.3 times as long as greater diameter of tibia. Wing: anal cell on vein 4 c. 0.59 times as long as discal cell on vein 4; cell-4 index = 0.47.

Abdomen. Syntergite 1+2 c. 0.47 times as long as tergite 3; tergite 5 c. 1.2 times as long as tergite 3, slightly longer than tergite 4. Outer surstylus considerably exceeding inner surstylus in length, with elongate, subtriangular apical section.

Dimensions. Total length 6.7 mm; length of thorax 2.3 mm; length of wing 6.1 mm.

Distribution. As given for genus.

Notes. The specific epithet refers to Toyohei Saigusa, of Fukuoka, Japan, whose percipient comment on relationships of this species is noted above.

Figure 86. *Terzia saigusai* n.sp., head.

Genus *Angitula* Walker

Angitula Walker, 1859: 123. Type species (monotypy) *A. longicollis* Walker.

Anguitula.–Osten Sacken, 1881a: 481–483. Error or emendation—5 usages.

Giraffomyia Sharp, 1899: 391–392. Type species (monotypy) *G. willeyi* Sharp. N.syn., but retained as subgenus.

Angituloides Hendel, 1913: 345. Type species (original designation) *A. austeni* Hendel. N.syn., but retained as subgenus.

Angitulina Enderlein, 1936a: 227, 228. Type species (original designation) *Elaphomyia polita* Saunders (probably = *Angitula longicollis* Walker).

Hammatopelma Enderlein, 1936a: 227, 228. Type species (original designation) *H. nigra* (sic) Enderlein.

Meachina Enderlein, 1936b: 241. Type species (original designation) *M. violacea* Enderlein.

Description. Medium-sized to rather large elongate flies, somewhat resembling micropezids, with glossy black thorax and abdominal tergites, and reduced hairing and bristling.

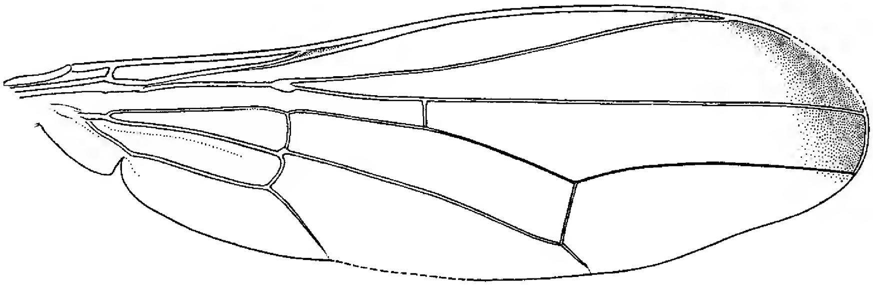


Figure 87. *Terzia saigusai*, wing.

Head generally longer than high, with pair of either epistomal processes or cheek processes in males of some species; eye rounded, but sometimes ventrally emarginate in males; postfrons slightly excavated between summits of eyes, extending only slightly in front of eyes in profile; face in part concave in profile, without distinct median carina, either slightly convex below without prominent epistomal margin, or with epistomal margin prominently protruded and, in some males, greatly expanded, or, in male of *A. nigra*, with a long, spatulate lobe on each side; inner vertical bristle large to quite small; outer vertical small or minute but usually discernible; postgenal bristle minute or absent; fronto-orbital and postvertical bristles absent; supracervical setulae strongly developed, on a transverse cervical tubercle. Antenna: segments 1 and 2 short; segment 3 c. two to three times as long as wide or longer, not potentially attaining centre of epistomal margin; segment 6 bipectinate, with rather long rays, or short-haired, or partly bare. Prelabrum moderately shallow, well separated from epistomal margin by membranous zone; palpus variably developed; proboscis stout, with broad labella.

Thorax pyriform, slender anteriorly, remarkably deep posteriorly; prothorax, especially pronotum, together with lateral cervical sclerites and associated membranous surfaces forming a variably long neck, which holds head well away from mesoscutum; pronotum otherwise variable in structure and sometimes sexually dimorphic; prosternum anteriorly truncate or variably narrowed, without precoxal bridge; mesoscutum broad posteriorly, somewhat narrowed anteriorly; scutellum with pair of elongate setiferous horns (as in Diopsidae); subscutellum little developed; postscutellum deep, convex; anterior section of sternopleural suture aligned (almost vertically) with membranous cleft (as in Micropezidae-Eurybatini), posterior section sometimes detached from anterior section; metathorax produced behind the halteres dorsally and ventrally into a short posterior cylinder, which supports the abdomen; metathoracic postcoxal bridge very deep and strongly sclerotised; metapleura and metasternum together forming a prominence to which hind coxae are attached (as in Megamerinidae, Syringogastridae, etc.); thoracic cuticle almost devoid of pruinescence, but with densely pubescent zone between metathoracic spiracle and halter; hairing of thorax greatly reduced, but dorsocentral series of small hairs present; scutellum usually with few fine hairs; thoracic bristles all very small or undifferentiated from hairs, except for moderate-sized bristle at apex of each scutellar horn. Legs long and slender (fore coxa particularly so) without bristles, except for long apicoventral spur on mid tibia; mid femur with a series of variably developed suberect posterior hairs, except in *A. willeyi*. Wing elongate, basally narrowed, with few markings, mainly along costa; subcosta distally straight, free from costa, strongly sclerotised; anterior crossvein meeting vein 4 near mid-length of discal cell; veins 3 and 4 apically subparallel, somewhat arched; second basal and anal cells each much more than half as long as discal cell; anal crossvein curved throughout, variable in length; alula, axillary lobe, and squama virtually absent.

Abdomen elongate, sometimes clavate and anteriorly petiolate; tergites largely or partly with reduced hairing. Male: tergites 4 and 5 generally about as long as tergite 3; outer surstylus simple, somewhat exceeding inner surstylus; stipe distally with linear band of short or long pubescence within longitudinal groove; glans short and stout, with one or two pairs of membranous distal lobes; paired terminal filaments subequal in length, varying from very short and stumpy to much longer than glans (in *A. nigra*), arising from sclerotised tunic. Female: tergites 4 and 5 either almost as long as tergite 3, or much shortened; spiracles 4 and 5 situated close below lateral margins of their tergites; tergite 6 short but sclerotised; ovipositor sheath moderately long; aculeus slender, obtuse.

Distribution. Moluccas. New Guinea. Bismarck Archipelago. Solomon Archipelago. Further details are given under the subgenera.

Notes. *Angitula*, as here delimited, was divided into six genera by Enderlein (1936a, 1936b), who included these taxa in his subfamily Angitulinae of the Phytalmiidae. Hennig (1940a), in dissolving the family Phytalmiidae, referred the Angitulinae as a whole to the Platystomatidae. He listed the species according to Enderlein's generic placements, but stated in his discussion of Angitulinae: "There is therefore to be recognized only one genus, *Angitula* Walk., with at most several subgenera" (my translation). Malloch (1939b), Steyskal (1950, 1952a), McAlpine (1973a), and Evenhuis (1989) accepted three angituline genera, *Angitula, Angituloides*, and *Giraffomyia*. Korneyev (1994), in excluding "the *Giraffomyia* group" from the *Angitula* alliance (as Angitulinae), was surely misled into interpreting certain character states (given by McAlpine, 1973a) as relevant to higher classification. I here treat these as three subgenera of the genus *Angitula*, on account of: (1) the unambiguous monophyly of *Angitula* s.l.; (2) the necessity of downgrading the subfamily Angitulinae sensu Enderlein to infra-tribal status, taking into consideration the apparent phylogenetic proximity of the outgroup *Terzia*; (3) the range of variation in other polytypic platystomatid genera, including variation in aedeagal and female abdominal structure (examples in *Duomyia, Chaetorivellia, Euprosopia, Lenophila, Rhytidortalis* and *Senopterina*); (4) the constant, easily recognized diagnostic characters of *Angitula* s.l.; and (5) the distinctive general appearance for the whole genus.

Key to subgenera of *Angitula*

1 Inner vertical bristle very small, or at least not much larger than outer vertical; vein 2 meeting costa well beyond level of discal crossvein; anterior extremity of abdominal tergite 1+2 with pair of conical or thorn-like processes, each sclerotised all round .... *Angitula*

—— Inner vertical bristle large, in contrast to vestigial or undifferentiated outer vertical; vein 2 meeting costa near or before level of discal crossvein; anterior extremity of tergite 1+2 with pair of low, rounded gibbosities, each open to thoraco-abdominal membrane on anterior side 2

2 Pronotum deeply bilobed, without ante-pronotum; mesoscutum with anterior median finger-like process, bearing pair of apical bristles and projecting between lobes of pronotum (Fig. 92) .... *Angituloides*

—— Pronotum not very deeply bilobed, with, at least in male, distinct ante-pronotum; mesoscutum without anterior median process .... *Giraffomyia*

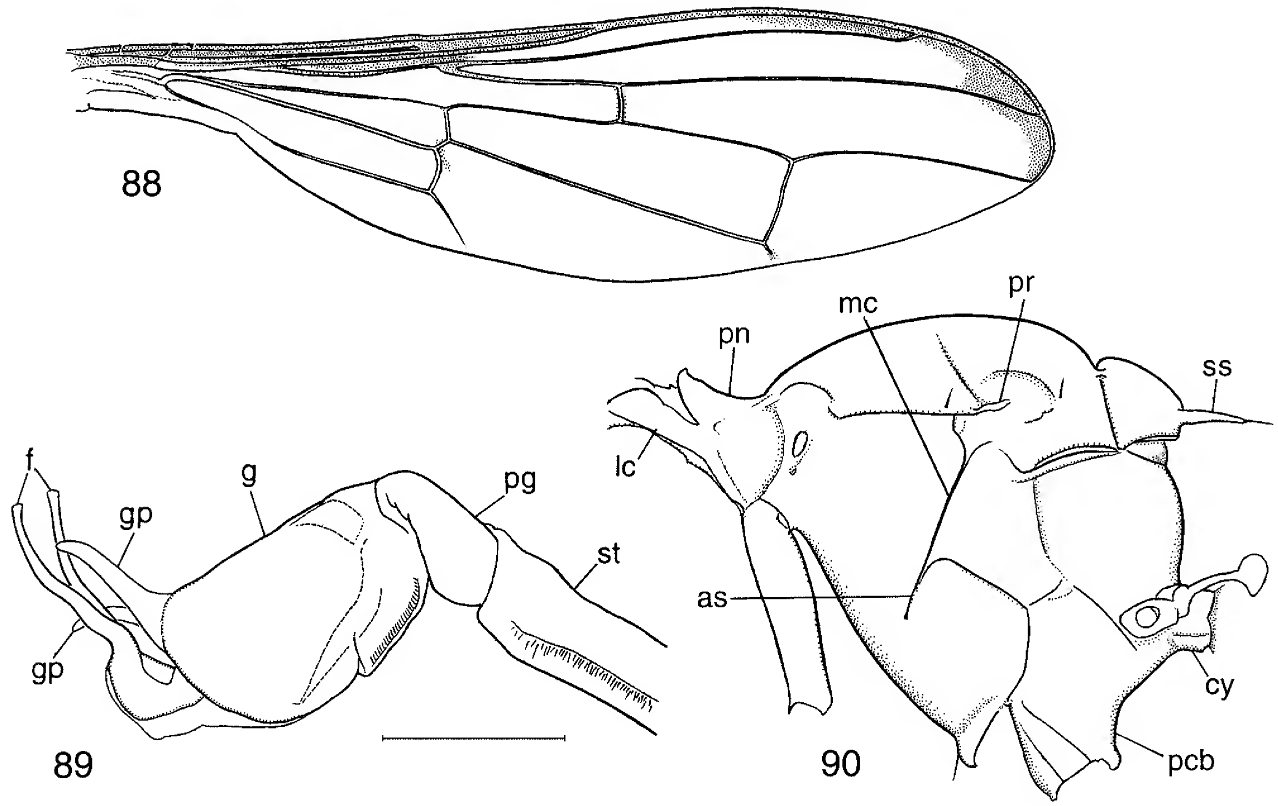
Subgenus *Angitula* s.str., n.stat.

Figs. 88–90

Angitula Walker, 1859: 123. Type species (monotypy) *A. longicollis* Walker.

Angitulina, Hammatopelma, and *Meachina* are synonyms, as detailed for the genus.

Description (principal diagnostic features only). Inner vertical bristle very small, or at least not much longer than outer vertical; antennal segment 3 usually c. three times as long as wide or longer; segment 6 bipectinate, with longer rays c. half as long as width of segment 3 or longer; palpus rather long, reaching approximately to anterior margin of prelabrum; pronotum moderately prolonged in front of mesoscutum, its anterior margin generally rounded, entire, and slightly curved upwards, without well defined ante-pronotum; mesoscutum without anterior median process; hind trochanter without ventral tubercle; vein 2 meeting costa well beyond level of discal crossvein; submarginal cell much wider than marginal cell at and beyond level of anterior crossvein; second basal cell at broadest part about as wide as anal cell; syntergite 1+2 at anterior extremity with pair of slender, strongly raised tubercles; abdominal spiracles 4 and 5 each with opening concealed by a tuft of pubescence; male: glans of aedeagus (where known) without terminal, sclerotised scoop-like lobe; paired terminal filaments each more than half as long as glans; female: tergite 6 usually quite short and, except in species with tergite 5 reduced, concealed by tergite 5.



Figures 88–90. *Angitula (Angitula) longicollis* Walker. 88, wing. 89, distal part of aedeagus. 90, thorax. Abbreviations: as, anterior section of sternopleural suture; cy, metathoracic cylinder; g, glans; gp, process of glans; lc, lateral cervical sclerite; mc, membranous cleft; pcb, metathoracic postcoxal bridge; pg, preglans; pn, pronotum; pr, postnotopleural ridge; ss, scutellar spine (paired); st, stipe.

Distribution. Moluccas: Halmahera, Bacan (Batchian), Seram. New Guinea: widely distributed on mainland, Misool, Aru, Normanby Island.

Notes. The subgenus *Angitula* includes those species listed by Evenhuis (1989) under the genus *Angitula*. Steyskal (1952a) gave a key to the species that he could identify from literature, but the species level taxonomy remains very unclear. Material of *A. (Angitula) longicollis* Walker here illustrated is identified from Steyskal's key, not from examination of type material. I am not yet convinced that *A. polita* (Saunders) is a synonym of *A. longicollis*. If the Bacan record of *A. longicollis* is due solely to Walker (1861c), it is based on a misidentification. Material from Bacan in AM and NMWC, probably identical with Walker's, belongs to a quite distinct species.

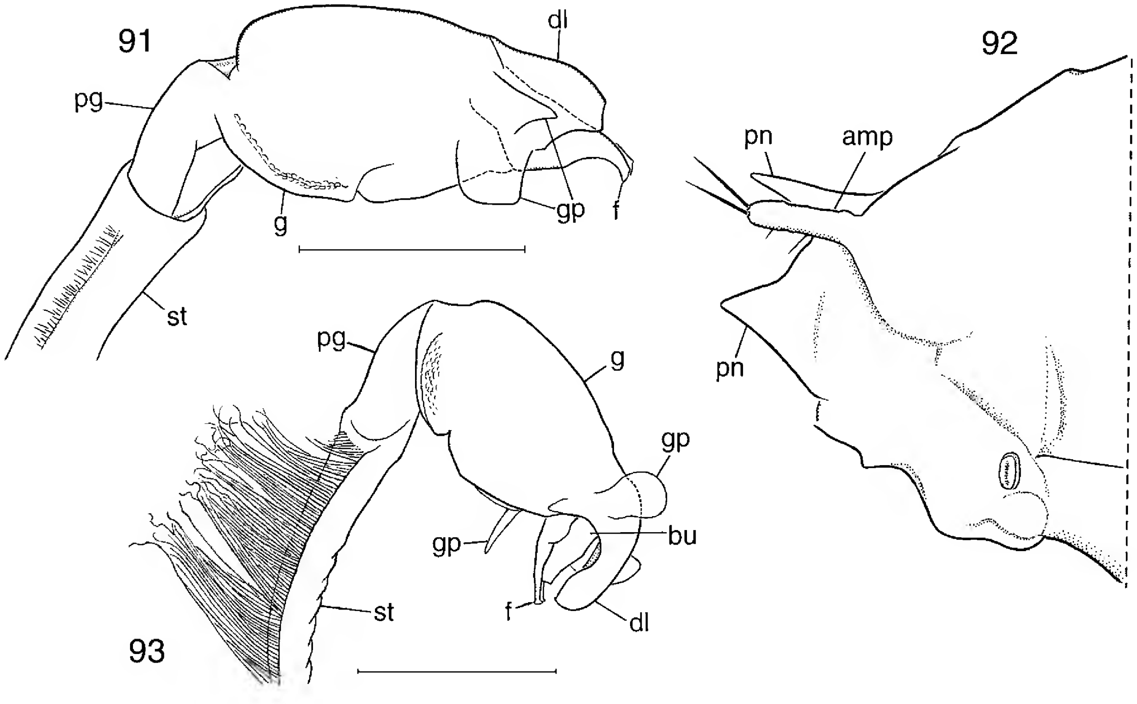
Secondary sexual modifications of the male head capsule vary greatly in this subgenus. Some species, e.g., *A. longicollis*, have little or no modification. Males of *A. krombeini* Steyskal have the epistomal margin of the face expanded into a broad plate. Those of *A. nigra* (Enderlein) have the epistomal margin produced into a pair of large, spatulate processes (erroneously referred to as cheek appendages). The only recorded male of *A. polita* (Saunders) has a pair of very small cheek processes.

Subgenus *Angituloides* Hendel n.stat.

Figs. 92, 93

Angituloides Hendel, 1913: 345 (as genus). Type species (original designation) *A. austeni* Hendel.

Description. Inner vertical bristle large; outer vertical vestigial; antennal segment 3 c. twice as long as wide; segment 6 irregularly short-haired dorsally, mainly on basal third, almost bare ventrally; palpus shorter than in *Angitula* s.str., less reduced than in *Giraffomyia*; pronotum very deeply divided into two subtriangular lobes, without antepronotum; mesoscutum with median finger-like process bearing pair of apical bristles, and projecting anteriorly between lobes of pronotum; hind trochanter with tooth-like ventral process in male, present as vestige in female; vein 2 meeting costa slightly before level of discal crossvein; submarginal cell not wider than marginal cell near level of anterior crossvein; second basal cell at broadest part narrower than anal cell; syntergite 1+2 at anterior extremity with pair of low, rounded gibbosities; abdominal spiracles 4 and 5 each with almost glabrous sclerotised ring; male: stipe of aedeagus with very long, brush-like pubescence; glans with sclerotised scoop-like distal lobe; paired terminal



Figures 91–93. 91, *Angitula (Giraffomyia) willeyi* (Sharp), distal part of aedeagus (scale = 0.2 mm). 92, *Angitula (Angituloides) austeni* (Hendel), anterior part of thorax, dorsolateral view; 93, distal part of aedeagus (scale = 0.2 mm). Abbreviations: amp, anterior median process of mesoscutum; bu, bulb; dl, distal lobe of glans; f, terminal filament (paired); g, glans; gp, processes of glans; pg, preglans; pn, lobes of pronotum; st, stipe.

filaments quite small, partly concealed by lobe of glans; female: tergites 4 and 5 large; tergite 6 quite short but apparently permanently exposed.

Distribution. Solomon Archipelago: Bougainville; New Georgia; Santa Isabel; Malaita; Guadalcanal; San Cristoval (Makira). There is a likelihood that populations also live on other islands of this Archipelago.

Notes. Only one species of *Angituloides*, *Angitula (Angituloides) austeni* (Hendel) n.comb., has been recognized, despite the wide distribution of the subgenus. Hendel's holotype was without adequate localisation ("Salomons-Inseln"). At present I have before me only material from Bougainville (♂, ♀) and Guadalcanal (3 ♀♀). These specimens agree closely, the only characters which appear likely to differentiate these insular populations being the black orbital stripe and fine occipital spotting of the Bougainville specimens, which are absent in those from Guadalcanal. A further study of geographic variation is desirable, but, on present data, such variation seems likely to be infraspecific.

The few recorded males show no modifications of the head capsule, but the hind-trochanteral process is distinctive.

Subgenus *Giraffomyia* Sharp n.stat.

Figs. 6, 91

Giraffomyia Sharp, 1899: 391–392 (as genus). Type species (monotypy) *G. willeyi* Sharp.

Description. Inner vertical bristle large; outer vertical bristle vestigial; antennal segment 3 c. twice as long as wide or somewhat less; segment 6 irregularly short-haired on almost entire length; palpus very small; thorax generally more elongate than in other subgenera; pronotum always prominently developed, usually longer in large males than in females, not deeply divided as in *Angituloides*, generally with freely projecting anterior part differentiated as antepronotum (Speight, 1969), less distinct in some females; mesoscutum without trace of median anterior process and associated bristles; hind trochanter without ventral process (in available material); vein 2 meeting costa near or slightly before level of discal crossvein; submarginal cell not or only slightly wider than marginal cell near level of anterior crossvein; second basal cell at broadest part narrower than anal cell; syntergite 1+2 at anterior extremity with at most pair of low, rounded gibbosities; abdominal spiracles 4 and 5 each with almost glabrous sclerotised ring (in available material); stipe of aedeagus with band of minute pubescence only; glans with sclerotised scoop-like distal lobe; paired terminal filaments very short and stout; female: tergites 4 and 5 large; tergite 6 quite short but apparently permanently exposed.

Distribution. Bismarck Archipelago: Manus; Los Negros; New Ireland; New Britain. Solomon Archipelago: Vella Lavella; Malaita (or Mala); Florida; Guadalcanal; Ugi (Uki); Ulawa.

Notes. New combinations for nominal species resulting from reduction of *Giraffomyia* to subgeneric status are: *Angitula (Giraffomyia) nigripes* (Steyskal), *Angitula (Giraffomyia) regularis* (Malloch), *Angitula (Giraffomyia) irregularis* (Malloch), *Angitula (Giraffomyia) solomonensis* (Malloch) (the above all from Solomon Archipelago), and *Angitula (Giraffomyia) willeyi* (Sharp) (from New Britain, Bismarck Archipelago).

I have on hand very little material from the Solomons and the above is a largely non-critical list. However, I do not think that Evenhuis (1989) is likely to be correct in raising *Giraffomyia regularis* var. *perfecta* Malloch to specific status. The variation in size of the male cheek processes described by Malloch in *A. (G.) regularis* is to be expected among individuals of the one species population, and is also seen in the large series of *A. (G.) willeyi* in AM. Also Evenhuis's synonymy of *A. (G.) irregularis* under *A. (G.) solomonensis*, perhaps on the basis of an ambiguous comment by Steyskal (1950: 96), seems unwarranted without further evidence, the two names applying to separate insular populations.

The numerous specimens of subgenus *Giraffomyia* available from the Bismarck Archipelago appear to represent at least four species, of which only *A. (G.) willeyi* is yet described.

Elongate cheek processes of various structure are present in larger males of perhaps all species of this subgenus (e.g., Fig. 6).

Subfamily Scholastinae

The subfamily has been characterised by McAlpine (1973a). While there remains an element of doubt as to whether the group is monophyletic, its distinction from the Platystomatinae is unambiguous.

Because the genera *Asyntona* and *Chaetorivellia* include both species with female tergite 5 much reduced and species with tergite 5 well developed, it is possible that the reduced condition is not in the groundplan of the subfamily. In *Lenophila*, female tergite 6 is small but by no means vestigial, so it appears that either absence of tergite 6 is not in the groundplan of the subfamily, or that *Lenophila* is misplaced here.

The Australasian genera included at present are: *Lenophila, Chaetorivellia, Tomeus, Pterogenia, Neohemigaster, Paryphodes, Scholastes, Trigonosoma, Zygaenula, Mesoctenia, Naupoda, Asyntona.*

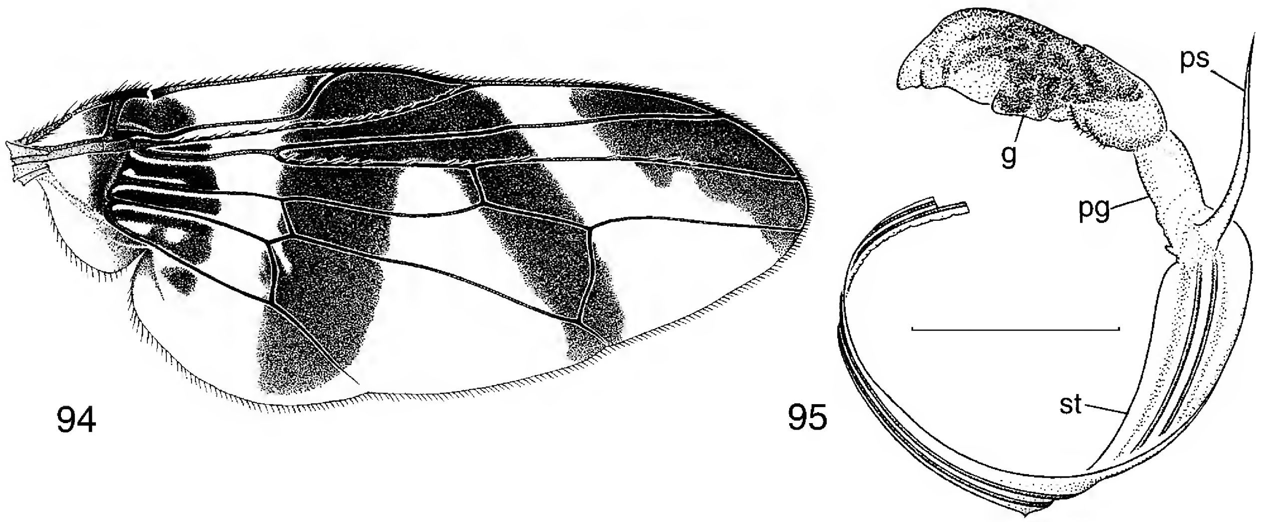
Genus *Lenophila* Guérin-Méneville

Figs. 94–96

Lenophila Guérin-Méneville, 1843: 200; McAlpine & Kim, 1977: 314–314. Type species (monotypy) *Ceratitis dentipes* Guérin-Méneville = *Ortalis dentipes* Macquart.

Celetor Loew, 1873: 4; Hendel, 1914a: 113–115. Type species *Ortalis dentipes* Macquart = *Tephritis strigipennis* Macquart (designated Hendel, 1914a).

Description. Hendel (1914a) gave a detailed description, which I supplement as follows.



Figures 94–95. *Lenophila secta* McAlpine & Kim. 94, wing. 95, aedeagus (scale = 0.25 mm). Abbreviations: g, glans; pg, preglans; ps, distal process of stipe; st, stipe. Illustrations by S.P. Kim.

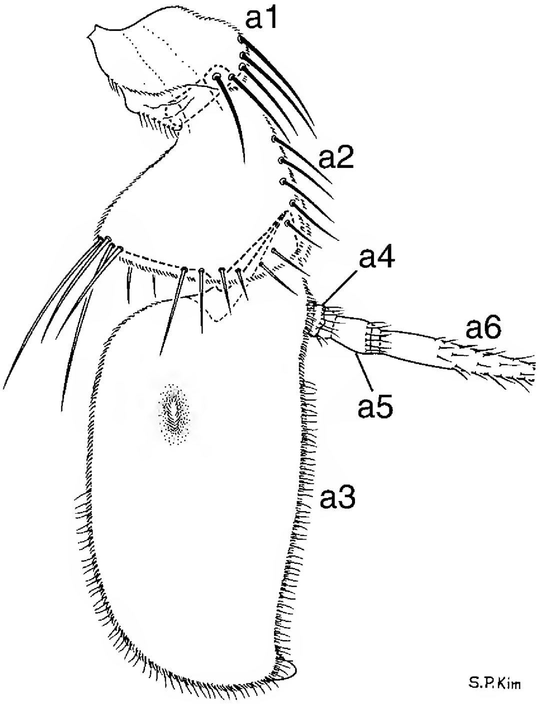


Figure 96. *Lenophila coerulea* (Macquart), antenna. a1–a6, antennal segments one to six.

Legs. Hind tibiae with male-restricted modifications of form and vestiture which differ in each species (McAlpine & Kim, 1977: figs. 9–14).

Male postabdomen. Aedeagus: stipe with terminal appendage tapering to a fine point; preglans distinct; glans large, with complex sclerotisation, without terminal filaments.

Female postabdomen. Tergites 5 and 6, often also tergite 4, variably reduced; ovipositor sheath (tergosternite 7) moderately long; aculeus slender, not depressed and blade like.

Distribution. Australia: apparently endemic.

The species are widely distributed in less arid parts of temperate Australia, including all states, but apparently are not present in Northern Territory. Three species are of limited occurrence in tropical Queensland. *Lenophila achilles* McAlpine & Kim extends to southern Tasmania (Bruny Island, AM).

Notes. The genus, which includes six known species, was reviewed by McAlpine & Kim (1977).

The bold pattern of the wing strongly resembles that of certain tephritid genera, particularly *Ceratitella* Malloch (see Hardy, 1967), and also the otitid *Dyscrasis* Aldrich (see Hernandez-Ortiz, 1988). This pattern, which is usually found in combination with a convex, glossy, black scutellum, also occurs in two undescribed species of *Atopognathus*. The common features of these flies could be due to mimicry of jumping spiders (Salticidae), an idea first mentioned to me by G. Daniels (see also Mather & Roitberg, 1987).

Adults of five of the species are almost invariably found on leaves of *Xanthorrhoea* spp. (Xanthorrhoeaceae) and for some it has been demonstrated that larvae live in the damaged or rotting trunk of this plant. On the other hand *L. dentipes* (Macquart) is not found on *Xanthorrhoea* and there is evidence of association with *Eucalyptus* sp. (Myrtaceae) and *Macrozamia* sp. (Zamiaceae). C.E. Chadwick (pers. comm.) reared numerous adults of *L. dentipes* from larvae living in the caudex of *Macrozamia communis* damaged by larvae of the weevil *Melanotranes internatus* (Pascoe) (Curculionidae).

Genus *Chaetorivellia* de Meijere

Fig. 97

Chaetorivellia de Meijere, 1913: 376; Hendel, 1914a: 128–129. Type species (monotypy) *Ortalis punctifascia* Walker.

Description. Hendel (1914a) keyed the genus and gave a detailed description, which I supplement as follows:

Male postabdomen. Aedeagus: stipe without terminal appendage; preglans distinct; glans not forming a simple capsule, but with complex sclerotisation and no terminal filaments.

Female postabdomen of two markedly different types (a and b). (a): tergite 5 large, at least as long as tergite 4; aculeus slender, not blade-like. (b): tergite 5 much reduced, more or less concealed in dried specimens; aculeus broad, blade-like. (a) and (b): aculeus with pair of small, terminal scale-like processes.

Distribution. Moluccas: Ternate; Halmahera (Gilolo); Bacan (Batchian); Ambon (Amboina). New Guinea: widely distributed on mainland. Solomon Archipelago: Bougainville. There are no records for Australia and the Bismarck Archipelago.

Notes. Hendel (1914a) gives *Ortalis trifasciata* Doleschall (described from Amboina) as the type species of *Chaetorivellia*, but *C. punctifascia* (Walker) (described from Gilolo) is the only nominal species originally included by de Meijere. Hendel considered these two nominal species as synonyms, but I do not consider the synonymy to be demonstrated as yet. The nominal species *Ortalis tarsalis* Walker, 1861c is also referred to *Chaetorivellia* (n.comb.) from examination of holotype (Batchian or Bacan, A.R.W., OX).

There are probably at least four distinct species of *Chaetorivellia* in collections, but species-level taxonomy in the genus needs further study. The great variation in female abdominal morphology is remarkable, but there is comparable variation in some larger genera of the family.

Genus *Tomeus* n.gen.

Type species: *Tomeus wyliei* n.sp.

Description (♂, ♀). Stout flies, conforming to the characterisation of the Scholastinae (McAlpine, 1973a: 26) except in features of the aculeus. Cuticle of head, thorax and abdomen largely dull and densely pruinescent.

Head much higher than long in profile, slightly wider than high; eye much higher than long; face slightly concave near centre, slightly convex below; parafacial on lower half with numerous non-seriate hairs; the following bristles present: outer vertical, quite small inner vertical, two fronto-orbitals, postgenal; postvertical bristle absent. Antenna, excluding arista, about half as long as face; segment 6 with non-seriate hairs on whole length. Prelabrum small; palpus of moderate size.

Thorax. Mesopleuron without strong gibbosity on upper part; scutellum rounded in outline, longer than a semicircle, somewhat depressed, extensively haired on dorsal surface and much of lateral surface; subscutellum convex, but small; the following thoracic bristles present: humeral, 1+1 or 0+1 notopleurals, small supra-alar, large postalar, posterior intra-alar, sometimes prescutellar acrostichal, two (posterior) pairs of scutellars, mesopleural. Legs moderately short and stout; femora not notably thickened; fore and hind femora with a few weak dorsal bristles, other femoral bristles undifferentiated; mid tibia with rather short, stout terminal spur. Wing essentially similar to that of *Scholastes*; vein 1 without setulae before level of humeral crossvein; vein 5 without setulae dorsally; all veins without ventral setulae; squama moderately small, almost semicircular, its area not greater than well-developed axillary lobe.

Abdomen ovoid, broadest across segment 2. Male postabdomen: tergite 5 c. as long as tergite 4. Female postabdomen: tergite 4 large; tergite 5 much reduced; tergite 6 apparently reduced to pair of minute plates; aculeus broad, strongly depressed, obtuse.

Distribution. New Guinea: Papua New Guinea—mainland.

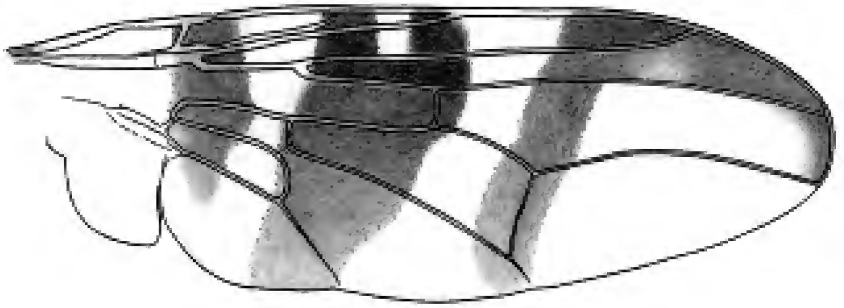


Figure 97. *Chaetorivellia* sp. (Laloki, Papua New Guinea, AM), wing.

Notes. *Tomeus* belongs in the subfamily Scholastinae and is most similar to *Neohemigaster, Pterogenia*, and *Scholastes*. It differs from all these in its smaller squama and broad, flattened ovipositor complex. It further differs from *Neohemigaster* in the bare vein 5, more strongly curved anal crossvein, and large, exposed tergite 4 of the female abdomen. It differs from *Pterogenia* (at least the Australasian species) in the short, non seriate hairing of the arista, bare base of vein 1 before humeral crossvein, bare vein 5, and more curved anal crossvein. It also differs from *Scholastes* in the arista as above, in the absence of dorsocentral, sternopleural, and anterolateral scutellar bristles, the undifferentiated posteroventral bristles of the fore femur, the apically desclerotised subcosta, and the large, exposed tergite 4 of the female abdomen. In general appearance *Tomeus* is reminiscent of some species of the mainly African genus *Paryphodes*, but is distinguishable from the only known Australasian species by the absence of the sternopleural and anterior scutellar bristles, the simple epistomal margin of face, the much less prominent subscutellum, the non-incrassate hind femur, the simpler contour of the posterior crossvein, the absence of setulae on vein 5, etc.

The generic name is from the Greek *tomeus*, a cutting instrument, in reference to the aculeus, and is masculine.

Tomeus wyliei n.sp.

Figs. 98–103

Material examined. HOLOTYPE, ♂, Papua New Guinea: Stony Logging Area, near Bulolo, Morobe Province, 765 m, 17.vii.1979, H.R. (AM). PARATYPES, Papua New Guinea: 1 ♂, same data as holotype (AM); 1 ♀, Upper Manki Logging Area, near Bulolo, Morobe Province, 5000 ft (c. 1500 m), iii.1973, F.R.W., P.S. (AM); 1 ♀, Brown River, near Port Moresby, Central Province, x.1960, J.L.G., (on) palm (BPB).

Description (♂, ♀). *Coloration*. Head largely ochraceous; ocellar spot black; postfrons and face with brown markings as in Fig. 98; occiput with brown suffusion. Antenna ochraceous, with brown suffusion on segments 2 and 3. Prelabrum and palpus brown. Thorax predominantly dull blackish brown; mesoscutum with dark to mid-grey pruinescence forming three very diffuse longitudinal bands; scutellum with broad U-shaped yellow band; humeral callus with yellowish zone entending as a band along upper margin of mesopleuron; lower part of mesopleuron with slight tawny suffusion. Fore and mid coxae predominantly brown; hind coxa predominantly ochraceous; femora ochraceous with brown suffusion most strongly developed on distal part of ventral surface; tibiae pale ochraceous with brownish sub-basal zone and usually trace of preapical zone; tarsi pale yellow. Wing with brown markings and suffusion as in Fig. 100. Halter pale yellow. Abdominal tergites 1 to 4 dull tawny with variable median and lateral marginal brown suffusion; tergite 5 of male brown laterally, tawny medially; ovipositor sheath brown to tawny.

Head as given for genus; height of cheek 0.15–0.19 of height of eye.

Thorax. Mesoscutum c. 0.86 times as long as wide, very densely pruinescent-pubescent and extensively setulose. Wing: entire membrane microtrichose; length of second basal cell c. 0.72 of length of discal cell.

Abdomen. Male postabdomen: outer surstylus broad, simple, ensheathing inner surstylus, with few fine setulae; inner surstylus shorter, with two large prensisetae; stipe of aedeagus broad, ribbon-like; preglans almost undifferentiated; glans with large rounded concave lobe (not visible in Fig. 103), and solid, sclerotised apical horn-like process; cavity of glans with lining partly densely papillose-rugose; cercus with numerous long, non-seriate setulae.

Dimensions. Total length, ♂ 5.7 mm, ♀♀ 5.1–6.3 mm; length of thorax, ♂♂ 2.5–2.6 mm, ♀♀ 2.4–2.9 mm; length of wing, ♂ 5.5 mm, ♀♀ 5.4–6.0 mm; length of glans (excluding entire apical process) 0.23 mm.

Distribution. As given for genus.

Notes. The specimens from Stony Logging Area were found on leaves of *Musa* (native banana).

The specific epithet refers to F. Ross Wylie, who collected material of this and other interesting Diptera in Papua New Guinea.

Genus *Pterogenia* Bigot

Figs. 104–106

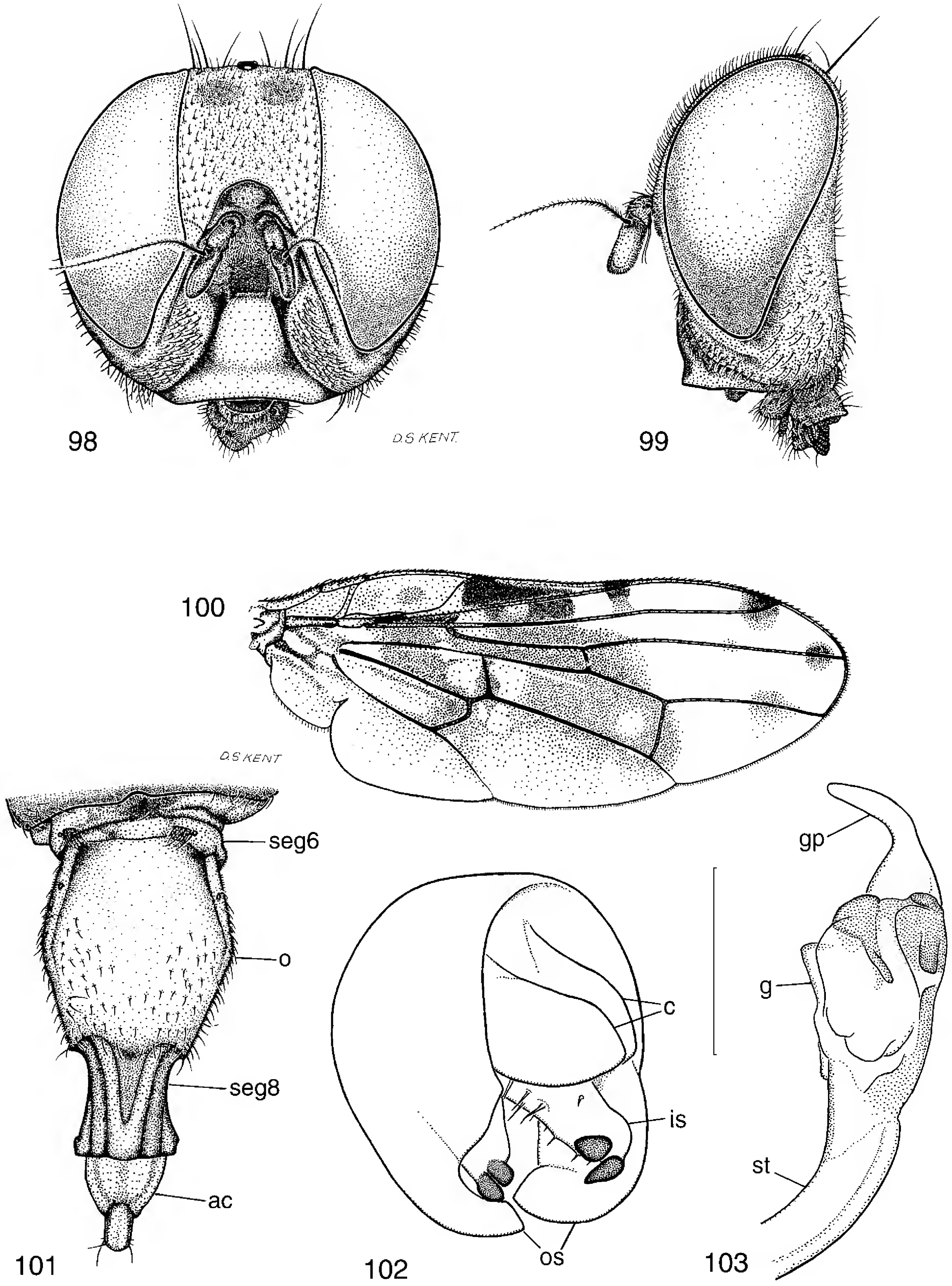
Pterogenia Bigot, 1859: 312. Type species (designated Hendel, 1914a: 20) *P. singularis* Bigot.
Agastrodes Bigot, 1859: 311. Type species (monotypy) *A. niveitarsis* Bigot.
Elachigaster Rondani, 1875: 431–432. Type species (monotypy) *E. albitarsis* Rondani (= *Agastrodes niveitarsis* Bigot).
Ditomogaster Rondani, 1875: 431, 433. Type species (monotypy) *D. xanthomera* Rondani (= *Pterogenia dayak* Bigot).

Description. The detailed description by Hendel (1914a: 141–144) remains valid, so long as the particular characters now attributed to *Neohemigaster* spp. are omitted. I supplement Hendel's description as follows.

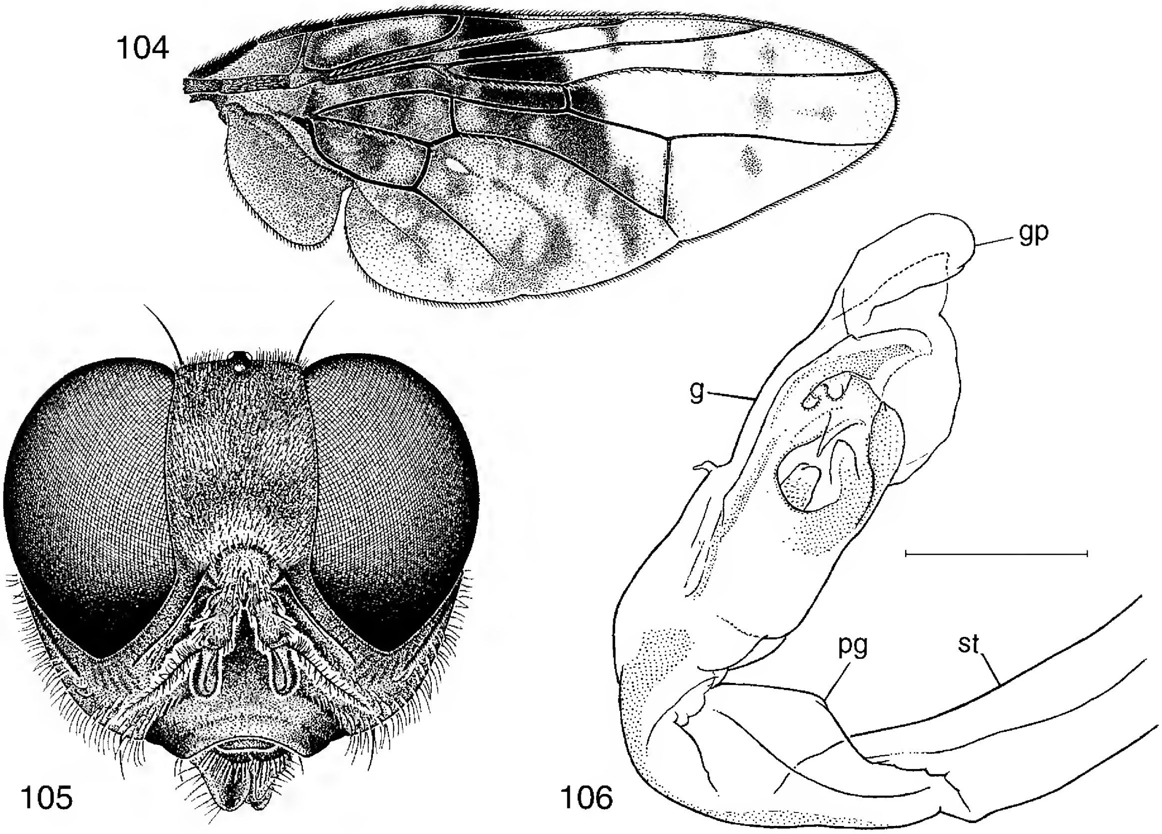
Head. Area between antennal sockets forming a narrow ridge; face generally without rounded gibbosity at each lateroventral extremity, at least in females; inner vertical and fronto-orbital bristles generally absent. Antenna generally reaching not much more than halfway from basal socket to centre of epistomal margin of face. Prelabrum generally attenuated anteriorly, sometimes joined to face by small median sclerite; palpus usually well developed, sometimes very broad, in one species minute.

Thorax. Prosternum usually larger and less truncated anteriorly than in *Neohemigaster*; subscutellum large, usually markedly less convex than in *Neohemigaster*. Wing: vein 1 always with group of dorsal setulae on basal part, before humeral crossvein (as in *Euprosopia*).

Abdomen. Tergite 2 variable, but usually without median



Figures 98–103. *Tomeus wyliei* n.sp.. 98–99, head. 100, wing. 101, female postabdomen, dorsal view. 102, epandrium and associated structures, posterolateral view. 103, distal part of aedeagus (scale for Figs. 102, 103 = 0.2 mm). Abbreviations: ac, aculeus; c, cerci; g, glans; gp, terminal process of glans; is, inner surstylus; o, ovipositor sheath (tergosternite 7); os, outer surstylus; seg6, seg8, abdominal segments six and eight; st, stipe.



Figures 104–106. 104, *Pterogenia nubecula* Hendel, wing; 105, *Pterogenia* "sp. A" (Mulgrave River, AM), head; illustrations by S.P. Kim. 106, *Pterogenia pectoralis* Hendel, distal part of aedeagus (scale = 0.1 mm). Abbreviations: g, glans; gp, terminal process of glans; pg, preglans; st, stipe.

tubercle on posterior margin. Female: tergite 4 usually well sclerotised, but shorter than tergite 3; tergite 5 vestigial; ovipositor sheath generally short, well sclerotised, subcircular in cross-section; aculeus attenuated.

Distribution. Australasian Region: Moluccas; New Guinea; Bismarck Archipelago (New Britain, AM); Solomon Archipelago (Bougainville, AM); Australia (Queensland, New South Wales). Oriental Region (widely distributed).

Notes. Numerous Australasian species are listed by Evenhuis (1989) and Oriental species by Steyskal (1977). Some of these are now transferred to *Neohemigaster* (q.v.), and the generic position of others remains to be determined.

The keys to species of Hendel (1914b) and Malloch (1939a) are very incomplete. Frey (1930) gave a key to the Philippine species.

Pterogenia is differentiated from other Australasian genera of Scholastinae by the presence of setulae on the stem vein (base of vein 1 before level of humeral crossvein). It most resembles *Neohemigaster*, q.v. for comparative data.

Adults of several Australian species are found on rotting logs or tree stumps infested with boring Coleoptera in rain forest. These may be oviposition sites.

Genus *Neohemigaster* Malloch

Fig. 107

Hemigaster Rondani, 1875: 431. Type species (monotypy) *H. albovittatus* Rondani. Preoccupied Brullé, 1846 (Hymenoptera).

Neohemigaster Malloch, 1939a: 100, 126–127. New name for *Hemigaster* Rondani. Type species (automatic) *H. albovittatus* Rondani.

Description. Resembling *Pterogenia*, as redescribed by Hendel (1914a). The following are the most notable features:

Head somewhat anteroposteriorly compressed, largely pruinescent and non-shining; facial ridge with few setulae at lower end; area between antennal sockets flat or slightly concave, margined on each side by a slight ridge which is decurrent on to face for short distance; face without median carina, but slightly convex medially on upper part, with a rounded gibbosity at each lateroventral extremity; outer vertical bristle well developed; inner vertical present or absent; postvertical and fronto-orbital bristles absent. Antenna extending c. halfway from basal socket to centre of epistomal margin of face; arista usually subplumose for

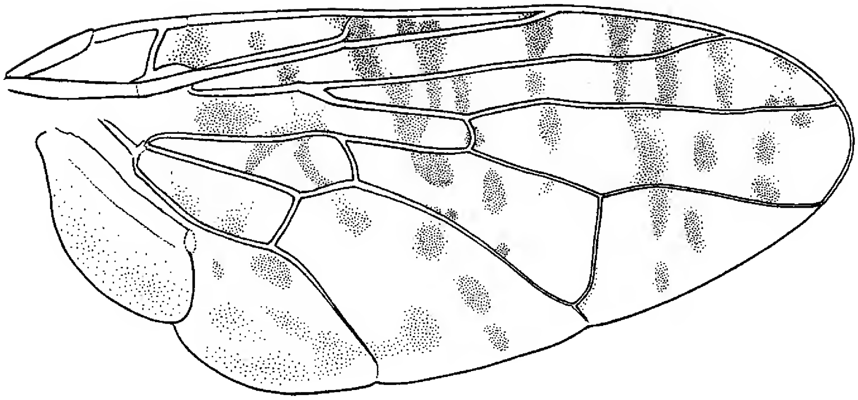


Figure 107. *Neohemigaster* "sp. 1" (Awala, Papua New Guinea, AM), wing.

most of length. Prelabrum small, but well sclerotised; palpus well developed, usually rather broad.

Thorax largely dull, pruinescent; prosternum usually very short and broad; subscutellum usually large and very convex; the following bristles generally present: humeral, 1+1 notopleurals, supra-alar, postalar, posterior intra-alar, usually three pairs of unequal scutellars situated on posterior part of scutellum, mesopleural; dorsocentral small or absent; prescutellar acrostichal bristle absent. Legs: fore femur with short or rudimentary dorsal and posteroventral bristles. Wing with very diverse brown markings; vein 1 with dorsal setulae only beyond level of humeral crossvein, bare basally; vein 5 setulose dorsally on basal section, sometimes also setulose more distally; squama larger than axillary lobe.

Abdomen short and rather broad; posterior margin of tergite 2 with median raised tubercle. Male: tergites 4 and 5 well developed. Female: tergite 3 very large; tergites 4 and 5 minute or desclerotised; ovipositor sheath depressed, keeled along each side; aculeus very slender, not depressed.

Distribution. Australasian Region: New Guinea. Oriental Region: widely distributed in Indonesia and Malaysia, possibly also Philippines and Taiwan.

Notes. Species of this genus were included in *Pterogenia* in all the writings of de Meijere and Hendel, and characters for separating these genera were first given by Malloch (1939a). It has therefore been difficult to place some of the described species without examination of types.

In my experience, species of *Neohemigaster* can be separated from those of *Pterogenia* by the absence of dorsal setulae on the basal part of vein 1 (stem vein), the flattened or slightly concave zone between the antennal sockets, the small rounded gibbosity, present even in females, at each lateroventral extremity of face, the great reduction of abdominal tergite 4 in the female, and the depressed, laterally keeled ovipositor sheath. The greater convexity of the subscutellum in *Neohemigaster* may be a valid difference, but needs checking for more species. The presence of the inner vertical bristle in *Neohemigaster* and the absence of the median tubercle on abdominal tergite 2 in *Pterogenia* are not consistent enough for generic segregation. In the male of an undescribed species of *Neohemigaster* ("sp.1" in AM) from Papua New Guinea the postgenal region on each side bears a stout, forwardly directed lamella, reminiscent of that of *Pterogenia singularis* Bigot.

The type species, *Neohemigaster albovittata* (Rondani), was redescribed from the holotype female by Hendel (1914b: 322–324) and the head and wing figured (1914a: pl. 12, fig. 231; pl. 13, fig. 232). Originally from Sarawak, East Malaysia, Malloch (1939a: 127) recorded a male of *N. albovittata* from Sandakan, Sabah. My knowledge of this species derives from the publications of Hendel and Malloch.

In addition, I have seen the following species referable to *Neohemigaster*: *Neohemigaster fascifrons* (de Meijere, 1916) n.comb., Java (AMST); *Neohemigaster guttata* (Walker, 1856) n.comb., as determined and redescribed by de Meijere (1916: 85–86), Singapore and Sumatra (AMST); *Neohemigaster* "sp.1", Papua New Guinea (Morobe, Oro, and Central Provinces, AM); *Neohemigaster* "sp.2", Sumatra (AM). Malloch (1939a: 127) mentioned two unnamed species of *Neohemigaster* from Sibuyan Island, Philippines. From the original descriptions, it seems probable that *Pterogenia eurysterna* Hendel (1914b: 319–321) from Taiwan, and *P. glabrina* Hendel (1914b: 318–319) from Sarawak are referable to *Neohemigaster*. Thus it appears that as many as nine species of *Neohemigaster* exist in collections. The described Oriental species are listed by Steyskal (1977) under *Neohemigaster* and *Pterogenia*.

I have collected females of *Neohemigaster* "sp.1" in a rubber plantation in Papua New Guinea on trunks of *Hevea brasiliensis*, at wounds probably made by boring Coleoptera. H. Roberts found both sexes of the same species in a natural rainforest habitat, the specimens being labelled "ex Xanthophyllum" (AM).

Genus *Paryphodes* Speiser

Paryphodes Speiser, 1911: 251. Type species (original designation) *P. omega* Speiser.

Systellodiscus Enderlein, 1912: 372. Type species (original designation) *S. perforatus* Enderlein.

Simomesia Enderlein, 1912: 373. Type species (original designation) *Simomesia tigrina* Enderlein (= *Scholastes nepticula* Loew).

Description. See Hendel, 1914a.

Distribution. Australasian Region: New Guinea—north-east, new record for Region. Afrotropical Region: mainland Africa—mainly tropical; Madagascar (specimen of a typical *Paryphodes* in NMWC; a further species doubtfully referred here in AM).

Notes. Hendel (1914b) gave a key to species, and Steyskal (1980) listed the species with additions and revised synonymy. The latter recognized 17 species, all from Africa.

Judging from the numerous Afrotropical specimens that I have examined, the only New Guinea species is reasonably typical of the genus. In addition to characters given in the key to genera, it differs from the species of *Scholastes*, which have a similarly developed sternopleural bristle, in having the postfrons c. twice as long as wide (much less than twice as long in *Scholastes*), and without the anterior transverse ridge present in *Scholastes*; two fronto-orbital bristles (instead of one); antennal segment 6 with numerous, quite short, non-seriate hairs on most of length (instead of being relatively sparsely long-bipectinate); dorsocentral bristles vestigial (instead of in one or more well-developed pairs); fore femur with short posteroventral bristles, scarcely longer than dorsal bristles (instead of much longer than any dorsal bristles); hind femur much thicker than mid femur (instead of scarcely thicker); vein 2 not undulated (instead of strongly undulated near mid-length); basal section of vein 5 dorsally setulose (instead of bare); anal crossvein nearly straight (instead of distinctly curved); tergite 5 of male as long as tergites 3 and 4 together (instead of no longer than tergite 3).

The record for Papua New Guinea is unexpected in the absence of any records from the Oriental Region. As the species are relatively small and inconspicuous for platystomatids, it is possible that they have been overlooked in some countries. As far as I can judge, the species from New Guinea is distinct from any of the described African ones. The possibility that it may be introduced by man is acknowledged.

Paryphodes hospes n.sp.

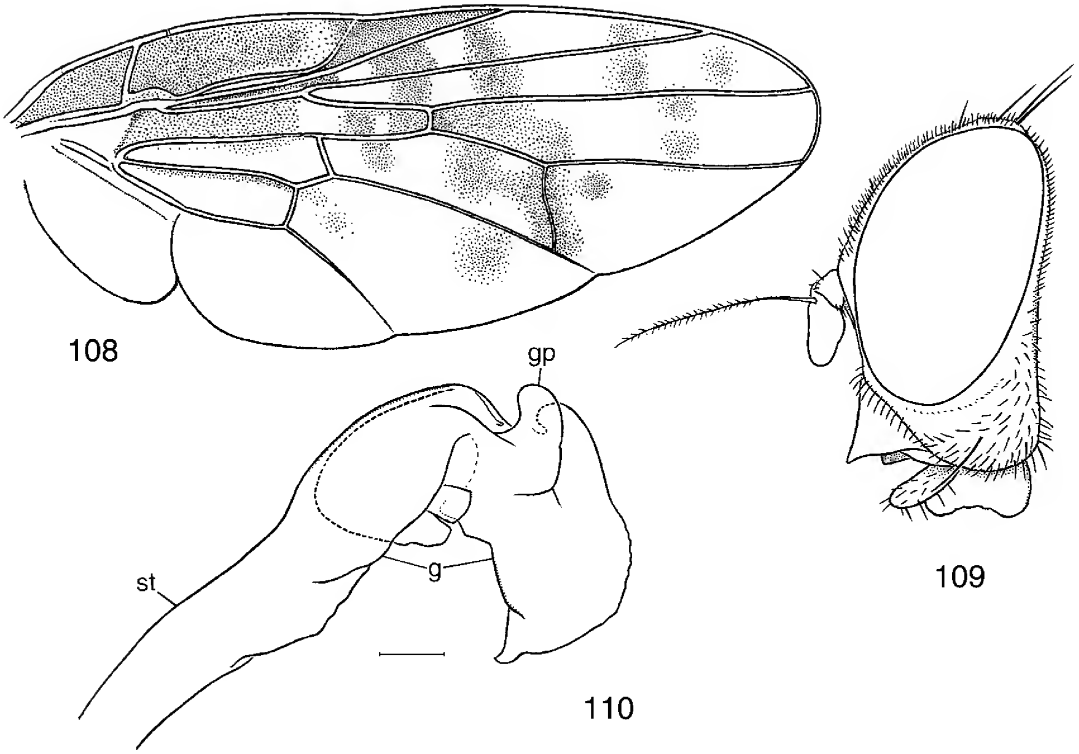
Fig. 108–110

Material examined. HOLOTYPE, ♂ (unique), Papua New Guinea: Bainyik, near Maprik, East Sepik Province, 21.xii.1963, D.K.M. (AM).

Description (♂, ♀ unknown). *Coloration*. Head dull fulvous; postfrons with pair of parallel brown stripes clear of orbits on posterior two-fifths, dilated and connected posteriorly but not quite reaching vertex; a pair of less distinct brownish marks at anterior third of postfrons; face with brown mark near centre, not extending its full width; occiput largely dark brown. Antenna fulvous, with slight brownish suffusions; segment 6 brown except at fulvous base. Palpus and prelabrum dull fulvous. Thorax dark brown, largely pruinescent and little shining; humeral callus with two yellow marks, upper one smaller and a little extended posteriorly above anterior notopleural bristle, lower one extending over upper part of mesopleuron; mesoscutum with very indistinct pair of grey dorsocentral stripes; scutellum with dull yellow arcuate marginal zone not extending on to anterior half. Femora brownish tawny, fore and mid ones a little darker except towards apices; fore tibia yellow, with tawny suffusions; mid tibia tawny, with brownish band beyond middle and yellow apex; hind tibia largely yellowish, with tawny base; tarsi pale yellow, without apical darkening. Wing hyaline or subhyaline except as follows: a pale uneven brownish suffusion in both costal cells; stigmatal section of subcostal cell yellowish brown, slightly paler distally; marginal cell with basal streak, a small brown blotch at base of vein 2, two larger brown blotches near middle, and a small brownish blotch near distal end; submarginal cell with two brown blotches adjoining large brown blotches in marginal cell, a less intense brownish mark adjoining distal blotch in marginal cell and an indistinct brown mark between last and apex; first basal cell tinged with brown on basal half, distally with two brown blotches, one of which is terminal; first posterior cell unevenly suffused with brown on basal third, with pair of brownish blotches about halfway between dark basal zone and apex and a faintly indicated blotch between this pair and apex; second basal and anal cells with faint suffusion only, but the latter with brown streak along vein 5; discal cell with brownish blotch at about basal quarter and extensive irregular distal brown suffusion which is clear of vein 5 except near discal crossvein; second posterior cell suffused with brown mainly near discal crossvein and with sub-basal blotch near vein 4, with very indistinct suffusion distally; third posterior cell with faint general suffusion and an indistinct blotch beyond middle near vein 5; axillary lobe and squama dull creamy. Halter yellowish, with brown capitellum. Abdominal tergites largely thinly pruinescent and somewhat shining, tawny to brownish tawny; pleural membrane fulvous.

Head. Postfrons evenly convex in profile, its length (antennal sockets to vertex) about twice as great as width near mid-length; ptilinal suture narrowly arched; parafacial bare; facial ridge not expanded below, where it has few setulae in two irregular series; face with no distinct carina, somewhat explanate on central lower part, slightly projecting below, but with epistomal margin sharply reflexed to face ventrally; antennal grooves broad and shallow; upper postocular area very narrowly visible in profile, margined by a very regular series of closely placed postocular setulae; the following cephalic bristles well developed: inner and outer vertical, two pairs of fronto-orbitals, postgenal; postvertical small; ocellar and lateral occipital absent. Antenna about half as long as face on median line; segment 6 long and slender, with very short hairs on whole length. Prelabrum deeply sclerotised at sides, much attenuated anteriorly; palpus moderately broad.

Thorax. Mesoscutum c. 0.85 times as long as wide; scutellum somewhat flattened dorsally, with numerous dorsal and some lateral setulae; mesopleuron moderately convex on upper part; subscutellum very convex and prominent (tachinid-like); the following thoracic bristles well developed: humeral, 1+1 notopleurals, supra-alar, postalar, posterior intra-alar, mesopleural, sternopleural, three pairs of normal scutellars, and a series of c. nine



Figures 108–110. *Paryphodes hospes* n.sp. 108, wing. 109, head. 110, distal part of aedeagus (scale = 0.05 mm). Abbreviations: g, glans; gp, medial process of glans; st, stipe.

ventrolateral shorter bristles or enlarged setulae on each side of scutellum; dorsocentral vestigial; prescutellar acrostichal absent. Fore and mid legs rather short; hind leg longer; fore femur with numerous non-seriate dorsal bristles, and a series of moderately long posteroventral bristles; mid femur more slender, with a series of posteroventral bristles; hind femur longer and much stouter than other femora, not curved, without strong bristles; mid tibia with one moderately large apical ventral spur; mid basitarsus elongate, much more than half as long as whole tarsus. Wing: entire membrane microtrichose; both costal cells unusually broad, with costa more arched on these cells than usual (compare figs. 50, 52, 53, 55–57 of Hendel, 1914b); vein 2 almost straight, except at origin; vein 3 with faint undulation near middle of distal section; length of second basal cell c. 0.87 of length of discal cell, both measured on vein 4; vein 4 index = 0.47; second section of vein 4 with very slight curvature; distal section of vein 4 with slight sigmoid curvature, becoming parallel with vein 3 apically, 2.0 times as long as penultimate section; discal crossvein moderately oblique, with sigmoid curvature, c. 1.7 times as long as distal section of vein 5; anal crossvein with almost imperceptible curvature; basal section of vein 5 with nine or ten dorsal setulae; axillary lobe and squama both moderately large and rounded.

Abdomen. Tergite 2 setulose mainly near posterior margin, with small median group of larger setulae on margin and more extensive lateral group of larger setulae; tergites 3 and 4 short; tergite 5 larger, almost uniformly setulose, somewhat narrowed posteriorly, as long as tergites 3 and 4 together. Aedeagus (Fig. 110): stipe moderately long, slightly expanded distally, but otherwise without differentiated preglans; glans moderately compact but constricted and partly desclerotised near middle, distal section with complex, asymmetrical sclerotisation, but no elongate processes, basal section with cup-like cavity containing complex fibrous structure (detail not shown in figure).

Dimensions. Total length 4.4 mm; length of thorax 2.3 mm; length of wing 3.9 mm; length of glans of aedeagus 0.24 mm.

Distribution. Papua New Guinea—lowlands of East Sepik Province.

Habitat. Tall rainforest remnant. I am informed that this forest at the Agriculture Station, Bainyik, was later clear-felled.

Notes. In the key to *Paryphodes* species of Hendel (1914b: 253–254), *P. hospes* runs imperfectly to *P. tigrinus* Enderlein, but differs in having the thorax predominantly dark brown instead of clay yellow and the second section of vein 4 shorter and much less curved. (*P. tigrinus* is a junior synonym of *P. nepticula* (Loew), according to Steyskal, 1980). Of the other species with yellowish marking on the scutellum, *P. duus* Steyskal has the second section of vein 4 longer and more curved and the wing much more extensively shaded with brown; *P. conspurcatus* Hendel has the distal section of vein 4 relatively short, the costa less arched over the costal cells, and the wing markings quite different (Hendel, 1914b: fig. 56); *P. compticeps* Enderlein has extensive yellow striping on the mesoscutum, black-brown abdomen (male), and a broad dark brown band covering "pterostigma" and anterior crossvein, all in disagreement with *P. hospes*. From the above it seems very probable that *P. hospes* is distinct from any of the described African species of *Paryphodes*, though most of these were also described from very little material. Of the Afrotropical species of *Paryphodes* that I have examined (in NMWC, PM, and other collections), none has the setulae on vein 5 or the well differentiated series of ventrolateral bristles on the scutellum seen in *P. hospes*, but there are numerous described species not yet examined for these features.

The holotype has a female strepsipteran or stylops projecting from the pleural membrane of the abdomen. Parasitism does not appear to have affected the morphology of the host fly, as is also the case in other stylopised platystomatids examined. Perhaps these parasites are referable to the family Dipterophagidae (see Drew & Allwood, 1985).

The specific epithet is Latin for stranger or visitor, on account of the unexpected occurrence of this Afrotropical genus in New Guinea.

Genus *Scholastes* Loew

Figs. 111, 112

Scholastes Loew, 1873: 38. Type species (generally accepted as original designation, but see note below) *Platystoma cincta* Guérin-Méneville.

Chaetostichia Enderlein, 1924: 133–134. New synonym. Type species (original designation) *C. aduncivena* Enderlein.

Chaestotichia.–Enderlein, 1924: 133. Variant spelling of above, here interpreted as an incorrect original spelling.

Description. See Hendel (1914a). I add the following.

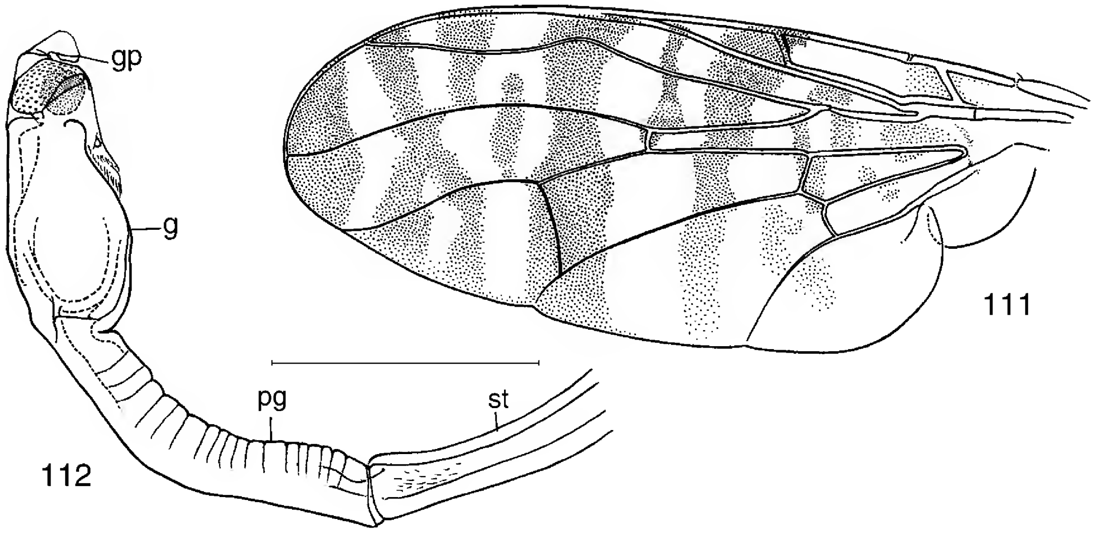
Wing. Stem vein without dorsal setulae before level of humeral crossvein.

Male postabdomen. Epandrium with thick lobe on each side, which overlaps base of outer surstylus; aedeagus with long stipe; preglans undifferentiated; glans rather small, with complex apical structure and no terminal filaments.

Female abdomen. Tergite 3 very large; tergite 4 vestigial; tergites 5 and 6 vestigial or absent; aculeus slender, not compressed.

Distribution. Australasian Region: Micronesia; Moluccas; New Guinea; Bismarck Archipelago; New Caledonia; Fiji; Tropical Polynesia; probably not established in Australia. Oriental Region. Afrotropical Region: Seychelles only.

Notes. I follow universal usage in accepting *Platystoma cincta* Guérin-Méneville as the type species, though this is at least questionable under the ICZN. Although Loew (1873)



Figures 111–112. 111, *Scholastes taylori* Malloch, wing. 112, *Scholastes cinctus* (Guérin-Méneville), distal part of aedeagus (scale = 0.5 mm). Abbreviations: g, glans; gp, terminal process of glans; pg, preglans; st, stipe.

stated that this was his type species, he simultaneously indicated that *Scholastes* was introduced as a replacement name because *Pachycephala* Doleschall was preoccupied. Such dual implications are to be resolved by Article 66.8 of ICZN (1999), especially as *P. cincta* was not among the species originally included in *Pachycephala* Doleschall. If *Pachycephala mohnikei* Doleschall is the type species of *Scholastes* (through designation by Enderlein, 1924 as type species of *Pachycephala* Doleschall, for which both *Scholastes* and *Oncoscelia* Enderlein are replacement names, see above under *Euprosopia*), then *Scholastes* becomes a junior subjective synonym of *Euprosopia* Macquart. The disused name *Chaetostichia* Enderlein would then become the valid name for the genus which includes *P. cincta* and allied species. As *Scholastes* auctorum is the type of a currently used subfamily name, this substitution is undesirable.

Scholastes, Paryphodes, and *Lenophila* are the only Australasian platystomatid genera with a sternopleural bristle (sometimes undeveloped in *Lenophila*). *Scholastes* is distinguished from the other two by having an irregular transverse ridge on the postfrons a little above the ptilinal suture, and by having vein 2 strongly undulated opposite the termination of vein 1. For other distinguishing characters see under *Paryphodes* and the key to genera.

Evenhuis (1989) lists 11 Australasian species of *Scholastes*. A further four possibly valid, mainly Oriental species have been listed (Steyskal, 1977 and 1980). I am not aware of any undescribed species in collections. I have examined type material of *Chaetostichia aduncivena* Enderlein in MNB, labelled "?Java". It is typical of *Scholastes* (n.comb.), but I have not determined its specific status. Keys to species have been given by Hendel (1914b), Curran (1936), and Malloch (1939a).

The larvae of *Scholastes lonchifer* Hendel (often incorrectly given as *lonchifera* or *lonchiferus*) and *S. bimaculatus* Hendel are recorded as infesting coconuts (*Cocos nucifera*; Auberton & Cheesman, 1929; McAlpine, 1973a).

Genus *Trigonosoma* Gray

Fig. 113

Trigonosoma Gray, in Griffith & Pidgeon, 1832: 774. Type species (monotypy) *T. perilampiformis* Gray (correctly *perilampiforme*).

Tropidogastrella Hendel, 1914a: 18, 134–136. Type species (original designation) *T. tropida* Hendel.

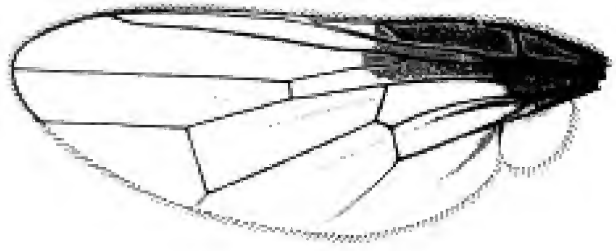


Figure 113. *Trigonosoma cristiventre* (Gerstaecker), wing. After Hendel (1914a).

Description. See Hendel (1914a).

Distribution. Australasian Region: Moluccas—Ambon. Oriental Region: widely distributed. Steyskal (1977) gives also Ceram (or Seram), but he is mistaken in including Ceram in the unrestricted type locality of *T. cristiventre* (Gerstaecker). Gerstaecker (1860) gives "Amboina" (= Ambon) only.

Notes. *Trigonosoma cristiventre* (Gerstaecker) from the Moluccas is the only recorded Australasian species. The records of this species from the Philippines by Frey (1930) need careful checking. Steyskal (1971) gave a key to species.

Genus *Zygaenula* Doleschall

Fig. 114

Zygaenula Doleschall, 1859: 117. Type species (monotypy) *Z. paradoxa* Doleschall.

Gorgopis Gerstaecker, 1860: 180–184. Type species (original designation) *G. bucephala* Gerstaecker.

Gorgopsis Schiner, 1868: 229. Unjustified emendation for *Gorgopis* Gerstaecker.

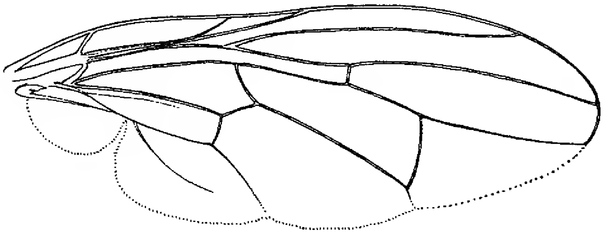


Figure 114. *Zygaenula paradoxa* Doleschall, wing. After Hendel (1914a).

Description. The redescription by Hendel (1914a: 138–139) is generally apt, even though he included species now referred to *Mesoctenia*. I have no material on hand for a revised description.

Distribution. Australasian Region: Moluccas (Ambon). Oriental Region: Philippines. The ranges of *Zygaenula* and *Mesoctenia* appear to be separated by Lydekker's Line.

Notes. *Zygaenula* closely resembles *Mesoctenia*, but the mid femur of the former is neither much thickened nor ventrally spinose. Only the type species, *Z. paradoxa* Doleschall (= *Gorgopis bucephala* Gerstaecker) is recognized.

Genus *Mesoctenia* Enderlein

Figs. 9, 115, 116

Mesoctenia Enderlein, 1924: 130–131. Type species (original designation) *M. ralumensis* Enderlein (= *Zygaenula coalescens* Hendel).

Description. See McAlpine (1973a).

Distribution. New Guinea: widely distributed on mainland; Aru. Bismarck Archipelago: New Britain; Manus. Australia: Queensland.

Notes. I have seen at least six species of *Mesoctenia*, and provided a provisional key to five of these (McAlpine, 1973a).

Hendel (1914a, 1914b) included *Mesoctenia* spp. in the genus *Zygaenula*, but Enderlein established the separate genus *Mesoctenia* for species with thickened, ventrally spinose mid femur. Malloch (1939a) accepted Enderlein's genus. Without material of the type species of *Zygaenula* for study, I am uncertain if this generic separation of *Mesoctenia* on a single character is justified. The wing illustration of *Zygaenula paradoxa* by Hendel (1914a, here copied as Fig. 114) suggests some venational differences from available *Mesoctenia* spp., but I am unable to confirm these at present.

G.A. Holloway and the author collected more than 20 specimens of *Mesoctenia australis* McAlpine on a young palm (Arecaceae) at Thornton Range, Queensland, in 1967. As a majority of these were soft, newly eclosed specimens, it is likely that the immature stages were also associated with the palm.

Genus *Naupoda* Osten Sacken

Figs. 117–120

Naupoda Osten Sacken, 1881b: 135. Type species (monotypy) *N. platessa* Osten Sacken.

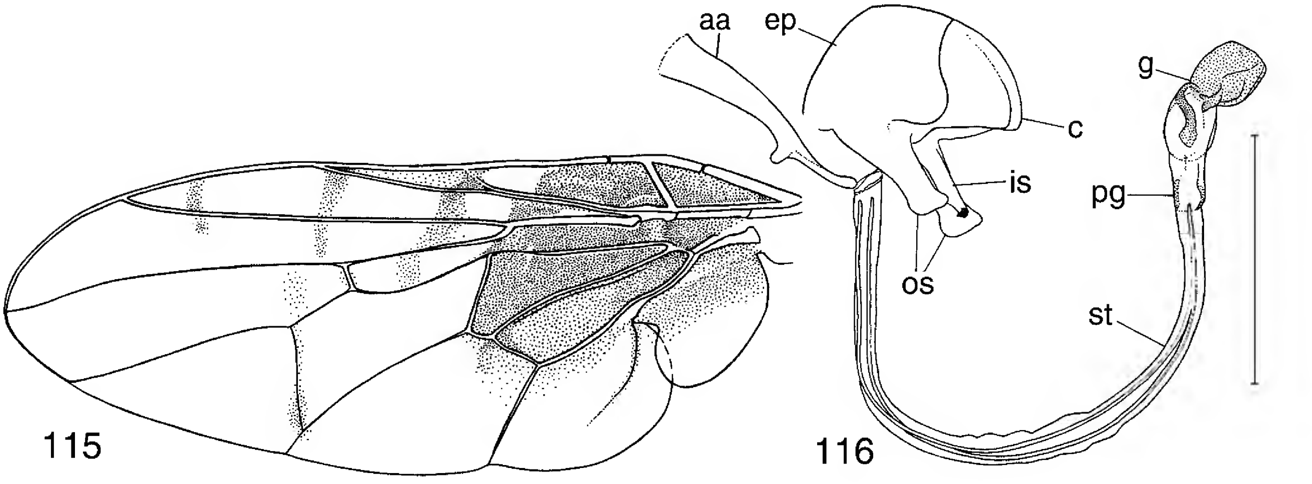
Description. See Hendel (1914a) for a detailed description, to which I add the following.

Male abdomen. Tergites 4 and 5 well sclerotised, but shorter than tergite 3; epandrium without distinct lateral lobe; outer surstylus with pair of moderately small terminal prensisetae; aedeagus with moderately long stipe; preglans forming separate sclerite; glans well developed, with complex, variable sclerotisation; terminal filaments absent; cercus with moderately long, rather few to numerous, irregularly placed setulae.

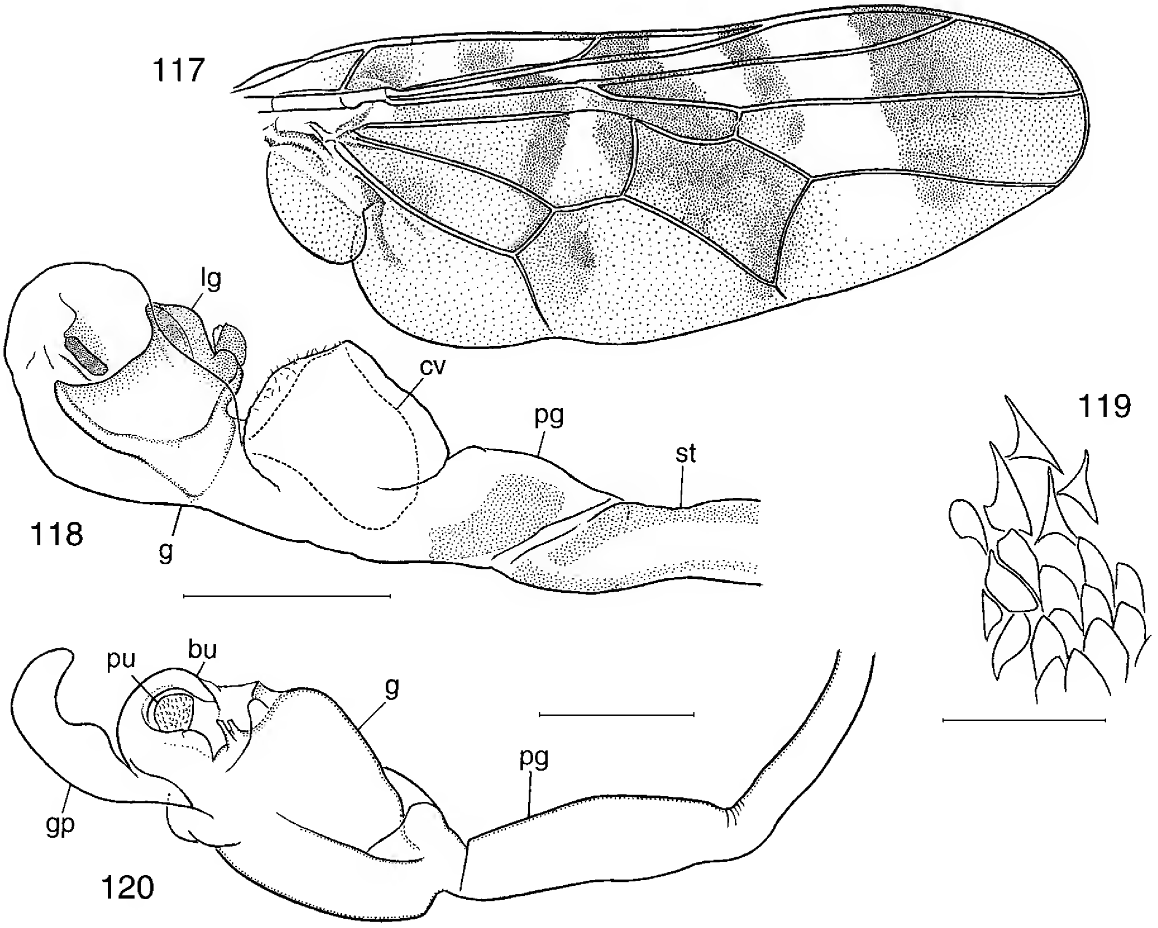
Female abdomen. Tergite 3 large; tergites 4 and 5 completely desclerotised (probably so in all true *Naupoda* spp.); ovipositor sheath depressed, keeled on each lateral margin; aculeus slender.

Distribution. Australasian Region: New Guinea; Solomon Archipelago—Choiseul, Malaita; Australia—east coast as far south as Richmond River district, Lord Howe Island. Oriental Region: widely distributed. Afrotropical Region: widely distributed in African tropics; Madagascar.

Notes. The Fijian species *Naupoda simmondsi* Bezzi was misplaced in this genus and is here transferred to the new genus *Phlyax*, q.v. The Oriental species *N. strigifera* de Meijere, *N. ypsilon* van der Wulp, and *N. ypsilonoides* de Meijere are apparently misplaced in *Naupoda*, from examination of type material (AMST), and their generic placement needs further study.



Figures 115–116. *Mesoctenia australis* McAlpine. 115, wing. 116, male external genitalia, setulae omitted from epandrium and cerci (scale f= 0.5 mm). Abbreviations: aa, aedeagal apodeme; c, cercus; ep, epandrium; g, glans; is, inner surstylus; os, outer surstylus; pg, preglans; st, stipe.



Figures 117–120. *Naupoda nudiseta* (Bezzi). 117, wing. 118, distal part of aedeagus (scale = 0.2 mm). 119, scales from lining of cavity of glans, acuminate ones nearest rim (scale = 0.025 mm). 120, *Naupoda platessa* Osten Sacken (?) (Luzon, BPB), distal part of aedeagus (scale = 0.1 mm). Abbreviations: bu, bulb; cv, cavity of glans; g, glans; gp, terminal process of glans; lg, sclerotised lobe of glans; pg, preglans; pu, pustulose sclerite; st, stipe.

The most typical species of *Naupoda* available to me are the Oriental *N. platessa* Osten Sacken, *N. imitans* de Meijere, and an undetermined species from West Malaysia. I place these in the subgenus *Naupoda* s.str. The known Australasian species all differ from *Naupoda* s.str. in several significant characters as shown in Table 3, and are here placed in the new subgenus *Gonga*. The subgeneric placement of the Afrotropical species (see Steyskal, 1980) and the few remaining Oriental species (see Steyskal, 1977) remains to be worked out. I have examined the aedeagus in *N. (Naupoda) platessa* Osten Sacken (or near, Luzon), *N. (Gonga) nudiseta* (Bezzi), and *N. (Gonga) regina* Hendel (Queensland population), and have found great structural differences between all three. *Naupoda (G.) nudiseta* differs from the other two in that the basal part of the glans contains a capacious, distally open cup-like cavity lined with several hundred densely packed scales (Figs. 118, 119), which is absent in the other two (compare Fig. 120).

Adults of *Naupoda regina* Hendel have been observed several times on foliage of rainforest trees in Australia. Bezzi (1928) quoted label data for *N. nudiseta* (Bezzi) from Lord Howe Island as said to do damage to peaches and bananas. The report may be due to confusion with *Dacus* (or *Bactrocera*) spp. (Tephritidae) which abound on the island (author's observations).

Subgenus *Gonga* n.subgen.

Type species: *Pterogenia nudiseta* Bezzi.

Description. See Table 3 for characters distinguishing *Gonga* from *Naupoda* s.str. In addition, species of *Gonga* have the anterodorsal gibbosity of the mesopleuron less pronounced than in *Naupoda (Naupoda) platessa*, the anal crossvein more markedly oblique so that the posterodistal angle of the anal cell is much more obtuse than the anterodistal angle, the basal section of vein 5 not setulose (condition variable in *Naupoda* s.str.), the conjoined cerci

Table 3. Subgeneric characters in genus *Naupoda*.

Subgenus *Naupoda*	**Subgenus *Gonga***
• Fronto-orbital bristle absent	• Fronto-orbital bristle present
• Epistomal margin of face narrowly reflexed to form a marginal ridge, which diverges from margin on each side	• Epistomal margin of face simple
• Peristomial series of setulae undifferentiated	• A differentiated series of fine anterior peristomial setulae present
• Subcosta with very slight apical curvature	• Subcosta with strong apical curvature
• Discal crossvein bent abruptly just before anterior end	• Discal crossvein curved, but without abrupt bend
• Basal section of vein 4 with weak, flexible point near distal third, sclerotised beyond this point	• Basal section of vein 4 weakened along much of distal quarter

of the male mounted on distal end of the non-sclerotised proctiger (instead of occupying the whole of the sides of the proctiger as in *N. platessa*). The squama is much larger than the axillary lobe, as in *Naupoda* s.str., but in contrast to some species referred, perhaps incorrectly, to the genus *Naupoda*.

Notes. This subgenus includes the following species: *Naupoda (Gonga) nudiseta* (Bezzi) (syn. *N. insularis* Paramonov) from Lord Howe Island; *N. (Gonga) regina* Hendel from New Guinea and eastern Australia, and *N. (Gonga) ventralis* Curran from the Solomon Archipelago. These are all the Australasian species of the genus *Naupoda* known to me.

The subgeneric name is a contraction of the Greek *gongylos*, a sphere, and is feminine because of the termination.

Genus *Asyntona* Osten Sacken

Figs. 3, 121

Asyntona Osten Sacken, 1881b: 135. Type species (monotypy) *A. doleschalli* Osten Sacken.

Description. See Hendel (1914a).

Distribution. Moluccas: Ambon; Kai Islands. New Guinea: mainland; Aru; Trobriand Islands. Solomon Archipelago: Bougainville; Tulagi (Florida Group); Guadalcanal. Queensland: Coen district northwards.

Malloch (1939a) recorded *Asyntona tetyroides* (Walker) from Philippine Islands, probably because Osten Sacken (1882) redescribed the supposed synonym, *A. doleschalli*, in a work on Philippine Diptera, which Malloch cited. However, Osten Sacken clearly gave the locality as "Amboina" (i.e. Ambon, Moluccas) for this species. I know of no other records of *Asyntona* from the Oriental Region, and I think the genus is endemic to the Australasian Region.

Notes. Hendel (1914b) and most subsequent authors have generally accepted only two species of *Asyntona*, viz. *A. flavipes* Hendel, with yellow head, and *A. tetyroides* (Walker) with predominantly blackish head, the names *A. doleschalli* Osten Sacken and *A. paradoxa* de Meijere being treated as synonyms of *A. tetyroides*. This interpretation is almost certainly not wholly correct. I have examined at least three dark-headed species (all in AM), but females and, perhaps, some diminutive males may be hard to place. The figures of Hendel (1914a: figs. 247–249, locality not given) may represent a fourth such species. Males (but perhaps not diminutives) of these species differ in armature of antennal segment 2 and of the hind trochanters. Further

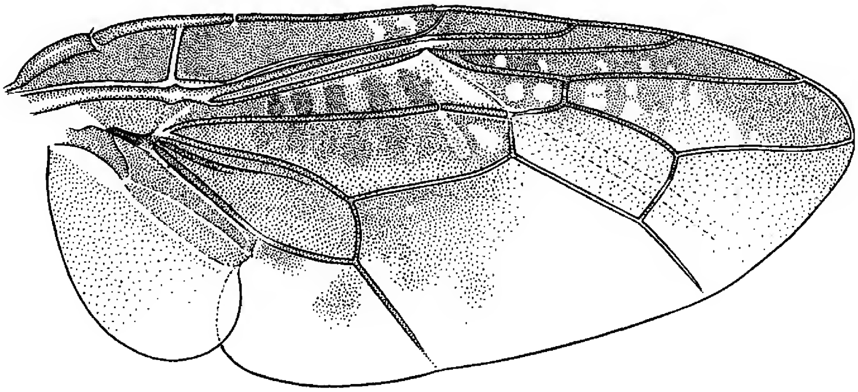


Figure 121. *Asyntona* "sp. A" (Wewak, Papua New Guinea, AM), wing.

study of type material and comparative morphology is needed to enable specific identifications.

Asyntona resembles *Naupoda* but has a larger alula, more complex folding of the wing (Malloch, 1939a), and tergites 4 and 5 of the female abdomen well sclerotised. The fringe of numerous marginal scutellar bristles is distinctive.

A specimen of *Asyntona* sp. from Trobriand Islands (J.W.I., AM) is labelled "behind beach, forest". Specimens of two distinct *Asyntona* spp. from Papua New Guinea (AM) have labels indicating that they were associated with *Pandanus* plants (Pandanaceae). Malloch (1940) recorded a specimen of *A. flaviceps* Hendel from Guadalcanal associated with *Pandanus*.

Subfamily Trapherinae

Description. Fronto-orbital bristles well developed; lower end of facial ridge often broadened and with field of irregularly placed setulae; face usually with transverse convexity below, or with transverse ridge or gibbosity near middle; cheek often with linear stripe of outstanding pubescence along lower margin of eye. Arista usually long-bipectinate (with only short hairs in *Eopiara*). Palpus usually broad and rather short. Wing: subcosta usually nearly straight and gradually approaching costa distally or with very short, often desclerotised transverse distal section; second basal cell often much broader than first basal cell, which often has a pronounced bend near junction of basal crossvein with vein 4; vein 7 usually represented beyond alular incision by a long, sharp crease, often accompanied by pigment; squama forming a small lobe, or vestigial and without lobe. Male postabdomen (studied in only a few genera): aedeagus without glans and terminal filaments, sometimes very short for the family (e.g., *Xiriella* sp.), or long, strap-like, and rolled up when not in use (e.g., *Xiria* spp.); cerci usually short, joined to membrane for most of their length, usually numerously and quite irregularly setulose (except in *Phlyax*). Female abdomen: tergites 4 and 5 unreduced; tergite 6 usually broad and, though always short, often permanently exposed, sometimes vestigial; ovipositor sheath usually rather short; aculeus often broad and blade-like.

Notes. Very little has been published on the taxonomy and morphology of this subfamily, apart from simple characterisations of included taxa. Some brief attempts to define and justify the group have been made by Hendel (1914a), Steyskal (1965, 1990), and McAlpine (1973a). The above characterisation is intended to aid decisions as to included taxa, though it has an admittedly weak basis. Some genera are still known from very few specimens, e.g., *Aglaioptera* and *Eopiara*, which are only represented in HELS collection, so far as I am aware.

Previously described genera of Trapherinae include: *Lule* Speiser, *Microlule* Steyskal, *Piara* Loew, *Seguyopiara* Steyskal, *Traphera* Loew, in the Afrotropical Region; *Aglaioptera* Frey, *Eopiara* Frey new stat. (originally as subgenus of *Piara*), *Phasiamya* Walker (*Phasiamyia*, subsequent misspelling by Hendel, 1914a; syn. *Pachymyza* Frey), *Poecilotraphera* Hendel, *Xiria* Walker, *Xiriella* Frey new stat. (originally as subgenus of *Xiria*) in the Oriental Region.

Oriental records of the genera *Lule* and *Piara* (see Steyskal, 1977) are due to misplacement of species of *Phasiamya, Xiriella*, and *Eopiara*. In this connection, *Xiriella lunaris* (de Meijere, 1916) and *Eopiara chrysoptera* (Frey, 1964) are new combinations. *Lule speiseri* de Meijere, 1914 is a new synonym of *Phasiamya metallica* Walker, 1849, from my examination of types of these Oriental species. Also, *Eopiara elegans* (Frey, 1964) is a new combination (from *Lamprogaster*).

The new genus *Phlyax*, evidently endemic to Fiji, is the first known trapherine in the Australasian Region. The species recorded from New Guinea as *Xiria papuana* Hennig and *Xiria strigata* Hennig belong in the platystomatine genus *Bama*, q.v.

Genus *Phlyax* n.gen.

Fig. 122

Type species: *Naupoda simmondsi* Bezzi.

Description (♂, ♀). Small very rotund dark metallic flies, with short moderately slender legs; habitus reminiscent of *Naupoda*.

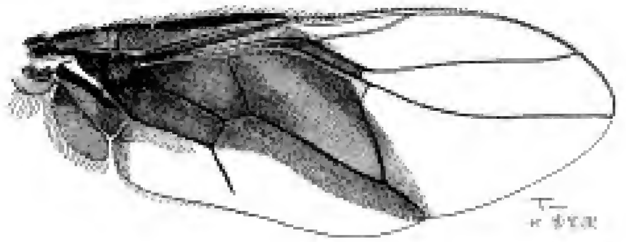


Figure 122. *Phlyax simmondsi* (Bezzi), wing. Modified from A.J.E. Terzi, in Bezzi (1928).

Head somewhat anteroposteriorly compressed; median zone of postfrons bare on entire width, with a series of incurved setulae on each side of bare zone; face largely smooth, transversely concave near middle, with lower margin prominently projecting, and median carina reduced to a short tubercle between antennae; facial ridge slightly expanded below, where fine setulae form a narrow field instead of a single series; peristomial setulae relatively long, forming a single series and becoming shorter where they approach bottom of facial ridge; parafacial narrow, finely setulose at upper extremity; occiput convex on each side below, very broadly concave above; the following bristles present: inner and outer vertical, very small postvertical, small ocellar, two well-developed reclinate fronto-orbitals, weakly differentiated postgenal; lateral occipital bristle absent. Antenna (excluding arista) much shorter than face; segment 3 elongate-oval; segment 6 long-bipectinate on most of length. Palpus broad, of moderate length.

Thorax very broad, dorsally convex; mesoscutum 0.71–0.75 times as long as wide; scutellum very broad, without setulae, densely pubescent on free margins; posterior margin thin, but not sharp; the following bristles present: humeral, 1+1 notopleurals, supra-alar, postalar, posterior intra-alar, prescutellar acrostichal, mesopleural, three pairs of scutellars of which those of apical pair are longer and separated from each other by nearly half width of scutellum; scapular, dorsocentral, and sternopleural bristles absent. Fore femur with a series of posteroventral bristles; femora otherwise without differentiated bristles or spines; mid tibia with long apical ventral spur and shorter anteroventral spur; tibiae otherwise unarmed. Wing with oblique crease enabling flexure of apical part as in *Naupoda* and *Asyntona*, but crease not entering discal cell; section of costa on second costal cell horizontally dilated, with microtrichia on dorsal surface in transverse rows, appearing like fine transverse striations; subcosta almost straight distally; vein 1 terminating close to subcosta; anterior crossvein short, meeting vein 4 near distal end of discal cell; discal crossvein strongly bent near anterior extremity; second basal cell much broader than anal cell; vein 5 without setulae; anal crossvein only slightly curved; distal section of vein 6 shorter than preceding section, not reaching margin; squama much reduced, without any lobe.

Abdomen broad, dorsally convex; tergites 4 and 5 unreduced in both sexes. Male postabdomen: epandrium with rounded posterolateral lobe on each side; outer surstylus slender, with minor setulae only; inner surstylus short and stout with two massive prensisetae; aedeagus shorter than epandrial complex, broad, largely membranous, with little apical sclerotisation and no glans or terminal filaments; cerci elongate, joined by membrane for entire length, each with only c. six setulae in a spaced longitudinal series. Female postabdomen: tergite 6 broad but very short, usually partly concealed in dried specimens; ovipositor sheath short and rather broad; aculeus with somewhat dilated basal section and parallel-sided, obtuse apical section.

Distribution. Fiji: Viti Levu Island (numerous localities, BPB, BM).

Notes. *Phlyax simmondsi* (Bezzi, 1928) n.comb., the only known species of *Phlyax*, was described in the genus *Naupoda*.

Phlyax differs from *Naupoda* in having: longer seriate peristomial setulae (these short or undifferentiated in *Naupoda*); arista long-bipectinate (instead of quite short-haired); scutellum without setulae (instead of extensively setulose dorsally); mid tibia with two unequal apical ventral spurs (instead of only one spur); section of costa on second costal cell broadly compressed (instead of slender, cylindrical); vein 1 closely approximated to end of subcosta (instead of diverging from subcosta distally); vein 3 bare (instead of dorsally setulose); anterior crossvein meeting vein 4 near distal end of discal cell (instead of, typically, near mid-length of discal cell); basal section of vein 4 without weak, flexible point (basal section of vein 4 with obvious flexible point or region beyond mid-length); oblique crease of wing membrane not entering discal cell (instead of intersecting discal cell); shorter, differently shaped second basal cell (compare Figs. 122 and 117), squamal lobe absent (instead of quite large), aedeagus short, without glans (instead of relatively long with well-developed glans), each cercus in male with setulae restricted to a single, spaced series (instead of having many irregularly placed setulae); abdomen of female with tergites 4 and 5 well developed (instead of quite desclerotised).

Naupoda ypsilon Wulp, 1899 from Java resembles *Phlyax* in the proximity of the anterior and discal crossveins, but the venation does not otherwise resemble that of *Phlyax*. It and certain related species are misplaced in *Naupoda*, as noted under that genus.

Similarity between *Phlyax* and *Naupoda* may be due to convergence in features related to mimicry of Coleoptera, perhaps particularly of alticine (galerucine) chrysomelids. The partly folded distal section of the fly's wing suggests the exposed tip of an imperfectly folded beetle's wing.

Naupoda is typical of the subfamily Scholastinae, but certain features of *Phlyax* seem to indicate a relationship to the Trapherinae rather than the Scholastinae, notably the reduced squama, as in the trapherine genera *Aglaioptera* Frey and *Poecilotraphera* Hendel, unreduced tergites of the female abdomen, and the very short aedeagus lacking the glans, which is rather like that of the one examined species of *Xiriella*. The only platystomatids known to lack the glans belong in the Trapherinae, but it is not yet known if this is the case in all included genera.

The venation of *Phlyax* is somewhat similar to that of the Afrotropical trapherine genus *Lule* Speiser, from which *Microlule* Steyskal is doubtfully generically distinct, in my opinion. *Phlyax* differs from *Lule* in the termination of vein 1 close to the subcosta, the absence of vein 7, even as a slightly pigmented crease, and the strong divergence of veins 3 and 4 distad of the discal crossvein. *Phlyax* has some resemblance to the Oriental genera *Phasiamya* Walker and *Xiriella* Frey, but differs from these in the dorsally hairless scutellum, bare vein 5, absence of visible vestige of vein 7 beyond the alula, and absence of the squamal lobe.

The name *Phlyax* (Latinised stem *phlyac-*) is Greek for jester. The gender is masculine.

Genera unplaced to subfamily

Genus *Apiola* McAlpine

Fig. 123

Apiola McAlpine, 1973a: 31. Replacement name for *Xenognathus* Malloch. Type species (automatic) *Xenognathus bryani* Malloch.

Xenognathus Malloch, 1930b: 225–226 (preocc. *Xenognathus* Gilbert, 1915). Type species (original designation) *X. bryani* Malloch.

Description. See Malloch (1930b). I have added (McAlpine, 1973a) that tergite 6 of the female abdomen, though much shorter than tergite 5, is well developed and not capable of being concealed below the latter, thus resembling *Angitula* (subgenus *Giraffomyia*) and *Xiria*.

Distribution. Tropical Polynesia: Western Samoa.

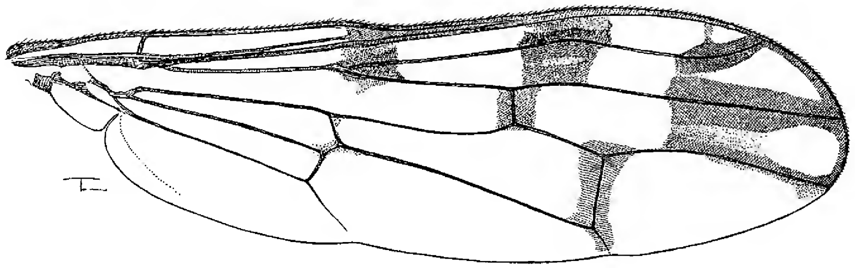


Figure 123. *Apiola bryani* (Malloch), wing. After A.J.E. Terzi, in Malloch (1930b).

Notes. Malloch (1930b) described two sympatric species, but expressed doubt as to their specific status. Lack of material has prevented further investigation of this question.

The male postabdominal structures of *Apiola* are undescribed, and, as there is no obvious close relationship to any other genus, its systematic position is hard to determine. The antennal features, including the form of segment 2, and the details of the ovipositor sheath and aculeus are reminiscent of some *Atopognathus* species, but, in the latter, tergite 6 is quite vestigial. With our present imperfect knowledge of the morphology of many platystomatid genera, I can only conjecture that its relationships may lie with such genera as *Atopognathus* and *Guamomyia*, which are difficult to place in the broader system.

Apiola is easily identified by the slender, ichneumonid-like habitus and obvious wing features (Fig. 123), in combination with the long-bipectinate arista, presence of ventral spinescent bristles on all femora, and absence of postgenal, mesopleural, and dorsocentral bristles.

The altitudes given by Malloch (2000–4000 feet = c. 600–1200 m) indicate a mountain habitat.

Genus *Atopognathus* Bigot

Fig. 4, 124

Atopognathus Bigot, 1881a: 47–48; 1881b: 24. Type species (monotypy) *A. platypalpus* Bigot.

Dasiortalis de Meijere, 1913: 378 (ex Hendel MS). Synonymised Hennig, 1940a. Type species (monotypy) *Ortalis contigua* Walker [= *Atopognathus complens* (Walker)].

Dasyortalis.–Hendel, 1914a: 129–131. Incorrect subsequent spelling of above.

Lasioxiria Hendel, 1914a: 12, 37–38. Type species (original designation) *L. hirsuta* Hendel. N.syn.

Lasiopsila Curran, 1936: 54. Type species (original designation) *L. fasciata* Curran [= *A. complens* (Walker)].

Description. Hendel (1914a) keyed the genus (as *Dasyortalis*) and gave a detailed description. Although this description did not take into consideration the characters of the species he included in *Lasioxiria*, it indicates much of the variation present in the genus, and is generally adequate. I add the following data to Hendel's description:

Antenna. Segment 6 well haired for most of length, either bipectinate or with irregularly placed hairs.

Thorax. Dorsocentral bristles one to about four pairs. Axillary lobe with fringe of long hairs, each >4 times as long as pubescence on vestigial squama, and not restricted to lower (squamal) region of lobe.

Abdomen. Male postabdomen: aedeagus with complex, sclerotised glans, without terminal filaments. Female postabdomen: tergite 5 large; tergite 6 much reduced, usually concealed; aculeus broad and blade-like, often acute, but sometimes obtuse or truncate.

Distribution. Moluccas: Ternate; Ambon. New Guinea: mainland—widely distributed; Aru; Normanby Island. Bismarck Archipelago: New Britain; Makada Island (Duke of York Group); New Ireland. Solomon Archipelago: Bougainville; Guadalcanal; Matema Island (Santa Cruz Group). Australia: Queensland.

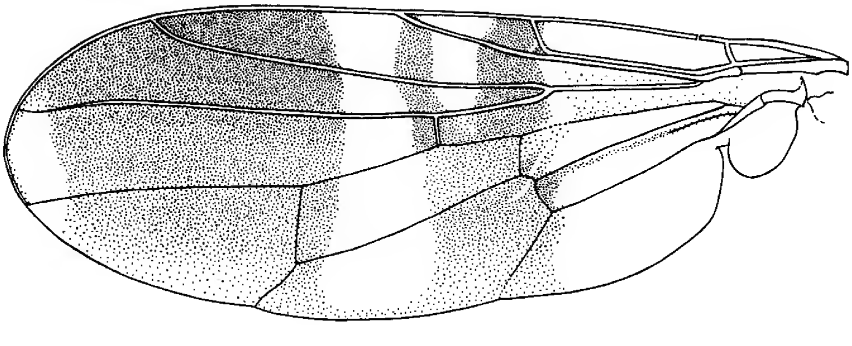


Figure 124. *Atopognathus* "sp. C" (Queensland, AM), wing.

Notes. Hennig (1940a) examined type material of *Atopognathus platypalpus* Bigot, and, as a result, synonymised "*Dasyortalis*" under *Atopognathus*, noting that Bigot's species seemed to be distinct from any treated by Hendel (1914b). Malloch (1939a) suggested the possibility of synonymy between *Lasioxiria* and "*Dasyortalis*", but in his key used the presence of a pair of "rounded or oval elevations" below the antennal foveae in *Lasioxiria* to distinguish it from "*Dasyortalis*". I find these elevations to be differentiated to a variable extent among the species of *Atopognathus*, but the variation does not provide a basis for sharp group distinctions. The type species of *Lasioxiria* is more elongate in habitus, wing, and cell proportions than *A. complens* (Walker) and closely related species, but again this variation does not clearly define major groupings.

One undescribed species ("sp. M" in AM, female only known) lacks setulae on vein 5 and has a series of long black bristles on the anterodorsal margin of antennal segment 3, but this species is linked through a related species, which is normal for *Atopognathus* in these features, to the rest of the genus. Several species with relatively narrow postfrons also have the fronto-orbital plates narrow. Bigot (1881b) described the male of *A. platypalpus* as "with the cheeks anteriorly, below the eyes, on each side uniappendiculate, with the appendages compressed, moderately erect, obovate ..." (my translation). The only male of the type series (OX) with head still present shows no such appendages, nor have I seen such structures in other *Atopognathus* species. Males of several species have broadened heads (Fig. 4).

A relatively large *Atopognathus* species (sp. J in AM), which lives in highlands of PNG, is very similar to *Lenophila* spp. in appearance, with its dark, shining body, glossy black scutellum, and characteristic wing stripes. The similarity is perhaps due to convergent mimicry of jumping spiders. It is distinguishable from *Lenophila* by its distinctly haired (ommatrichose) eyes, vestigial squama, sinuate vein 2, setulose vein 5, and, in the female, its unreduced tergite 5 and blade-like aculeus.

Atopognathus includes at least 20 species, many of them undescribed. *Atopognathus hirsutus* is a new combination for *Lasioxiria hirsuta* Hendel.

Hendel (1914a, 1914b) associated *Ortalis tarsalis* Walker, 1861c, from Batjan (Bacan, Moluccas), and *O. leucomera* Walker, 1864, from Misool (New Guinea), with "*Dasyortalis*", without seeing material. *Ortalis tarsalis* belongs in *Chaetorivellia* (q.v.), but generic placement of *O. leucomera* remains doubtful, as type material has not been seen.

J. Ismay has reared *A. complens* (Walker) from larvae living in a ginger stem damaged by a lepidopterous larva in Papua New Guinea (label data in AM). Adults of an undescribed *Atopognathus* sp. are commonly found on the large leaves of *Alocasia brisbanensis* (family Araceae) in or at the margins of rainforest on the Atherton Tableland, Queensland (author's observations).

Genus *Guamomyia* Malloch

Figs. 125–127

Guamomyia Malloch, 1942: 206. Type species (original designation) *G. fascipennis* Malloch.

Description. The following data amplify the description by Malloch.

Head. Postfrons coarsely but not densely setulose; inner vertical bristle smaller than and situated in advance of outer vertical; lower end of parafacial with patch of non-seriate setulae; cheek with a series of longer peristomial setulae, one of which corresponds in position to a vibrissa.

Thorax. Scutellar bristles two or three pairs. Wing: subcosta with distal section bent away from vein 1 at an obtuse angle, meeting costa at a very acute angle; anal crossvein strongly and rather evenly curved to almost straight.

Male postabdomen. Aedeagus with compact sclerotised glans, without terminal filaments.

Female postabdomen. Tergite 5 unreduced and exposed; tergite 6 apparently absent, though sternite 6 present; aculeus slender, not depressed, obtuse.

Distribution. Micronesia: Guam. Papua New Guinea: mainland. Bismarck Archipelago: Mussau; Lavongai (or New Hanover). Australia: Lord Howe Island. The genus is apparently absent from the Australian mainland, and the known distribution is discontinuous.

Notes. I have seen c. four species of *Guamomyia* but only one is yet described. The genus was previously mentioned and keyed as "genus A" (McAlpine, 1973a).

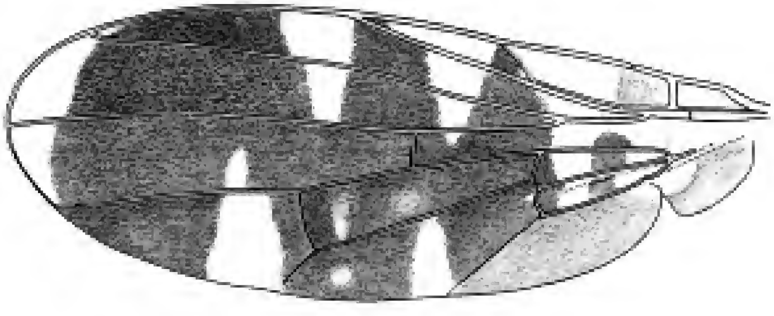
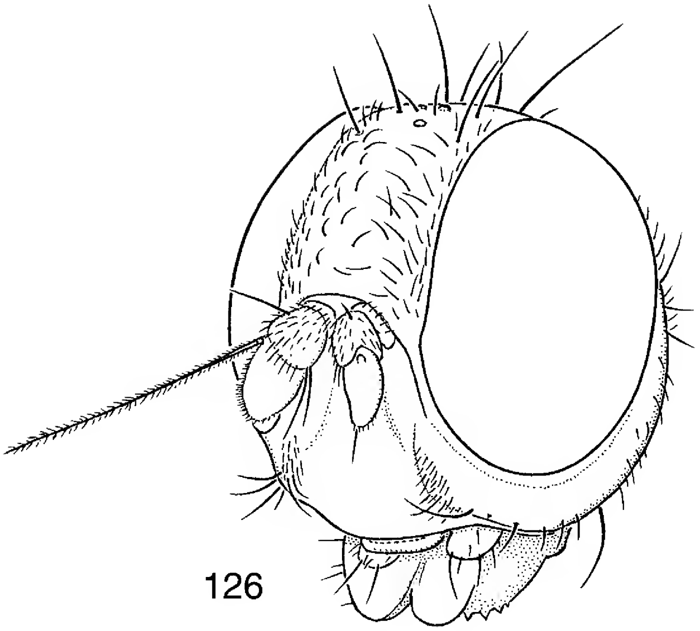
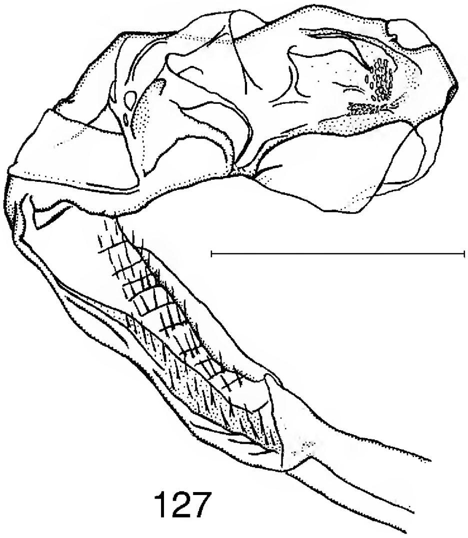


Figure 125. *Guamomyia* "sp. A" (Lord Howe Island, AM), wing.





Figures 126–127. *Guamomyia* "sp. A". 126, head. 127, distal part of aedeagus (scale = 0.1 mm).

The late Z.R. Liepa reported in litt. (29.xii.1972) on her observations on the Lord Howe Island species: "They were all taken on *Pandanus* roots, and most were on the juicier, not yet earthed roots, and resembled the black spots on the roots so much that, unless they moved, you couldn't see them."

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Revision of *Paralamyctes* (Chilopoda: Lithobiomorpha: Henicopidae), with Six New Species from Eastern Australia

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ABSTRACT. *Paralamyctes* Pocock, 1901 has a classic Gondwanan distribution, with species previously known from New Zealand, southern Africa, Madagascar and Chile. The genus as hitherto conceived is paraphyletic, with *Triporobius* Silvestri, 1917 (India) and *Haasiella* Pocock, 1901 (New Zealand, Tasmania) nesting within the group. Species from Argentina and New Caledonia originally assigned to *Paralamyctes* belong to *Analamyctes* Chamberlin, 1955. Revision of *Paralamyctes* based upon monophyletic subgroups recognizes four subgenera: *P. (Paralamyctes), P. (Haasiella), P. (Nothofagobius)* n.subgen. and *P. (Thingathinga)* n.subgen. The eastern Australian occurrence of *Paralamyctes* is demonstrated by six new species. *Paralamyctes (Thingathinga) grayi* n.sp. is distributed from the Blue Mountains to the Budawang Range, New South Wales; *P. (Thingathinga)* from the Barrington Tops may be specifically distinct. *Paralamyctes (T.) grayi* and the allied *P. (T.) hornerae* n.sp. from northern New South Wales have affinities to the New Zealand *P. (T.) validus*. *Paralamyctes (Nothofagobius) cassisi* n.sp. occurs in northern New South Wales, while the closely related *P. (N.) mesibovi* n.sp. inhabits northern Tasmania. Australian *P. (Nothofagobius)* is sister to the Patagonian *P. (N.) chilensis* (Gervais), which is illustrated based upon new collections. *Paralamyctes (Paralamyctes) monteithi* n.sp. is widespread in Queensland; *P. (P.) neverneverensis* n.sp. is endemic to the Dorrigo region, northern New South Wales. In addition to these two Australian species, the nominate subgenus occurs in New Zealand, southern Africa, Madagascar and India, the latter record based on the junior subjective synonym *Triporobius*. All new species are included in a key to Australian Lithobiomorpha.

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Most native Australian species of lithobiomorph centipedes belong to the family Henicopidae. Published systematic work on eastern Australian henicopids was undertaken long ago (Newport, 1845; Pocock, 1901; Chamberlin, 1920) based on scant material. Like most of the Australian chilopod fauna except for the Scolopendridae, the few henicopid species formalised in the literature are in need of modern revision, and most of the fauna is undescribed. This study initiates a systematic survey of Australian Henicopidae by documenting the genus *Paralamyctes*.

Pocock (1901) erected *Paralamyctes* for a new species, *P. spenceri*, from Durban, South Africa. Additional species were subsequently assigned from Argentina (*P. andinus* Silvestri, 1903), South Africa (*P. asperulus* and *P. weberi*

Silvestri, 1903; *P. laevigatus* and *P. tabulinus* Attems, 1928), New Zealand [*P. validus* Archey, 1917 and its junior synonym *P. dubius* Archey, 1917 (Archey, 1921, 1937); *P. harrisi* Archey, 1922], New Caledonia (*P. humilis* Ribaut, 1923) and Madagascar (*P. tridens* and *P. quadridens* Lawrence, 1960). The Chilean species *Henicops chilensis* Gervais in Walckenaer & Gervais, 1847, was recognized as *Paralamyctes* by Silvestri (1905), a reassignment followed by subsequent workers. Attems (1928) and Archey (1937) revised previously named taxa from South Africa and New Zealand, respectively, and provided keys to species of the genus. Further work on the southern African fauna by Lawrence (1955a,b) recognized *P. weberi* as a junior synonym of the widespread *P. spenceri*, which occurs in the Cape region, Swaziland-Eastern Lowveld and throughout KwaZulu-Natal, as well as in Madagascar (Lawrence, 1960). Chamberlin (1955) removed five species from *Paralamyctes* (*P. andinus, P. asperulus, P. humilis, P. laevigatus* and *P. tabulinus*), assigning them to a new genus *Analamyctes*.

Though species from most fragments of Gondwana have been recognized as *Paralamyctes*, none have as yet been reported from Australia. Herein, six new species of this genus are described from eastern Australia (see Fig. 1 for distributions). These and other species accepted as members of *Paralamyctes* are accommodated in four subgenera that are diagnosed based on shared derived characters. The systematic revision recognizes *Haasiella* Pocock, 1901, as a clade within *Paralamyctes*, and *Triporobius* Silvestri, 1917, as a synonym of the nominate subgenus *P. (Paralamyctes)*. This revision identifies *Paralamyctes* in India, but rejects its occurrence in northern Argentina and

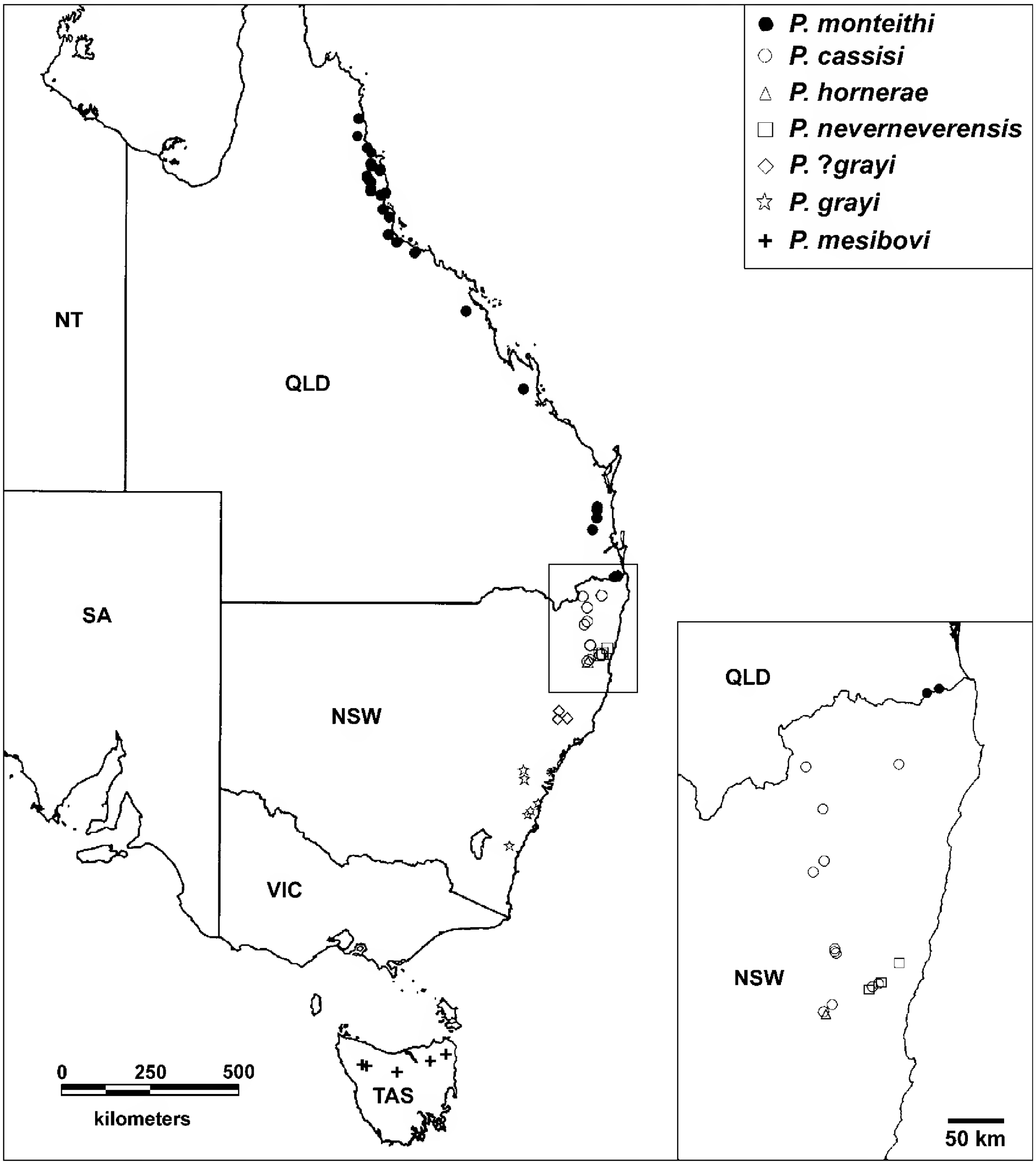

Figure 1. Map of eastern Australia, showing records of *Paralamyctes* species. Detail of northern New South Wales indicates sympatric occurrences of *P. cassisi*/*P. hornerae* and *P. cassisi*/*P. neverneverensis*.

New Caledonia. *Paralamyctes* is unknown from Western Australia. Species of *Dichelobius, Henicops* and *Lamyctes* described by Attems (1911) represent all known henicopid diversity in the southwest (examination of the Western Australian Museum collection by the author, March 2001).

Methods and terminology

Each species in this work is illustrated by electron microscopy, with a particular focus on the largely neglected mouthparts. This method has proven useful in examining and figuring characters for henicopid phylogeny. Details of the mandible in particular emerge as new taxonomic characters for identifying clades within *Paralamyctes*. The electron micrographs in the present paper accompany illustrations of non-Australian species of *Paralamyctes* and other genera of Henicopidae in a cladistic analysis based on morphological and molecular sequence data (Edgecombe *et al.*, 2001). Specimens were air-dried, and photographed on a Leo 435VP using a Robinson backscatter detector.

In all descriptions, length of specimens is measured from the margin of the head shield to the end of the telson; because this measure is affected by telescoping, length of the head shield is cited as a measure of body size (Andersson, 1978). Nomenclature for the segments of the second maxillary telopod and the maxillipede follows Borucki (1996: figs. 41 and 57, respectively). The so-called *Spingriffel* (Rilling, 1968: fig. 17) is called a penis, following Eason (1964). Terminology applied to the anogenital region is that used by Eason (1964: figs. 279, 280). Antennal sensilla are described as by Lewis (1981: figs. 81, 88). In descriptions of the mandible, the "sickle-shaped bristles" (Attems, 1928) that comprise the pectinate lamella are referred to as aciculae, following Chamberlin (1912). The cluster of bristles on the dorsal edge of the mandible is called a furry pad, after Attems (1928) (= pulvillus of Crabill, 1960: 15). Rows of scale- or peg-like structures on the mandibular teeth (*denticules accessoires* of Lawrence, 1960: 93) are called accessory denticles.

The following abbreviations are used for repositories of specimens examined:

AM	Australian Museum, Sydney
ANIC	Australian National Insect Collection, Canberra
BM/BMNH	Department of Entomology, Natural History Museum, London
CAS	California Academy of Sciences, San Francisco
FMHD	Division of Insects, Field Museum of Natural History, Chicago
IAEP	Instituto di Entomologia e Zoologia Agraria, Università degli Studi di Napoli Federico II, Portici
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge
QM	Queensland Museum, Brisbane
QVMAG	Queen Victoria Museum and Art Gallery, Launceston
SAM	South African Museum, Cape Town
TMAG	Tasmanian Museum and Art Gallery, Hobart
ZMUC	Zoological Museum, University of Copenhagen

Abbreviations for collectors are: DKY, D.K. Yeates; GBM, G.B. Monteith; GC, G. Cassis; GDE, G.D. Edgecombe; GT, G. Thompson; MRG, M.R. Gray; ZJ, Z. Johanson.

Systematics

Chilopoda Latreille, 1817
Order Lithobiomorpha Pocock, 1902
Family Henicopidae Pocock, 1901
Subfamily Henicopinae Attems, 1914
Tribe Henicopini Chamberlin, 1912

Paralamyctes Pocock, 1901

Type species. *Paralamyctes spenceri* Pocock, 1901; by original designation.

Diagnosis. Henicopini with relatively large, bell-shaped sternite on first maxilla bordered by unsclerotised inner edge of coxa; suture between coxa and sternite confined to a narrow contact at posterior edge of maxilla; coxa separate in front of sternite, median suture lacking. Median furrow on head shield well impressed, continuous to transverse suture (= *Paralamyctes* + *Haasiella* of previous workers).

Discussion. Attems' (1928) detailed diagnosis of *Paralamyctes* accurately describes most features of new Australian species, and only a few modifications need noting. The number of aciculae ("sickle-shaped bristles") on the mandible was cited by Attems as 10, but ranges up to 15 in *P. grayi* n.sp. A purportedly diagnostic presence of four lobes on the claw (pretarsus) of the second maxilla is in fact atypical for the genus, whilst Archey's (1937) citation of a trifid claw as diagnostic of this genus does not apply to *P. spenceri*, any Australian species, or the New Zealand *P. validus*. Most species of *Paralamyctes*, including representatives of each of the four subgenera recognized herein (e.g., *P. monteithi* n.sp., Fig. 6B; *P. grayi*, Fig. 14L; *P. cassisi* n.sp., Fig. 20I; *P. mesibovi* n.sp., Fig. 23L; *P. chilensis*, Fig. 25G) have a five-part claw, as is also shared by *Haasiella trailli* (Archey, 1917). The details of branching of the claw are identical to those in Lithobiidae (e.g., *Australobius scabrior* Chamberlin, 1920), with two slender digits interspersed between three larger digits. As such, a five part claw is considered to be plesiomorphic, probably a general character for Lithobiomorpha. Attems listed 2+2 genital spurs in the female gonopod as diagnostic of *Paralamyctes*. Because this number is plesiomorphic for Henicopidae (indeed, for Lithobiomorpha), the discovery of species with 3+3 spurs (*P. cassisi* n.sp. and *P. mesibovi* n.sp.) must be identified as an apomorphy, and cannot serve to exclude these species from *Paralamyctes* if monophyly is to be maintained.

Whether *Paralamyctes* sensu Attems (1928) and Archey (1937) is monophyletic is not adequately established. Like the second maxillary claw and 2+2 gonopod spurs noted above, most purportedly diagnostic characters are symplesiomorphies. A bisegmented tarsus on all trunk legs, perhaps the most obvious character used to define *Paralamyctes*, is shared with *Analamyctes* Chamberlin, 1955, Zygethobiini and Lithobiidae, and may therefore be plesiomorphic relative to the single tarsal segment found in some legs of other Henicopini (e.g., *Lamyctes* Meinert, 1868; *Lamyctinus* Silvestri, 1909; *Haasiella* Pocock, 1901). Attems (1928) cited a labrum "with numerous ramifying bristles on the inside" in the diagnosis of *Paralamyctes*. Despite a thorough survey by electron microscopy, no aspect of labral bristling emerges as diagnostic of *Paralamyctes* sensu Attems; *Henicops* Newport, 1844, for example, has a distribution and branching structure of the labral bristles completely within the range of *Paralamyctes* species. Other symplesiomorphies cited by Attems (1928) are as follow: a single ocellus (general for Henicopidae); presence of posterior and lateral borders on the head shield (general for Lithobiomorpha); stigmata on segments 1, 3, 5, 8, 10, 12 and 14 (general for Henicopini); gonopod segmentation typical of all Henicopidae; a simple claw on the female gonopod (general for Henicopidae, probably general for Lithobiomorpha, and perhaps for Chilopoda); a three-segmented telopod of the second maxilla (general for Pleurostigmophora); "simple and branched bristles" on the tarsus of the second maxilla (general for Lithobiomorpha); an undivided sternite on the first genital segment (general for Chilopoda, the division being informative only for *Henicops* + *Lamyctes*); and a row of coxal pores on legs 12–15 (general for Lithobiomorpha). These characters cannot serve as synapomorphies within Henicopini.

Attems (1928) noted a first maxillary sternite being "triangular, partially fused with the coxae" in the diagnosis of *Paralamyctes*. The relative enlargement and bell ("triangular") shape of the sternite in all species of *Paralamyctes* (Figs. 6F, 14E,G, 18F, 20G, 23G) is, however, shared with *Haasiella* Pocock, 1901 (= *Wailamyctes* Archey, 1917; Johns, 1964), and is considered synapomorphic for this broader group. Outgroup lithobiids (e.g., *Lithobius*) possess a smaller, triangular sternite that lies at the end of a median suture, similar to that of *Henicops* (Edgecombe *et al.*, 2001: fig. 8B), *Lamyctes* and *Analamyctes*. A large, bell shaped sternite is observed in *Haasiella insularis* (= *Wailamyctes munroi*: Archey, 1937: pl. 22, fig. 5) as well as *H. trailli* (Edgecombe *et al.*, 2001: fig. 8D). In addition to the size and shape, the sternite of *Paralamyctes* and *Haasiella* is distinctive for the less complete fusion of its sutures than in other lithobiomorphs, the sternite lying against an unsclerotised strip along the inner margin of the coxa. A sutural contact with the coxa is confined to the posterolateral extent of the sternite. The only comparable development of the sternite in Henicopidae is in *Esastigmatobius japonicus* Silvestri, 1909 (tribe Zygethobiini) (Edgecombe *et al.*, 2001: fig. 8E). Other Zygethobiini, such as *Zygethobius pontis* Chamberlin, 1911, have the typical, smaller sternite, such that the similarity between *Paralamyctes* + *Haasiella* and *Esastigmatobius* may be convergent.

Another character that serves as a synapomorphy for *Paralamyctes* + *Haasiella* is a pronounced median furrow on the head shield (Figs. 13A, 15H). Attems (1928) accurately noted "median furrow deep" in his diagnosis of *Paralamyctes*, but the same condition is present in *Haasiella*. The status of this character as a synapomorphy is revealed by outgroup comparison with *Henicops* + *Lamyctes, Zygethobius* and Lithobiidae, in which the median furrow is confined to the anteriormost part of the head shield or forms a shallow depression rather than a sharp furrow. The only instances of a median furrow resembling that of *Paralamyctes* and *Haasiella* within the Henicopidae are within Anopsobiinae (e.g., in *Anopsobius*), in which the median furrow likewise extends to the transverse suture, and in *Esastigmatobius japonicus*, in which the median furrow extends about three-quarters the length to the transverse suture (Edgecombe *et al.*, 2001: fig. 1C).

All species of *Paralamyctes* described here possess a cluster of small basiconic sensilla between the coxal process and telopod of the first maxilla (Fig. 14I). Attems (1928: 55) cited this "little cluster of spinules" as a diagnostic character of *Lamyctes*, but this must be dismissed based on its ubiquitous presence in *Paralamyctes* (e.g., see Archey, 1937: pl. 22, fig. 5 for *P. (Haasiella) insularis*). The sensilla cluster does not provide evidence for a *Lamyctes*/*Paralamyctes* clade because it is widely present throughout Henicopidae and Lithobiidae (pers. obs. for *Henicops, Zygethobius, Anopsobius, Lithobius, Australobius*) and thus appears to be a general character for Lithobiomorpha.

A taxonomic issue of particular biogeographic significance is the status of *Triporobius* Silvestri, 1917, a monotypic genus based on *T. newtoni* Silvestri, 1917, from India. I have examined the holotype of this species (IAEP collection). Silvestri (1917) distinguished *Triporobius* from *Paralamyctes* based on a single character, the restriction of coxal pores to legs 13–15 in *Triporobius*. Given that this state is certainly an autapomorphy for *T. newtoni*, *Triporobius* falls within the cladistic structure of *Paralamyctes*. It shares the large, bell-shaped sternite and long median furrow in the head shield that define the *Paralamyctes* + *Haasiella* clade, and additionally has certain characters unique to *Paralamyctes (Paralamyctes)* as defined below. As such, biogeographic hypotheses that regard *Paralamyctes* as absent from India are based on a taxonomic artifact. Attems' (1928) statement that *Triporobius* possesses eight ocelli on each side of the head is puzzling; the holotype of *T. newtoni* bears a single ocellus per side, as described and figured by Silvestri (1917). This anomaly may be explained if Attems misread Silvestri's paper, which has a description of a species of *Archilithobius* with eight ocelli printed just above the figure of *Triporobius newtoni*.

Some morphological details in Silvestri's (1917) illustrations of *Triporobius newtoni* require emendation. Silvestri (1917: fig. 5.8) depicted only simple setae on the tarsus of the telopod of the second maxilla, whereas the holotype possesses eight or nine plumose setae, and thus conforms to *Paralamyctes* and other henicopids. More significantly, Silvestri (1917: fig. 5.3, 5.4) drew the aciculae with notches along their dorsal sides, but each of these eight or nine aciculae is actually pinnulate along its distal half. An arrangement of pinnules along the dorsal side of the aciculae is elsewhere observed in *Paralamyctes* species from South Africa (*P. spenceri*; Attems, 1928: fig. 448; Edgecombe *et al.*, 2001: fig. 5E), Madagascar (*P. quadridens*; Lawrence, 1960: fig. 28B), New Zealand (*P. harrisi* Archey, 1922; Edgecombe *et al.*, 2001: fig. 5F), Queensland (*P. monteithi* n.sp.: Fig. 5I,J) and New South

Wales (*P. neverneverensis* n.sp.: Fig. 11A,J) (see discussion of that subgenus for evidence that pinnules confined to the dorsal side of the aciculae is a synapomorphy for this group).

Several species that were originally assigned to *Paralamyctes* were reassigned to the new genus *Analamyctes* by Chamberlin (1955). Chamberlin distinguished the two genera based on a single character, the number of antennal articles being fixed at 19–20 in *Paralamyctes* versus 23–43 in *Analamyctes*. Although antennal segmentation is taxonomically useful at some levels in Henicopini, Chamberlin's classification is incongruent with a larger body of character evidence that retains some supposed *Analamyctes* within a monophyletic *Paralamyctes* while grouping typical *Analamyctes* with *Lamyctes, Lamyctinus* and *Henicops*. The reliability of Chamberlin's two character states for antennal segmentation (19–20 versus 23–43) is weakened by new Australian species, some of which have article counts that fall between these two states (e.g., 20–21 in *P. neverneverensis*, 20–22 in *P. hornerae*), and others that range between both states (18–25 in *P. monteithi*). I have examined two specimens that represent two named species of *Analamyctes*, the type species, *A. tucumanus* Chamberlin, 1955, and *A. andinus* (Silvestri, 1903). BM 1903.7.2.0 (Fig. 2), a male labelled as "Tucuman 450 m", represents *A. tucumanus*, the holotype being from Cerro San Xavier, Tucumán, Argentina. The type locality for *A. andinus* is Punta de Vacas, Mendoza, Argentina; a specimen from 25 km north of Villaviciencio, Mendoza (ZMUC collection: Fig. 3) is assigned to this species. Based on these specimens, *Analamyctes* lacks both synapomorphies of *Paralamyctes* + *Haasiella*; it has no median furrow on the head shield (Fig. 2), and the sternite of the first maxilla is small, lying behind a median suture. Antennal segmentation with short, ring-like articles occurring in pairs between series of longer articles in both species (Fig. 2) resembles *Lamyctes* (Edgecombe *et al.*, 2001: fig. 1D) and *Henicops*. The subtriangular shape and dentition of the maxillipede coxosternite suggest closest affinities to *Lamyctes* and *Lamyctinus*; a minute, conical seta set in a prominent socket at the anterolateral edge of the dental margin in both *A. tucumanus* and *A. andinus* (Edgecombe *et al.*, 2001: fig. 3J) is certainly homologous with the "pseudoporodont" of *Lamyctinus* (Negrea & Matic, 1996: fig. 3; Edgecombe *et al.*, 2001: fig. 3K) and some species of *Lamyctes* ("ectodont" of Chamberlin, 1955; "porodont" of Zalesskaja, 1994). A porodont is not differentiated in *Paralamyctes*. Mandibular morphology, examined for *A. andinus* (Fig. 3), also most closely resembles *Lamyctes, Lamyctinus* and *Henicops*. Detailed similarities include: bipinnulate aciculae in which the pinnules are relatively long (Fig. 3B); an abrupt differentiation of the branching bristles along the length of the fringe, with multifurcating bristles splaying from scale-like bases on the dorsal part of the fringe, and pectinate bristles on the ventral part of the fringe (Fig. 3C); accessory denticles near the fringe of branching bristles on the dorsal part of the mandible being developed as flattened, multifurcating scales (Fig. 3D) rather than simple conical elements as in other Henicopinae. Also similar to *Lamyctes* and *Lamyctinus* is the lack of posterolateral projections on any tergites in *A. andinus* and *A. tucumanus* (Fig. 2).

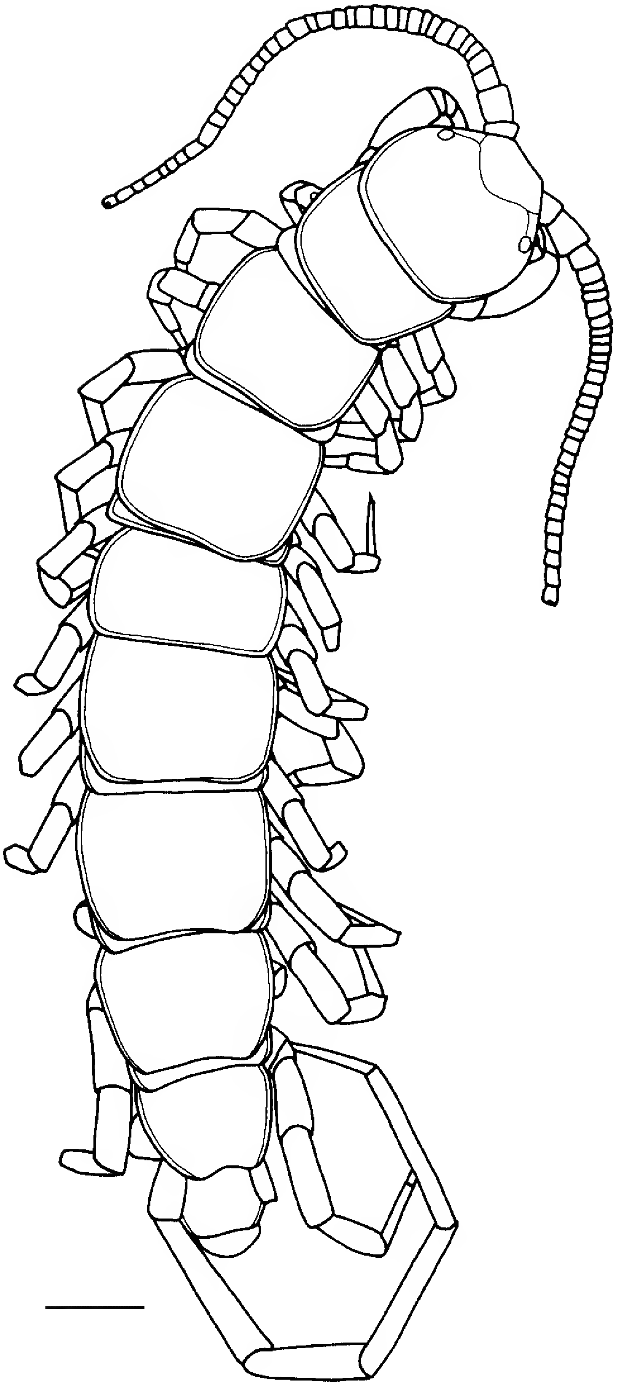

Figure 2. *Analamyctes tucumanus* Chamberlin, 1955. ♂ BM 1903.7.2.0, Tucumán, Argentina. Scale 1 mm.

At least one of the South African species reassigned by Chamberlin (1955) from *Paralamyctes* to *Analamyctes, P. asperulus*, is more appropriately retained in *Paralamyctes* [see discussion of *P. (Paralamyctes)* below]. The status of two others, *P. laevigatus* and *P. tabulinus* is uncertain; no specimens have been illustrated and descriptions are imprecise. However, maxillipede dentition of these species (6+6 teeth in both fide Attems, 1928) is more consistent

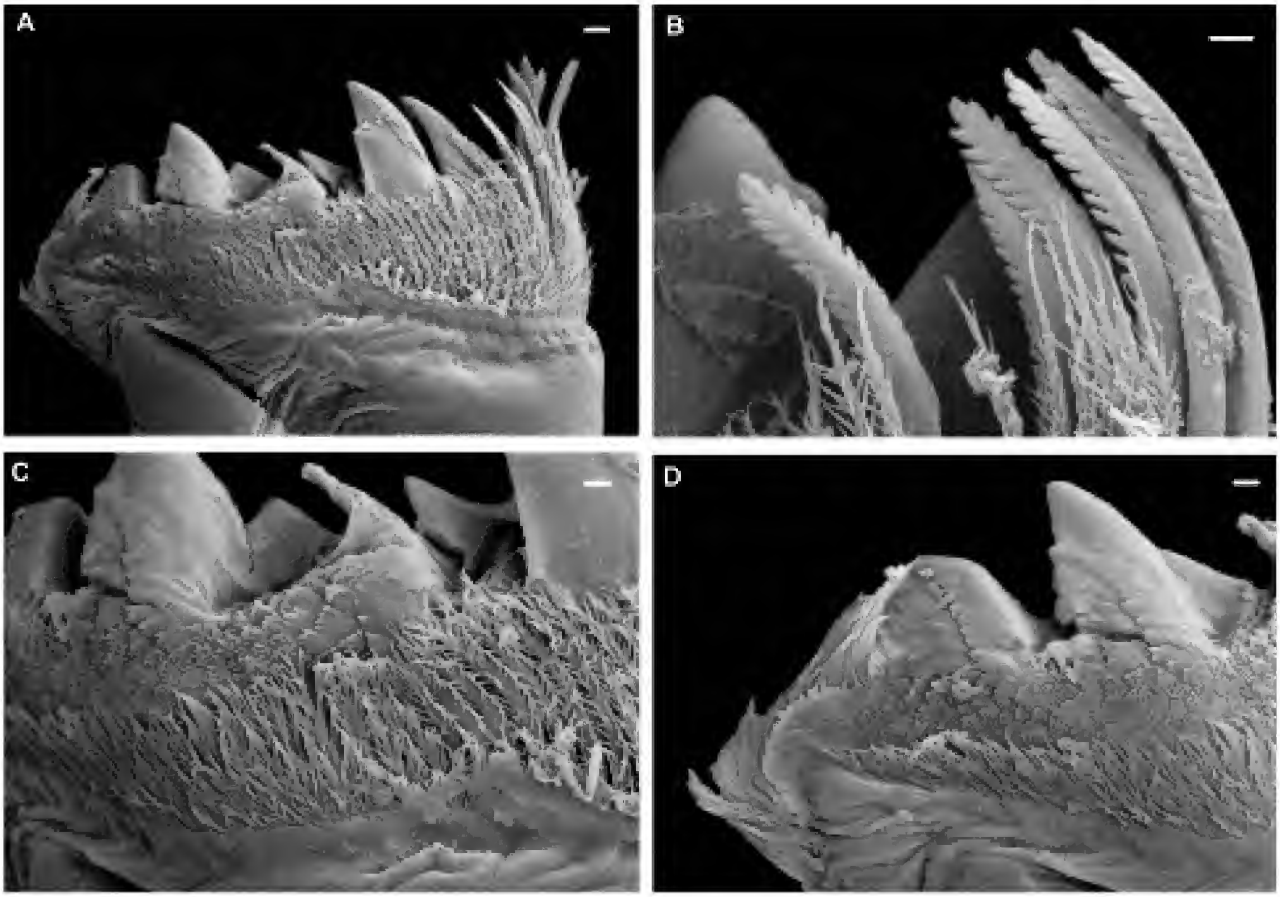

Figure 3. *Analamyctes andinus* (Silvestri, 1903). Scanning electron micrographs of mandible. ZMUC, sex undetermined (genital region damaged), 25 km N of Villaviciencio, Mendoza, Argentina. A, gnathal lobe; B, aciculae; C, fringe of branching bristles; D, teeth and furry pad. Scales 5 µm except A, 10 µm.

with membership in *Paralamyctes* than *Analamyctes*, and *P. laevigatus* was described by Attems (1928) as having a deep median furrow on the head shield (synapomorphy of *Paralamyctes*). Of the non-Argentine species referred to *Analamyctes* by Chamberlin (1955), only the reassignment of *Paralamyctes humilis* Ribaut, 1923, from New Caledonia is accepted here. This placement accounts for its triangular, few-toothed maxillipede coxosternite, large number of antennal articles, and weak definition of an articulation between tarsomeres. With the exclusion of *A. andinus* and *A. humilis* from *Paralamyctes*, the occurrence of the latter genus in South America is limited to *P. chilensis* in northern Patagonia (Chile and Argentina), and *Paralamyctes* is not known to occur in New Caledonia.

Paralamyctes (Paralamyctes) Pocock, 1901

= *Triporobius* Silvestri, 1917

Diagnosis. *Paralamyctes* with mandibular aciculae bearing elongate pinnules along dorsal side of acicula only; accessory denticle field intergrading with furry pad; antenna with relatively few (typically 17–20) elongate, tubular articles; articulations between tarsomeres strong; longitudinal median furrow on sternites well defined.

Assigned species. *Paralamyctes asperulus* Silvestri, 1903; *Paralamyctes weberi* Silvestri, 1903; *Triporobius newtoni* Silvestri, 1917; *Paralamyctes harrisi* Archey, 1922; *Paralamyctes quadridens* Lawrence, 1960; *Paralamyctes tridens* Lawrence, 1960; *Paralamyctes (Paralamyctes) monteithi* n.sp.; *Paralamyctes (Paralamyctes) neverneverensis* n.sp.

Distribution. South Africa (KwaZulu-Natal, Western Cape Province, Eastern Lowveld, Northern Province), Swaziland, Madagascar, southern India, Australia (Queensland, northern New South Wales), New Zealand (North Island).

Discussion. Several apparently apomorphic characters are shared between *Paralamyctes monteithi* from Queensland, *P. neverneverensis* from the Dorrigo region of New South Wales, *P. newtoni* from India, *P. spenceri* and *P. weberi* from southern Africa and *P. harrisi* from New Zealand. These species all have pinnules on the mandibular aciculae branching from a single side (dorsally). The same distribution of the aciculae was illustrated by Lawrence (1960: fig. 28B) in *P. quadridens* from Madagascar. Other species of *Paralamyctes* have either bipinnulate aciculae (branching from both sides), for example *P. (Nothofagobius) chilensis* (Fig. 25I,K) and *P. (Haasiella) trailli* (Edgecombe *et al.*, 2001: fig. 5B), or simple (non-pinnulate) aciculae, as in *P. validus* (Edgecombe *et al.*, 2001: fig. 5G), *P. grayi* (Fig. 13F) and *P. hornerae* n.sp. (Fig. 18K). The bipinnulate condition is regarded as plesiomorphic, based on the presence of bipinnulate aciculae in *Henicops* (Edgecombe *et al.*, 2001: fig. 5C), *Lamyctes* (Edgecombe *et al.*, 2001: fig. 5A), *Lamyctinus, Analamyctes* (Fig. 3B), Zygethobiini (*Esastigmatobius, Zygethobius*; Edgecombe *et al.*, 2001: fig. 5H), Anopsobiinae (*Anopsobius*) and Lithobiidae (*Lithobius, Australobius, Bothropolys* [Edgecombe *et al.*, 2001: fig. 5D]). Species with pinnules along only one side of the aciculae, *P. (Paralamyctes)*, also share an intergradation between the accessory denticles on the mandible and the furry pad, the distal projections of the furry pad merely being progressively elongated (Fig. 5F,M). In other Henicopini and in the Lithobiidae, the furry pad is well differentiated from the accessory denticles. This involves either an abrupt elongation of the elements of the furry pad (Figs. 13E, 15M), or an intervening smooth region that lacks bristle-like morphology (Fig. 20E,F). *Paralamyctes (Paralamyctes)* as defined by morphological (largely mandibular) characters is also identified as a monophyletic group based upon molecular sequence data (Edgecombe *et al.*, 2001).

Species of *P. (Paralamyctes)* share strong joints between the tarsomeres on all legs, with a small condyle commonly developed at the articulation dorsally. The status of this character as a synapomorphy [relative to the weak articulations in *P. (Thingathinga)*] is uncertain. Most lithobiids have strong articulations, so this state is possibly plesiomorphic for *Paralamyctes*. Ambiguity is caused by the inapplicability of the character in some relevant outgroups (e.g., *Lamyctes* and Anopsobiinae, in which the tarsi lack articulations). Another character shared by all species of *P. (Paralamyctes)* by which they are distinguished from other *Paralamyctes* is the elongation of the longitudinal median furrow on the sternites. This is especially pronounced on the posterior sternites, running along most of the length of the sternite (Fig. 6L). The character is variably developed in outgroups, and its polarity is uncertain.

Among South African species referred to *Paralamyctes* by Attems (1928), I have examined *P. spenceri* (Natal Museum collections), its alleged junior synonym *P. weberi* (including its holotype), and the holotype of *P. asperulus* Silvestri, 1903 (IAEP collection). Lawrence's (1955b) synonymy of *P. weberi* is unconvincing. Lawrence cited little material from the Cape region and claimed to "have never seen a specimen which could be ascribed to *weberi*" (1955b: 18). I have observed material from Table Mountain (MCZ 28614) that conforms to the holotype of *P. weberi* in having four blunt, widely-separated teeth on each margin of the maxillipede coxosternite and having a distal spinose projection on the tibia of leg 14, and follow Attems (1928) in considering it and *P. spenceri* as distinct species. Contrary to Chamberlin's (1955) reassignment of *P. asperulus* to *Analamyctes*, this species can be confirmed as a member of *Paralamyctes* based on its deep median furrow on the head shield and the large, bell-shaped sternite of the first maxilla. An elongate distal part of the maxillipede tarsungulum and knob-like teeth on the dental margin of the coxosternite indicate membership in *P. (Paralamyctes), P. (Haasiella)* or (*Thingathinga*). The shape of the maxillipede coxosternite resembles that of *P. spenceri*, and the strong articulations defining the tarsomeres on all legs are also like that species (but strikingly different from *Analamyctes*, in which tarsal articulation are faint). *Paralamyctes asperulus* is apparently referable to *P. (Paralamyctes)*. Antennal articles are mostly elongate, resembling species of that subgenus. The description by Lawrence (1960) is sufficient to indicate that *P. quadridens* from Madagascar is a member of *P. (Paralamyctes)*. Two males of this species (FMHD 94-60) from Réserve Anjanaharibe-Sud, Befingotra, confirm the single, dorsal row of pinnules on the aciculae, and the accessory denticles intergrade with the furry pad as in other *P. (Paralamyctes)*. The other endemic Malagasy species, *P. tridens* Lawrence, 1960, is provisionally assigned to *P. (Paralamyctes)* based on Lawrence's (1960) assertion that it bears very close resemblance to *P. (P.) spenceri*, and description of a single row of eight or nine thick "teeth" (pinnules) on the distal part of the aciculae (Lawrence, 1960: 93).

Paralamyctes (Paralamyctes) monteithi n.sp.

Figs. 4–7, 8A,B, 9A

Etymology. For Geoff Monteith, Queensland Museum, whose collections in the Wet Tropics include much of the material of this species.

Diagnosis. *Paralamyctes (Paralamyctes)* usually with 20 long, tubular antennal articles; body relatively elongate, long tergites extended (e.g., TT3 and 5 as long as wide); 3–6 (very rarely 7) small teeth on dental margin of maxillipede coxosternite; cephalic pleurite constricted just behind Tömösváry organ, which lies on ventral margin of head shield; groove in accessory denticle field lacking on mandibular teeth; 3–6 coxal pores (usually 4–6); posterior margin of sternite 15 of male typically rounded.

Type material. HOLOTYPE QM S42683, ♂ (Fig. 4A,C), south end of Bluewater Range, 45 km NW of Townsville, Queensland, 19°11'51"S 146°24'16"E, 750 m, GBM, GT and S. Hamlet, 7 Dec 1986–16 Feb 1987, pitfall, rainforest. PARATYPES: QM S42682, 1♀, QM S42684, 1♂, Bluewater Range, same locality as holotype, 700–800 m, GBM, GT and S. Hamlet, 6–8 Dec 1986.

Other material. NE QUEENSLAND (Wet Tropics): QM S42652, 2♂♂, Cardwell Gap, 18°31'53"S 146°11'E, R. Raven, P. and E. Lawless and M. Shaw, 24 Sep–25 Nov 1992, pitfall; QM S42685, 2♂♂, 1♀, Cardwell Range, Upper Broadwater Creek Valley, 18°19'15"S 145°58'34"E, 750 m, GBM, GT and S. Hamlet, 18 Dec 1986–14 Jan 1987, pitfall, rainforest; QM S42680 1♂, S42681 1♀, Mt Elliot, summit, 19°29'29"S 146°58'00"E, 1150 m, A. Graham, Jan–26 Mar 1991, pitfall and intercepts, fern glade; QM S42686, 1♀, Emerald Creek, Lamb Range, 17°05'06"S 145°36'06"E, 950 m, GBM, DKY and GT, 11 Oct 1982, sieved litter, rainforest; QM S42691, 1♀, Douglas Creek, Lamb Range, 17°06'51"S 145°37'26"E, 900 m, 12 Oct 1982, GBM, DKY and GT, 12 Oct 1982, Pyrethrum, rainforest; QM S42687, 1♀, Mt Hypipamee NP, tower near the Crater, 17°27'23"S 145°29'12"E, 1230 m, GBM and J. Hasenpusch, 7 Mar–15 May 1995, intercept trap; QM S42689, 1♂, Mt Misery Rd, 15°52'39"S 145°12'58"E, 730 m, 6 Dec 1990–17 Jan 1991, Queensland Museum and ANZSES, pitfall; QM S42690, 2♂♂ and 1♀, North Bell Peak, Malbon Thompson Range, 1000 m, GBM and GT, 20–22 Nov 1990, pitfall; QM S42692, 1♂, Mt Tyson, 2 km W of Tully, 17°55'35"S 145°54'34"E, 650 m, DKY, 7 May 1983, sieved litter, rainforest; QM S42693, 1♂, Malaan SF, 17°35'30"S 145°36'45"E, R. Raven, P. and E. Lawless and M. Shaw, 25 Jul–26 Nov 1992, pitfall; QM S42694, 1♀, Mt Fisher, Kjellberg Rd, 7 km SW of Millaa Millaa, 17°32'34"S 145°33'31"E, 1000 m, GBM and DKY, 3 May 1983, sieved litter, rainforest; QM S42688, 1♂, Mt Bartle Frere, 0.5 km N of South peak, 1500 m, 6–8 Nov 1981, Earthwatch/Queensland Museum; QM S42695, 2♂♂, summit, Mt Bellenden Ker, 17°15'40"S 145°51'25"E, 1560 m, GBM, H. Janetzki and D. Cook, 8 Oct 1991; QM S42696, 1♂, S42704, 1♀, Bellenden Ker Range, Cableway base station, 100 m, Earthwatch/Queensland Museum, 17 Oct–7 Nov 1981, pitfall; QM S42697, 1♀, S42699, 1♂, Bellenden Ker Range, Cable Tower 5, 17°16'32"S 145°53'00"E, 532 m, Earthwatch/Queensland Museum, 1–7 Nov and 17–24 Oct 1981; QM S42700, 1♂, S42705, 1♀, summit TV station, Mt Bellenden Ker, 1560 m, S. Montague, Apr–Oct 1982, pitfall (S42700), GBM and DKY, 29 Apr–2 May 1983, moss on ground (S42705), rainforest; QM S42701, 2♂♂, several immatures, S42703, 2♂♂, 3♀♀ (Figs. 4B, 6A–C,G,J), summit, Mt Bellenden Ker, 1560 m, Earthwatch/Queensland Museum, 17 Oct–5 Nov 1981, pitfall; QM S42706, 1♂, S45147, larva, Bellenden Ker Range, Cable Tower 3, 1054 m, Earthwatch/Queensland Museum, 17–31 Oct 1981; AM KS 57900, 2♂♂, 1♀, Black Mountain Rd, 28.1 km NW of Kuranda, 16°40'25"S 145°30'08"E, GDE, 28 Apr 1998, sifted litter, rainforest; AM KS 57901, 1♀ (DNA voucher specimen), KS 57902, 2♀♀, Mt Hypipamee NP, The Crater, 17°25'29"S 145°29'00"E, GDE and G. Milledge, 25 Apr–2 May 1998, sifted litter and pitfall, rainforest; AM KS 57903, 1♂, Danbulla SF, 1.9 km E of Mobo Creek Crater, GDE, 27 Apr 1998, sifted litter, rainforest; ANIC, 1♀, Kuranda, 16°45'S 145°35'E, 430 m, R.W. Taylor, 29 Jul 1977, rainforest; ANIC, 1♂, Tully Falls SF, 17°46'S 145°33'E, A. Walford-Huggins, 4 Oct 1978, rainforest; ANIC, 1♂, Koombooloomba, 17°50'S 146°36'E, 750 m, R.W. Taylor and J. Feehan, 4 Jul 1971, Berlese, wet sclerophyll; ANIC, 6♀♀, Mission Beach, 17°50'S 146°06'E, 10 m, M. Cemak, 2 Sep–1 Oct 1996; ANIC, 2♂♂, 2♀♀, Mission Beach, 17°52'S 146°04'E, 40 m, M. Cemak, 2 Sep–4 Nov 1996, pitfall; ANIC, 1♀, 5 km W of Paluma, 19°01'S 146°10'E, ca. 950 m, R.W. Taylor and J. Feehan, 13 Jul 1971, Berlese, rainforest; CAS, 1♂, Tinaroo Lake near Kairi, 700 m, 8 Nov 1962, E.S. Ross and D.Q. Cavagnaro; CAS, 1♀, 1 mile NE of Ravenshoe, 975 m, 7 Nov 1962, E.S. Ross and D.Q. Cavagnaro; MCZ 34824, 1♂, Mt Spurgeon, 3500–4000 ft, Jul 1932, G.H. Curry.

Central eastern Queensland (Eungella/Rockhampton): AM KS 57904, 1♂ (Figs. 7A, 8A,B), KS 57905, 1♀ (Fig. 7B), KS 57906, 1♀ (Figs. 7C, 9A), KS 57907, 1♀ (Figs. 5A–J, 6H,I,K–M), KS 57908, 1♀ (DNA voucher specimen), KS 57909, 1♂, 3♀♀, Eungella NP, Dalrymple Rd, 1.7 km NE of Snake Rd, 21°04'S 148°34'30"E, GDE, S. Davis and G. Milledge, 18 and 21 Apr 1998, rainforest litter; QM S45184, 1♂, Eungella, Schoolhouse, 21°08'S 145°29'E, R. Raven and J. Gallon, 13 Feb 1986, sieved litter, rainforest; ANIC, larva, presumed fourth larval stadium (12 legs plus three limb-buds), Cammoo Caves, 23°10'S 150°28'E, R.W. Taylor and A. Weir, 25 Oct 1976, dense low closed forest.

SE Queensland—Kenilworth/Imbil region: AM KS 57910, 1♀ (Figs. 5K–M, 6D–F), KS 57911, 1♀ (DNA voucher specimen), Kenilworth SF, Sunday Creek Rd, 9.8 km W of Charlie Moreland Park, 26°40'11"S 152°36'35"E, GDE, S. Davis and G. Milledge, 6–7 May 1998, sifted litter, wet sclerophyll; QM S42679, 1♂, Amamoor Creek via Imbil, 26°21'45"S 152°37'56"E, 91 m, GBM and S.R. Monteith, 1975–1976, pitfall, rainforest; QM S42678, 1♂ (Fig. 7D), Cold Creek via Imbil, 26°27'20"S 152°37'26"E, 122 m, GBM and S.R. Monteith, 1974–1975, pitfall, rainforest; QM S42677, 1♀, Deer Reserve SF via Kilcoy, 26°59'29"S 152°28'33"E, 457 m, GBM and S.R. Monteith, 1974–1975, pitfall, rainforest. Lamington region: QM S42669, 1♀, Lamington NP, Mt Bithongabel, 28°15'55"S 153°10'13"E, 1160 m, GBM and S.R. Monteith, 1975–1976, pitfall, rainforest; QM S42675, 1♀, Repeater Station, Springbrook, 28°14'23"S 153°15'58"E, 1000 m, GBM and S.R. Monteith, 1975–1975, pitfall, rainforest; QM S42676, 2♂♂, Lamington NP, Nagarijoon, V.E. Davies and R. Raven, 5 Apr 1976.

Description. Length up to 27 mm; length of head shield up to 2.4 mm. Colour (based on specimens in absolute ethanol): antennae dark orange; head shield orange with chestnut mottled network; tergites pale orange with dark mottling concentrated in longitudinal median band and near margins; maxillipedes bright orange; sternites yellow/pale orange, becoming darker orange with more abundant chestnut mottling posteriorly; prefemur to tibia pale orange or yellow with purple mottling; tarsi orange; genital sternite and gonopods orange.

Head shield smooth. Frontal margin with strong median notch; posterior margin transverse. Median furrow extends back to transverse suture, length about 30% that of head shield, deep throughout. Antenna extends back to tergite 4 or 5; 18–25 antennal articles, overwhelming majority of specimens with 20; all articles substantially longer than wide; basal two articles only slightly enlarged relative to adjacent ones (Fig. 6A), with gradational rather than abrupt changes in setation (increased abundance of short trichoid sensilla from about fifth article, fewer longer setae). Posterior side of polygonal area surrounding hair socket of trichoid sensilla on antenna raised as a semicircular stop (*Kragen*) (Fig. 8B); two or three finger-shaped thin-walled basiconic sensilla at anterior edge of antennal articles adjacent to band of arthrodial membrane (Fig. 8A,B). Ocellus whitish, moderately domed. Cephalic pleurite usually inclined, narrowed to a slender band behind Tömösváry organ (Figs. 5H, 6D), which lies on ventral margin of head immediately posteroventral to ocellus (Fig. 5G), encircled by sutures that define anterior limits of pleurite; Tömösváry organ moderately large, elliptical.

Tergites faintly to distinctly wrinkled, more so on posterior segments. T1 generally trapeziform, considerably smaller than T3, slightly narrower than head shield (Fig. 4A), about 75% width of widest tergite (T8), posterior angles rounded and posterior margin transverse; lateral borders subparallel in TT3 and 5, posterior angles rounded, posterior borders transverse or T5 faintly concave; TT1, 3 and 5 bordered posteriorly; lateral borders of TT7–14 convex; border of T7 incomplete posteriorly, posterior margin with shallow transverse median embayment, posterior angle rounded; TT8–14 (variably T6) bordered laterally; posterior margin of T8 gently concave, posterior angle rounded, TT10 and 12 elongate, posterior borders weakly to gently concave, posterior angles form obtuse, blunt corners; TT9, 11 and 13 embayed posteriorly, with largely transverse median extent, posterior angle of T9 blunt, TT11 and 13 sharp but not toothed; T14 longer than wide,

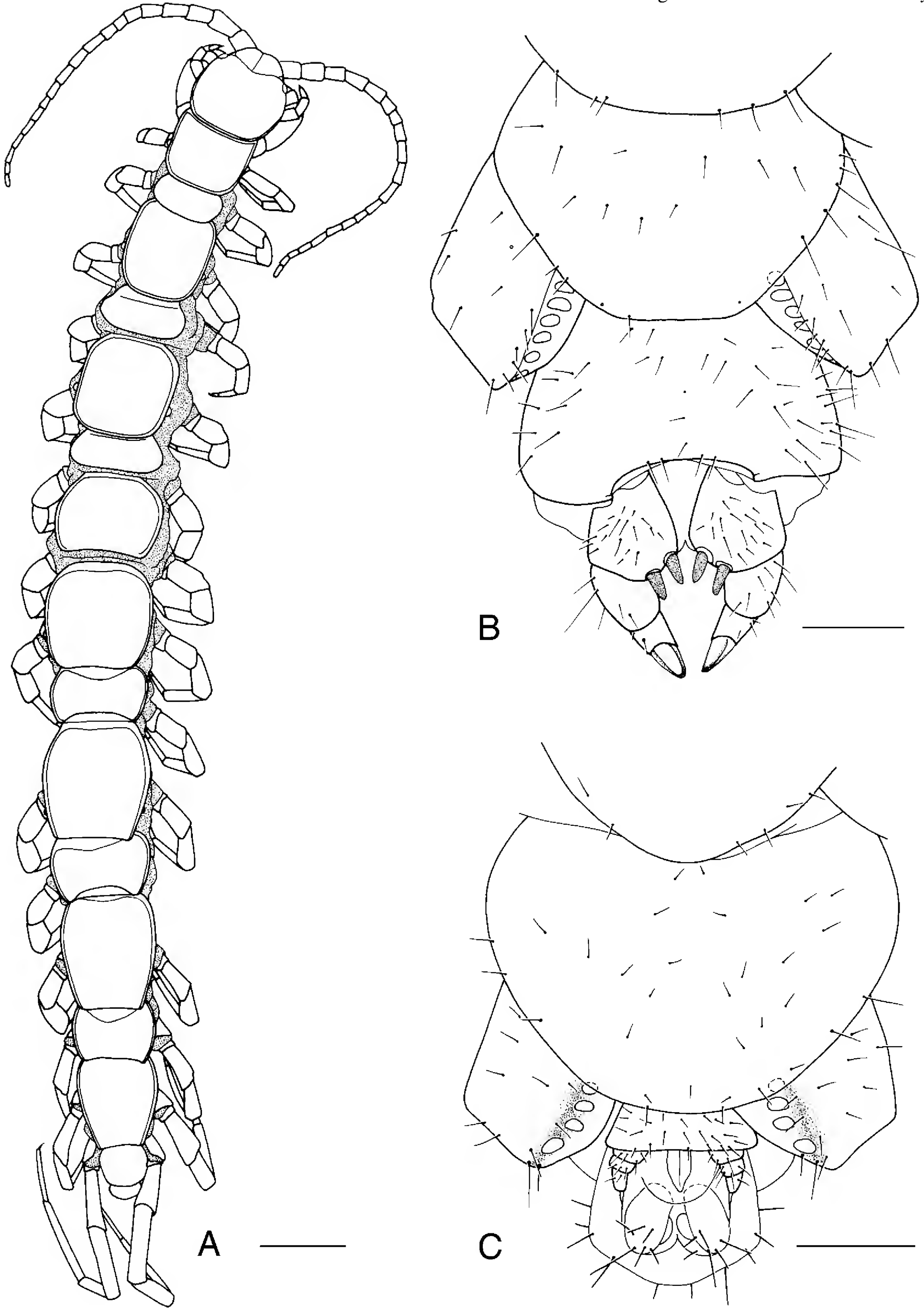

Figure 4. *Paralamyctes (Paralamyctes) monteithi* n.sp. A,C, holotype ♂ QM S42683, south end of Bluewater Range, northeastern Queensland; C, terminal segments and gonopods; scales 2 mm, 0.5 mm. B, ♀ QM S42703, terminal segments and gonopods, summit of Mt Bellenden Ker, northeastern Queensland; scale 0.5 mm.

posterior border usually gently concave in both sexes, with blunt posterior angles (Fig. 6M); in males from Mt Bellenden Ker, posterior margin of TT12 and 14 transverse to weakly convex and posterior angles rounded, posterior margin of T13 gently concave. Short, slender setae along lateral borders of all tergites; anterior tergites with few additional setae, concentrated anterolaterally; short setae evenly scattered over surface of posterior tergites (Fig. 6M).

Small transverse seta projects medially from pit in labral sidepiece (Fig. 5B). Labral margin with rounded shoulder

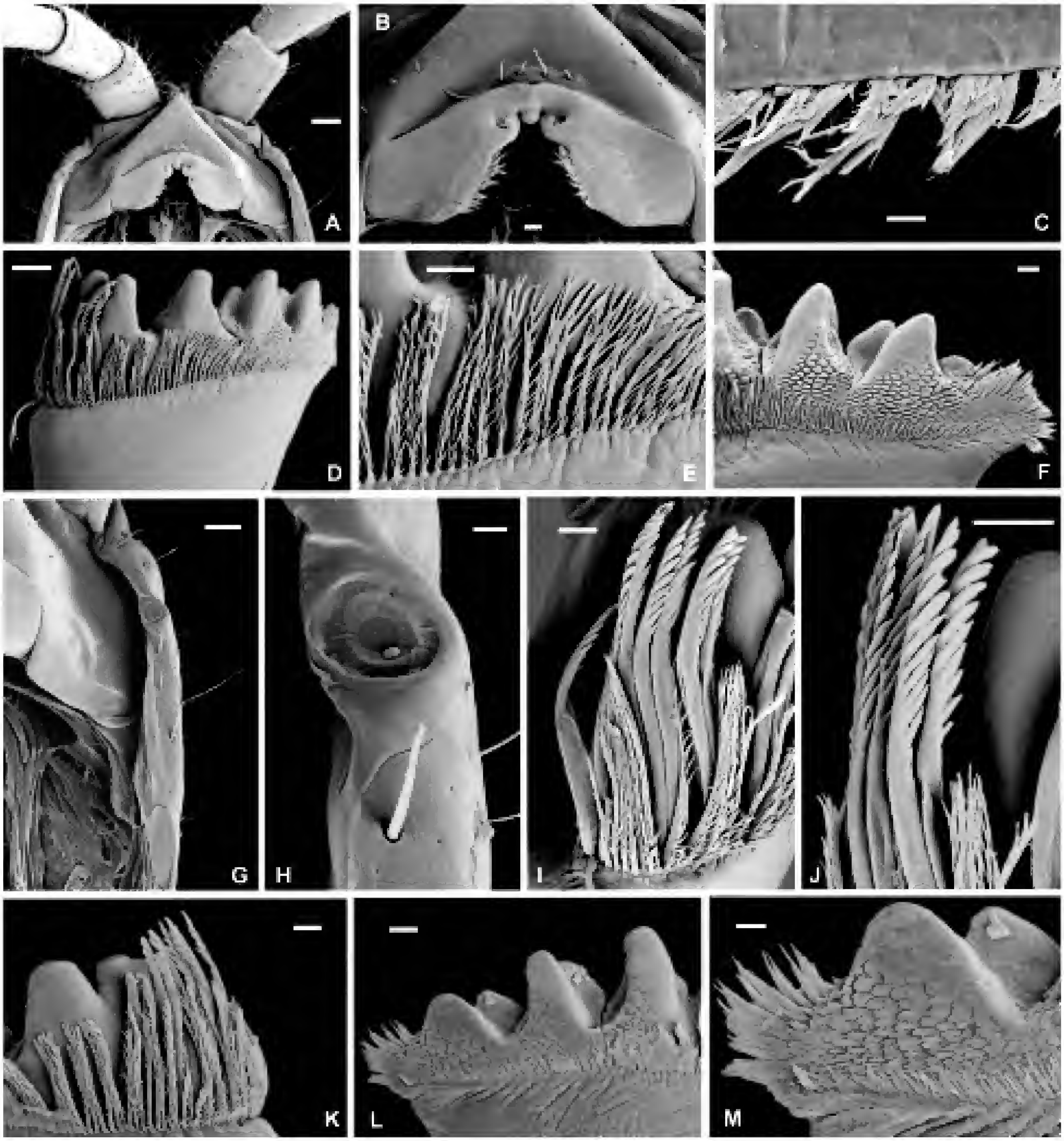

Figure 5. *Paralamyctes (Paralamyctes) monteithi* n.sp. Scanning electron micrographs. A–J, ♀ AM KS 57907, Eungella NP, central eastern Queensland. A, ventral view of head, scale 200 µm; B, clypeus and labrum, scale 50 µm; C, branching bristles on labral margin, scale 10 µm; D, gnathal lobe of mandible, scale 50 µm; E, fringe of branching bristles on mandible, scale 20 µm; F, mandibular teeth and furry pad, scale 20 µm; G, cephalic pleurite, scale 100 µm; H, Tömösváry organ, scale 20 µm; I,J, mandibular aciculae, scales 20 µm. K–M, ♀ AM KS 57910, Kenilworth SF, southeastern Queensland. K, ventral part of mandible, scale 20 µm; L, mandibular teeth, scale 20 µm; M, accessory denticles and furry pad on mandible, scale 10 µm.

beside midpiece, with pronounced break in curvature where dense, long fringe of branching bristles overhangs margin; bristles branch as irregular, elongate bifurcations or multifurcations (Fig. 5C).

Maxillipede coxosternite trapezoidal to subsemicircular, dental margin broad, each half gently convex (Figs. 6G,H, 7); median notch lacking; teeth small, blunt bulbs, ranging from 3+3 to 6+6 (one specimen with 7+7), set off by furrow that parallels dental margin. Coxosternite bearing relatively few large, scattered setae, usually with distinctly denser setation behind dental margin and anterolaterally (Fig. 6H). Tarsungulum with long, slender pretarsal section (Fig. 6G).

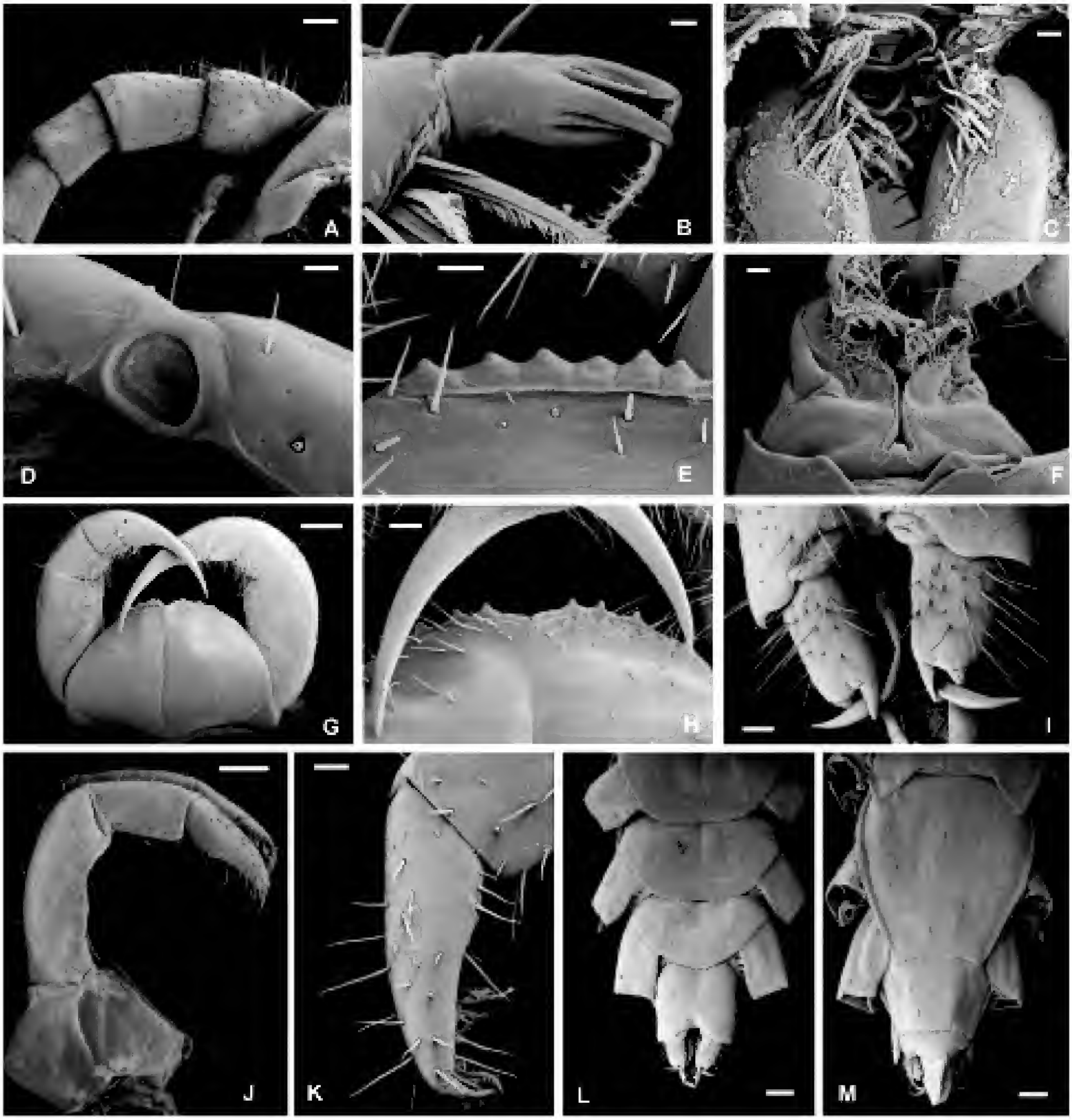

Figure 6. *Paralamyctes (Paralamyctes) monteithi* n.sp. Scanning electron micrographs. A–C,G,J, ♀ QM S42703, summit of Mt Bellenden Ker, northeastern Queensland. A, proximal part of antenna, scale 200 µm; B, pretarsus of second maxillary telopod, scale 10 µm; C, coxal processes of first maxillae, scale 20 µm; G, maxillipede, scale 400 µm; J, coxa and telopod of second maxilla, scale 200 µm. D–F, ♀ AM KS 57910, Kenilworth SF, southeastern Queensland. D, Tömösváry organ, scale 20 µ; E, dental margin of maxillipede coxosternite, scale 50 µm; F, first maxillae, scale 50 µm. H,I,K–M, ♀ AM KS 57907, Eungella NP, central eastern Queensland. H, dental margin of maxillipede coxosternite, scale 100 µm; I, gonopods, scale 90 µm; K, distal part of telopod of second maxilla, scale 50 µm; L, ventral view of terminal segments, scale 300 µm; M, dorsal view of terminal segments, scale 300 µm.

Setae on forcipule concentrated on inner part of trochanteroprefemur, femur, tibia and tarsal part of tarsungulum, these setae relatively long, of fairly uniform diameter.

Mandible: Four paired teeth (Fig. 5D). Ten aciculae; up to 10 finger-shaped pinnules aligned against each other on distal third of dorsal side of each acicula (Fig. 5I,J). Fringe of branching bristles skirts aciculae, evenly shortening dorsally to very short fringe beneath furry pad (Fig. 5F,M); bristles narrow-based, evenly branching along entire length (Fig. 5E), bifurcate or pauciramous distally. Accessory denticle field without grooves between rows of denticles or at margin of denticle field (Fig. 5F,L); largest accessory

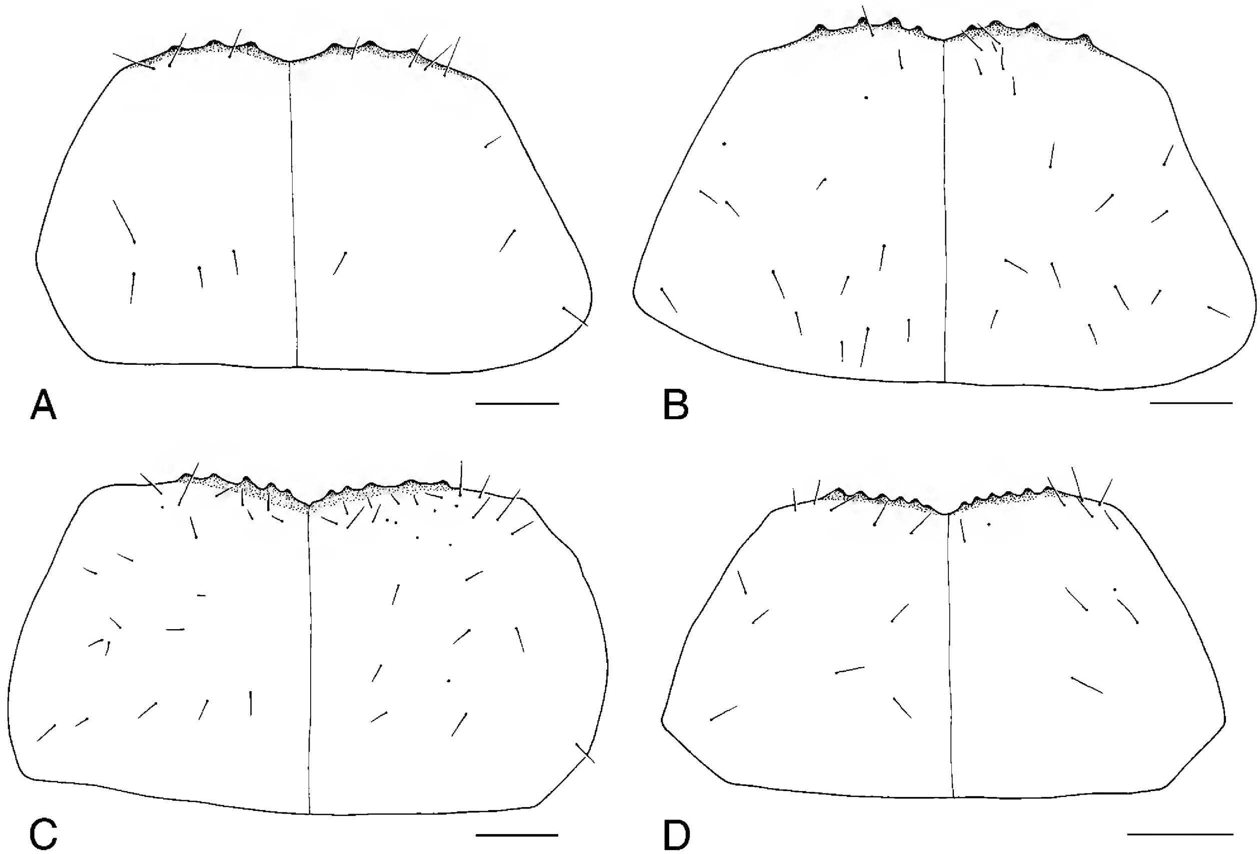

Figure 7. *Paralamyctes (Paralamyctes) monteithi* n.sp. Maxillipede coxosternite, showing variation in number of teeth on dental margin. A–C, Eungella NP, Dalrymple Rd, central eastern Queensland. A, ♂ AM KS 57904, 3+3 teeth; B, ♀ AM KS 57905, 4+4 teeth; C, ♀ AM KS 57906, 5+5 teeth. D, ♂ QM S42678, 6+6 teeth, Cold Creek via Imbil, southeastern Queensland. All scales 0.25 mm.

denticles scale-like, flattened, grading into rod-shaped scales then small elongate scales near fringe of branching bristles (Fig. 5M); slender, rod-like accessory denticles grade into furry pad; furry pad with many elongate, simple bristles, some bifid or pauciramous bristles.

First maxilla: Bell-shaped sternite of typical size for genus (Fig. 6F), anterolateral margins set in arthrodial membrane, posterolateral edge delimited from coxa by well-defined suture. Coxal process triangular, with 8–12 simple setae on anteromedial edge (Fig. 6C), this cluster usually separated from a few setae aligned on inner edge of coxal process. Cluster of minute, barb-like basiconic sensilla between coxal process and telopod. Distal article of telopod with two rows of long, plumose setae along inner margin; branches developed along distal half of these setae; short, simple setae on membranous strip alongside inner margin; main, more sclerotised field of distal article of telopod largely barren of setae, a few along outer margin.

Second maxilla: Sternite small, fused with coxae. Band of short setae along anterior part of coxa not prominent (Fig. 6J). Tarsus bearing numerous simple setae on outer surface, dense cluster of plumose setae on membranous patch on inner surface (Fig. 6K); branches on plumose setae mostly confined to distal half. Claw small, composed of five digits, median and outer pair long, thick, with shorter, needle-like digit between median and each outer digit (Fig. 6B).

Strong, pointed distal projections with sclerotised tips on tibiae of legs 1–14. Setae on legs of relatively uniform diameter, gracile. Premur with few short setae on anterior and posterior faces, numerous setae of varied lengths dorsally, some longer setae on ventral edge of prefemur; prefemur lacking ventral recess; longest setae on femur and tibia equal to or slightly shorter than longest on prefemur; a few slightly to indistinctly thickened setae encircling distal margin of femur; seta at ventrodistal edge of tibia distinguished by slightly darker (orange-brown) pigmentation but not significantly thickened; tarsal setae uniformly slender, of fairly even length. Articulation between tarsomeres strong on all legs, with small condyle dorsally. Distitarsus about 45% length of basitarsus on anal leg; anal leg basitarsus 9.5–11 times longer than broad (Fig. 9A). Pretarsal claws curved; pair of accessory claws symmetrical, about 25% length of main claw (Fig. 9A).

Longitudinal median furrow shallow on anterior half of sternites, extending to or behind midlength on sternites 14 and 15 (Fig. 6L), sometimes present along entirety of sternite. Short setae scattered across anterior third of sternites and along lateral margin, with strongest marginal setae anterolaterally; sternal setation similarly developed along length of trunk.

Coxal pores round or transversely ovate (Fig. 4B,C), commonly 4555/4555 or 5666/5666 in females, maximum

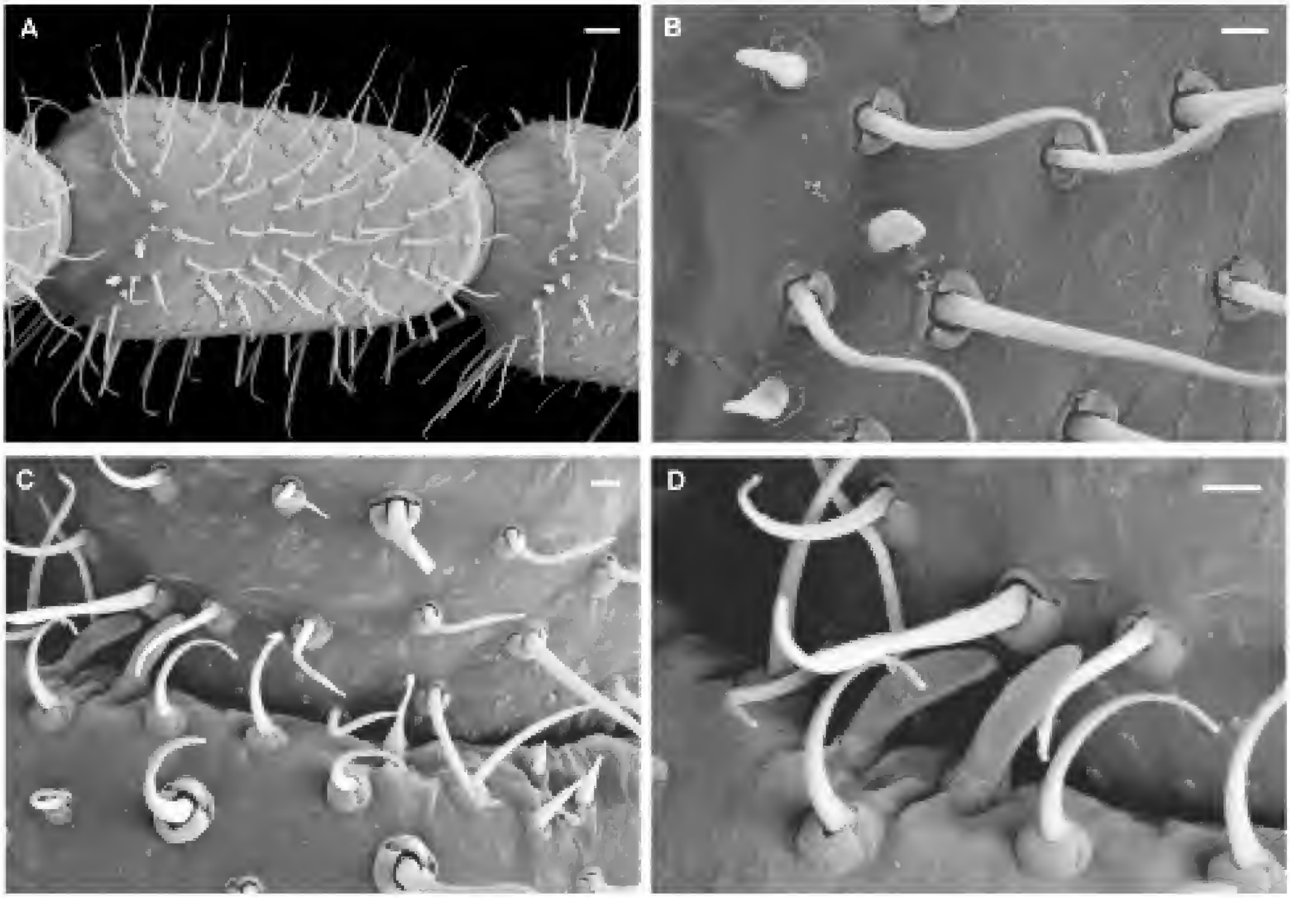

Figure 8. Antennal sensilla. A,B, *Paralamyctes (Paralamyctes) monteithi* n.sp. AM KS 57904, ♂, Eungella NP, Queensland. A, nearly dorsal view of second- to fourth-last antennal articles, showing trichoid sensilla, pair of thin-walled basiconic sensilla, scale 20 µm; B, seventh-last antennal article, anterior to left, showing trichoid sensilla with stop (*Kragen*) basally, three thin-walled basiconic sensilla, scale 5 µm. C,D, *Paralamyctes (Thingathinga) grayi* n.sp. ♂ AM KS 58466, Mt Barrengarry, NSW. C, fourth- and fifth-last antennal articles, showing pair of thin-walled basiconic sensilla at left, cluster of three thick-walled basiconic sensilla at right, scale 5 µm; D, detail of thin-walled basiconic sensilla, scale 5 µm.

6666/6666, minimum 3444/3444; males most commonly 4444/4444, maximum 5555/5555, not uncommonly 3333/3333. Coxal pore field delimited from anteroventral face of coxa by rounded edge in most specimens, or with variably developed fold, when present, distal coxal pores may be partly concealed in ventral view by fold (Fig. 6L). Anal pores large in both sexes (Fig. 4C).

Male (Fig. 4C): Sternite of segment 15 rounded posteriorly/posterolaterally. Sternite of first genital segment small, undivided, with transverse posterior margin, bearing numerous short, evenly scattered setae. Gonopod of three articles and tapering, seta-like terminal process, the three articles each bearing a few short setae; maximum length of penis equal to that of gonopod exclusive of terminal process, in some specimens only as long as first article of gonopod.

Female (Fig. 4B): Sternite of segment 15 transverse or convex posteromedially. Tergites of first genital segment and telson usually well sclerotised. Sternite of first genital segment large, posterior margin concave between condyles of gonopods, surface evenly scattered with short setae. First article of gonopod bearing two conical spurs of equal size; spurs gently curved such that tip points up; first and second articles of gonopod with mix of short and moderately long setae (Fig. 6I); third article with a few small setae. Claw undivided.

Discussion. Comparison with the only other Australian species of *P. (Paralamyctes), P. (P.) neverneverensis* n.sp., is made in discussion of that species below.

Paralamyctes (Paralamyctes) monteithi appears to be most closely related to *P. (P.) harrisi* Archey, 1922, from North Island, New Zealand. These taxa are particularly similar in the elongation of the antennomeres (all being longer than wide versus some subequally-proportioned antennomeres in other species of *Paralamyctes*, e.g., Figs. 13B, 15C), the identical structure of the mandibular aciculae, a much elongated pretarsal component of the maxillipede tarsungulum, particularly dense setation on the inner part of the forcipule (e.g., numerous long setae on the tibia and femur; Fig. 6G), and the shape of the maxillipede coxosternite. In both species, the dental margin of the coxosternite is wide and usually biconvex, and the outer part of the margin is conspicuously devoid of teeth (Fig. 7). *Paralamyctes (P.) harrisi* also resembles *P. monteithi* in having the Tömösváry organ shifted lateral to the main surface of the cephalic pleurite, such that the organ comes

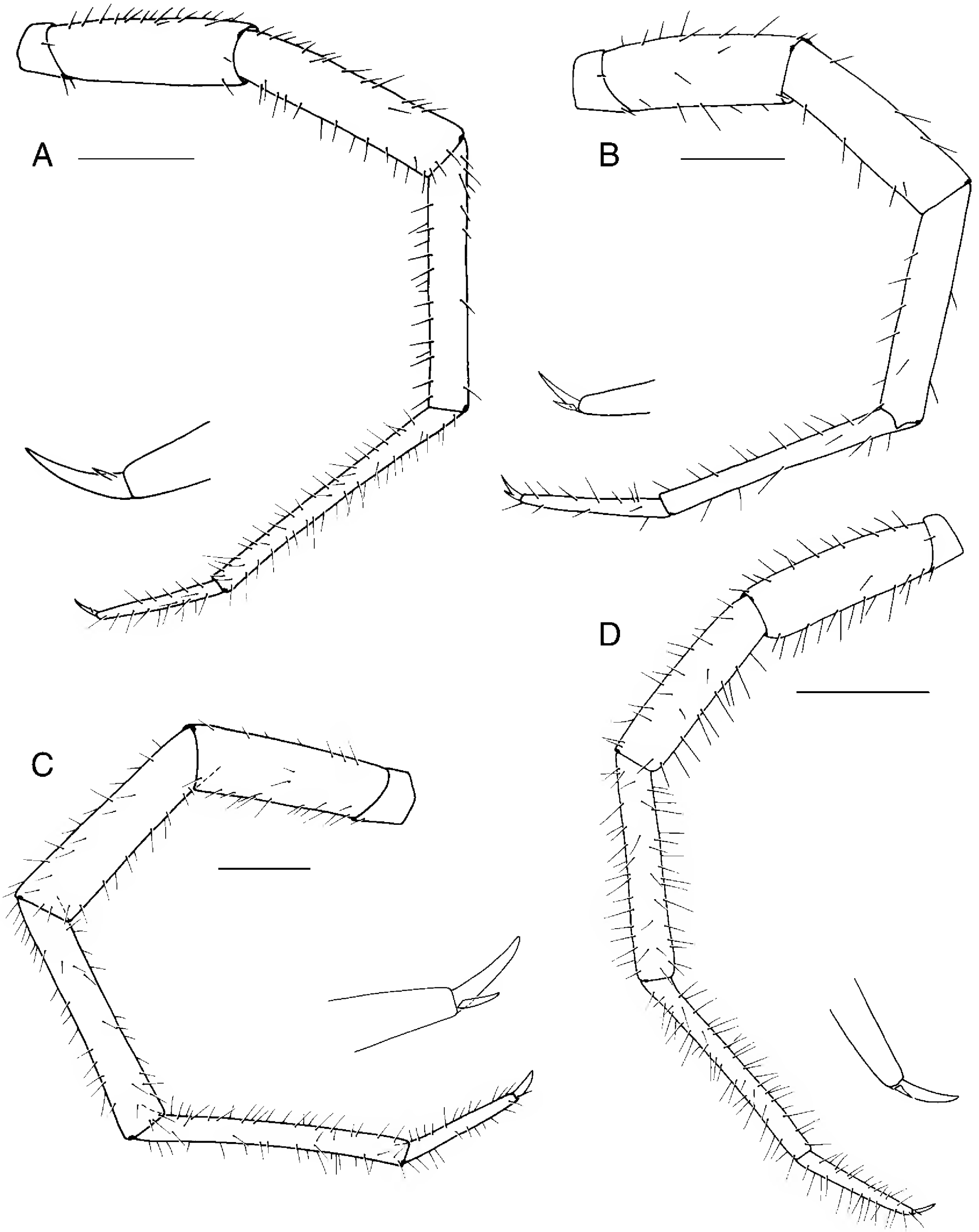

Figure 9. Anal legs of *Paralamyctes (Paralamyctes)*, with details of pretarsi. A, *P. (P.) monteithi* n.sp., ♀ AM KS 57906, Eungella NP, Queensland. B, *P. (P.) neverneverensis* n.sp., ♂ AM KS 57955, Dorrigo NP, NSW. C, *P. (P.) harrisi* Archey, 1922, ♀, CAS, White Pine Bush, Hawkes Bay, New Zealand. D, *P. (P.) spenceri* Pocock, 1901, ♂, Natal Museum, Town Bush, Pietermaritzburg, KwaZulu-Natal, South Africa. Scales 1 mm except B, 0.5 mm.

to lie on the ventral margin of the head (Fig. 5A,G). In other species of *Paralamyctes* and in other Henicopidae, the Tömösváry organ is situated on the flat surface of the pleurite (Figs. 11G, 14J, 20L, 21I, 25M). These characters provide evidence for a sister species relationship between the Queensland and New Zealand taxa. *Paralamyctes (P.) monteithi* is distinguished from *P. (P.) harrisi* by usually having more antennal articles (typically 17 in *P. harrisi*, but occasionally as many as 20), having a less setose anterolateral part of the maxillipede coxosternite, and by having a constriction of the cephalic pleurite behind the Tömösváry organ (see discussion below).

Paralamyctes monteithi has a broad geographic range, but it has not proven possible to consistently differentiate populations from different parts of the range based on external morphology. All Queensland samples share a typical development of 20 elongate antennomeres and have the Tömösváry organ at the ventral margin of the head. The cephalic pleurite that bears the Tömösváry organ is relatively steeply inclined, whereas it more consistently lies horizontally in other species of *Paralamyctes*. The suture that delimits the cephalic pleurite displays a most peculiar course around the Tömösváry organ, the pleurite narrowing sharply behind the organ (Figs. 5G,H, 6D). An elongate body, expressed by the relative lengthening of the head shield and long tergites, is developed throughout the range of the species. These characters indicate that all of the Queensland material is closely related (a monophyletic group).

Within this widespread species, the most distinctive variant is observed from the summits of Mt Bellenden Ker and Mt Bartle Frere, in which the posterior margins/angles of tergites 12–14 exhibit a measure of sexual dimorphism that is otherwise not observed in the species (or in other *Paralamyctes*, in which dimorphism in the tergites is usually limited to the tergite of the intermediate segment being relatively wider in females). Males on Bellenden Ker have less concave posterior margins of TT12–14 and more rounded posterior angles than do females, or males from other localities. The Bellenden Ker sample has either 3+3 or 4+4 teeth on the dental margin of the maxillipede coxosternite, whereas material from other parts of the range (including other localities in the Wet Tropics region) usually has more teeth. Specimens from the southern part of the range (Lamington and Kenilworth/Imbil regions) have 5+4, 5+5 or 6+6 teeth (Fig. 7D), and the dental margin is more trapezoidal than semicircular (compare Fig. 6E,H for maximum difference). However, these same characters are present in specimens from the Bluewater Range and Cardwell Range/Cardwell Gap in the Wet Tropics, so the southeastern Queensland samples cannot be segregated on this basis. Indeed, the sample from Eungella confounds distinguishing geographic groupings within *P. monteithi* based on tooth number or shape of the coxosternite, having 3+3, 4+4, and 5+5 teeth about equally represented in a single population (Fig. 7A–C), and the dental margin varies from wide/biconvex (Fig. 7C) to approximately semicircular (Figs. 6H, 7A).

Paralamyctes (Paralamyctes) neverneverensis n.sp.

Figs. 9B, 10, 11

Etymology. For the Never Never, Dorrigo NP, where the species occurs.

Diagnosis. *Paralamyctes (Paralamyctes)* with Tömösváry organ on cephalic pleurite, without modification of sutures around it as in *P. (P.) monteithi*; dental margin of maxillipede coxosternite relatively narrow, with 5+5 or 6+6 large, pointed teeth; pretarsal section of tarsungulum relatively short; spinose distal projection on tibia of leg 15.

Type material. HOLOTYPE AM KS 61063, ♀ (Fig. 10A,B), Nana Creek SF, 5 km ENE of Lowanna, NSW, 30°11'51"S 152°56'53"E, MRG, G. Milledge and H. Smith, 10–23 Nov 1999, pitfall. PARATYPES: QM S42666, 1♂ (Fig. 11), S42667, 1♀, Dorrigo NP, NSW, Never Never, 700 m, GBM, 1980–1981, pitfall, rainforest; AM KS 57955, 1♂ (Figs 9B, 10C; DNA voucher specimen), Dorrigo NP, Wonga Walk, 200 m E of Tristania Falls, 30°22'S 152°44'E, G. Giribet, M.K. Nishiguchi and Y.-y. Zhen, 29 Mar 2000, rainforest litter.

Description. This species is sufficiently similar to *P. (P.) monteithi*, described in full above, to limit description to features that differ. Description of colour in a freshly collected specimen is also provided because this information is often lacking in preserved material.

Length of head shield up to 1.4 mm. Head with irregular chestnut mottling, bright orange band along transverse suture; antennae dark orange, lighter distally; maxillipede bright orange; tergites light orange with chestnut median longitudinal patch and posterior and lateral margins; sternites with irregular purple and chestnut network; proximal part of legs light yellow with blue patches, tarsi orange.

Antenna with 20–21 articles; basal two articles considerably larger than succeeding ones, several articles of subequal length and width, including on distal part of antenna (Fig. 11H). Inner margin of labrum gently shouldered. Tergite shapes as for *P. (P.) monteithi* except for slightly shorter TT12 and 14 (Fig. 10A). Maxillipede coxosternite trapezoidal (Fig. 11K); dental margin convex, each half sloping posteromedially; narrow band along dental margin sclerotised to same extent as teeth; median notch shallow or lacking (Fig. 11M); pretarsal part of tarsungulum slightly longer than tarsal part (Fig. 11L). About five setae on anteromedial edge of coxal process of first maxilla (Fig. 11I). Distitarsus about 55% length of basitarsus on anal leg; anal leg basitarsus about 10 times longer than broad (Fig. 9B). Coxal pores round; 2344/2344, 2443/2344 in females; 2222/2222, 2333/2233 in males. Genital sternite and gonopods of both sexes (Fig. 10B,C) indistinguishable from *P. (P.) monteithi*.

Discussion. *Paralamyctes neverneverensis* co-occurs with *P. (Nothofagobius) cassisi* in the Dorrigo region. They are most readily distinguished by the former's fewer antennal articles, more dentate margin of the maxillipede, larger T1, and two (versus three) spurs on the female gonopod, without an extension on the spur-bearing segment. Mandibular characters also provide obvious distinction (e.g., strongly pinnulate versus simple aciculae).

Paralamyctes (Paralamyctes) neverneverensis is distinguished from the Queensland species *P. (P.) monteithi* by having the Tömösváry organ on the surface of the cephalic pleurite (Fig. 11G) rather than on the ventral margin of the head. The peculiar sutural course around the Tömösváry organ is unique to *P. (P.) monteithi*, whereas *P. (P.) neverneverensis* retains the typical pleurite morphology that is primitive for *Paralamyctes* (indeed, general for Henicopidae). Further distinction between the New South Wales and Queensland species is provided by the larger teeth on the maxillipede coxosternite in the former, the narrower dental margin, the shorter tarsungulum on the maxillipede (Fig. 11K–M), and the presence of some short antennal articles (Fig. 11H). The differences cannot be attributed to ontogeny (all specimens of *P. neverneverensis* being relatively small) because the specific differences can be discerned in equivalent sized and even smaller specimens of *P. monteithi*. Even the larval stage with 10 legs and two limb-buds (equivalent to the third larval stadium of

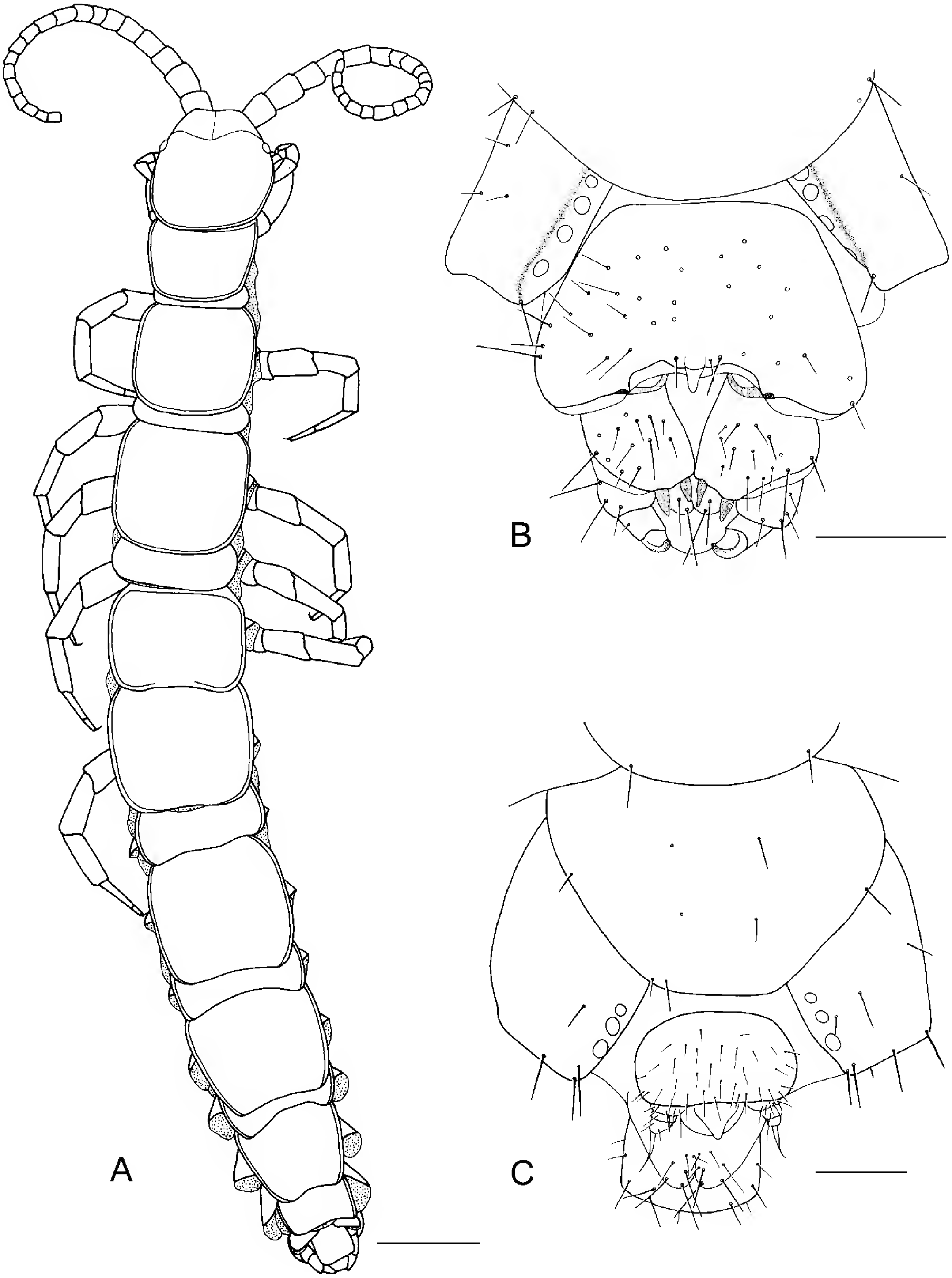

Figure 10. *Paralamyctes (Paralamyctes) neverneverensis* n.sp. A,B, holotype ♀ AM KS 61063, Nana Creek SF, NSW; B, terminal segments and gonopods; scales 1 mm, 0.25 mm. C, paratype ♂ AM KS 57955, terminal segments and gonopods, Dorrigo NP, NSW; scale 0.25 mm.

Lithobius variegatus: Eason 1964) already has a long maxillipede tarsungulum and only 3+3 blunt teeth on the dental margin in *P. monteithi* (QM S45147).

The maxillipede coxosternite in *P. (P.) neverneverensis* is similar in shape to that of *P. (P.) spenceri* from southern Africa, and these species also share larger, more pointed teeth than are developed in other species of the subgenus. *Paralamyctes neverneverensis* is distinguished from *P. spenceri* by having distal spinose projections on the tibiae of all trunk legs [see Fig. 9 for comparison of anal legs in *P. (Paralamyctes)*] and by having a shorter maxillipede tarsungulum.

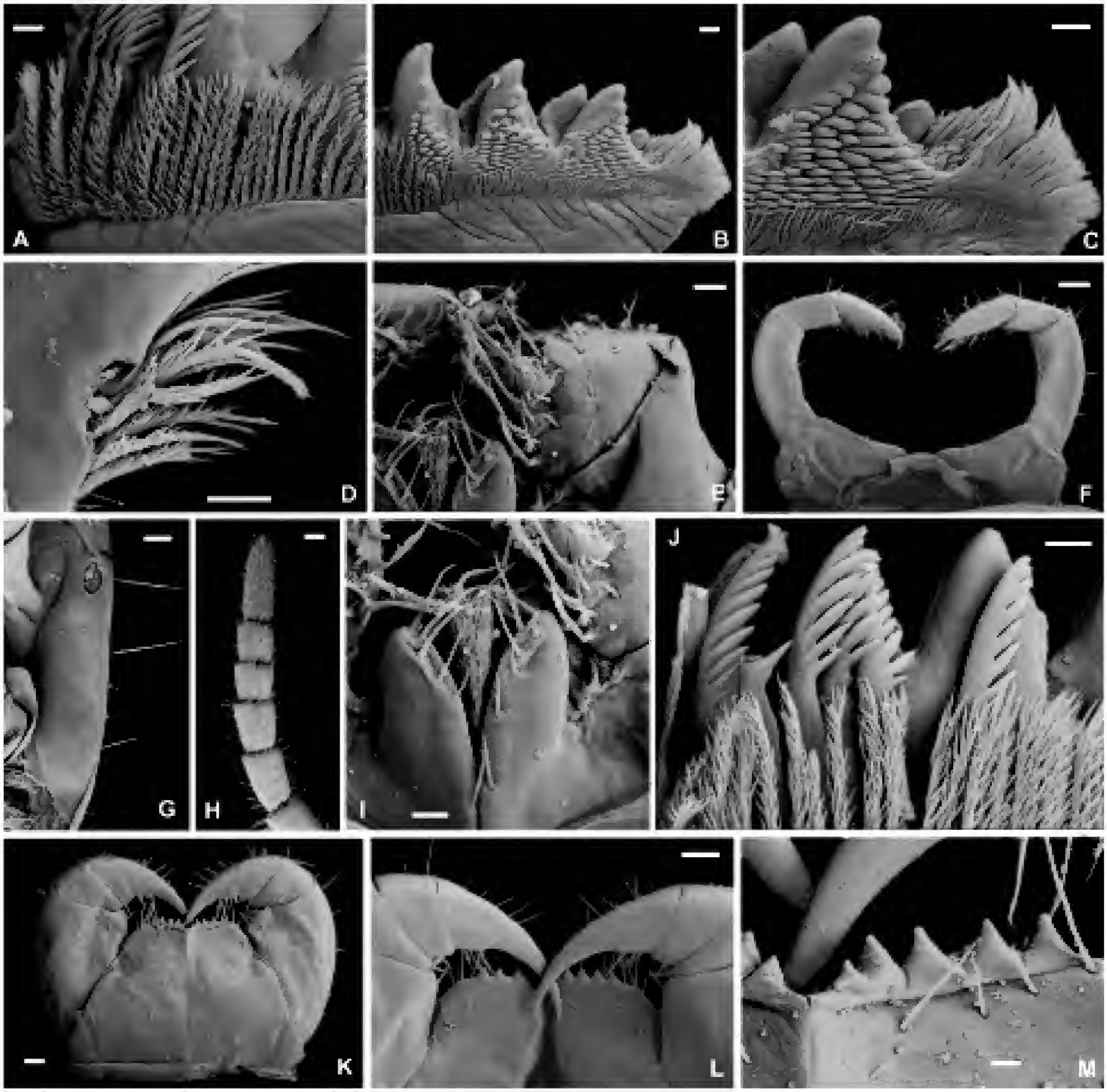

Figure 11. *Paralamyctes (Paralamyctes) neverneverensis* n.sp. ♂ QM S42666, Never Never, Dorrigo NP, NSW. Scanning electron micrographs. A, fringe of branching bristles on mandible, scale 10 µm; B,C, mandibular teeth and furry pad, scales 10 µm; D, branching bristles on labral margin, scale 10 µm; E, telopod of first maxilla, scale 20 µm; F, second maxillae, scale 100 µm; G, cephalic pleurite, scale 50 µm; H, distal articles of antenna, scale 20 µm; I, coxal processes of first maxilla, scale 20 µm; J, mandibular aciculae, scale 10 µm; K, maxillipedes, scale 100 µm; L,M, dorsal and ventral views of maxillipede dental margin, scales 100 µm, 20 µm.

Paralamyctes (Thingathinga) n.subgen.

Etymology. *Thingathinga*, the Yaurorka name for centipede (Johnston, 1943).

Diagnosis. *Paralamyctes* with simple (non-pinnulate) mandibular aciculae; dental margin of maxillipede coxosternum wide, subtransverse, bearing numerous (6–12) small, knob-like teeth; coxal process of first maxilla gently tapering, blunt, with cluster of setae concentrated on tip; articulation between tarsomeres of anterior legs developed ventrally but fused dorsally; longitudinal median furrow confined to anterior part of sternites.

Type species. *Paralamyctes (Thingathinga) grayi* n.sp.

Assigned species. *Paralamyctes validus* Archey, 1917 (= *P. dubius* Archey, 1917); *Paralamyctes (Thingathinga) hornerae* n.sp.

Distribution. Australia (New South Wales), New Zealand (North and South Islands).

Discussion. *Thingathinga* n.subgen. is endemic to New South Wales and New Zealand. The simple mandibular aciculae that unite species of *Thingathinga* (Figs. 13F, 18K; Edgecombe *et al.*, 2001: fig. 5G) are elsewhere observed in Henicopidae only in Australian species of *P. (Nothofagobius)*, but a majority of character data suggests independent origins of simple aciculae from bipinnulate aciculae in these two groups. Congruent with simple aciculae in *Thingathinga* are a wide, subtransverse dental margin of the maxillipede that bears at least six small teeth (Figs. 15B,I, 18E), and a blunt and weakly tapering coxal process on the first maxilla (Figs. 14G,H, 15K, 18G). The setae on the tip of the coxal process are segregated from those along the medial margin of the process more so than in the other subgenera of *Paralamyctes*, in which the setae are developed along a sloping anteromedial edge of the coxal process (compare Figs. 14H and 11I, 20G). Species of *P. (Thingathinga)* have weaker tarsal articulations than other *Paralamyctes*, the articulation in anterior legs having a narrow fused region along the dorsal edge. The relatively incomplete median furrow on the sternites in *P. (Thingathinga)* provides a distinction from *P. (Paralamyctes)* in particular.

The subdued tarsal articulations of *P. (Thingathinga)* invite comparison with *Lamyctopristus validus* Attems, 1928, from South Africa, in which a faint trace of a joint is sometimes present on legs 1–12. Assignment of *Thingathinga* to *Lamyctopristus* can be dismissed based on the deep median notch on the maxillipede coxosternite of *L. validus* and *L. granulosus* Lawrence, 1955b, and presence of only three large teeth on the dental margin in both species of *Lamyctopristus*. I have examined the sole specimen of the type species (SAM ENW X7515). Attems (1928) did not describe a small conical node lateral to these teeth in the holotype of *L. validus* that corresponds to the pseudoporodont of *Lamyctes, Lamyctinus* and *Analamyctes*. The median furrow on the head of *Lamyctopristus validus* terminates just behind the median notch, thus excluding this species from the *Paralamyctes*/*Haasiella* clade. An alliance between *Lamyctopristus* and *Lamyctes, Lamyctinus* and *Analamyctes* is indicated by short antennomeres occurring in pairs between groups of longer antennomeres in the proximal part of the antenna, the subtriangular outline of the maxillipede coxosternite (narrow, curved dental margin), and presence of a pseudoporodont (characters 4(1), 11(0), and 14(0), respectively, of Edgecombe *et al.*, 2001).

Paralamyctes (Thingathinga) grayi n.sp.

Figs. 8C,D, 12–14, 15A–G,H–M?, 16A?, 16B

Paralamyctes n.sp.–Edgecombe *et al.*, 1999: 295.
Paralamyctes n.sp.–Edgecombe *et al.*, 2000: fig. 3C,D.

Etymology. For Michael R. Gray, in recognition of his career in terrestrial arthropods at the Australian Museum, and for collecting this species throughout much of its range.

Diagnosis. *Paralamyctes (Thingathinga)* with antenna of 22–29 articles; ocellus weakly convex; mandible with up to 15 simple aciculae; coxal process of first maxilla bearing up to 25 simple setae, usually about 15; 6–12 small teeth on dental margin of maxillipede coxosternite (most commonly 7+7 at type locality); ventral edge of prefemora commonly recessed; five to eight coxal pores on each of legs 12–15, set in deep grooves and largely concealed by anteroventral face of coxa; coxal pores usually ovate or figure eight-shaped; distal spinose projection on tibia of leg 14 but not 15; short setae abundant on genital sternite and female gonopods; penis small; terminal process on male gonopod short.

Type material. Holotype AM KS 57912, ♂ (Fig. 12A), from former Scout camp, Mt Keira Fauna Reserve, NSW, 34°24'S 150°50'E, C. Horseman, 20 Nov 1978–17 Jan 1979, pitfall. Paratypes: all from type locality, C. Horseman and MRG, pitfalls: Australian Museum KS 35607, 4♂♂, 6♀♀, KS 57913, 1♀ (Fig. 15A–E), 14 Nov 1974; KS 35833, 1♂, KS 35835, 4♂♂, 2♀♀, KS 35836, 2♂♂, 1♀, KS 57916, 1♂, KS 57917, 1♂, 2♀♀, KS 57918, 3♂♂, 23 Nov–20 Dec 1978; KS 35834, 1♂, 23 Jun–20 Dec 1978; KS 35837, 2♂♂, KS 35838, 1♂, KS 35839, 7♂♂, KS 35840, 1♂, 17 Jan–14 Feb 1979; KS 35841, 1♂, 1♀, 7 Sep–4 Oct 1979; KS 35858, 1♂ (Fig. 15G), KS 57914, 1♂ (Figs. 13A,B, 14A–C,J,K, 15F), KS 57915, 1♀ (Figs. 13F, 14D–F,L), 31 Jan 1979; KS 35860, 1♂, KS 35863, 1♂, KS 35866, 1♂, KS 35868, 2♀♀, 14 Mar–11 Apr 1979; KS 57919, 2♂♂, 1♀, KS 57920, 6♂♂, 1♀, 20 Nov 1978–17 Jan 1979; KS 57921, 6♂♂, 1♀, 23 Nov–20 Dec 1978; KS 41430, 1♀ (Fig. 16B), KS 57922 (Figs. 13C–E,G–M, 14G–I), KS 57923, 1♂ (Fig. 12C), KS 57924, 1♀ (Fig. 12B), KS 57925, 9♂♂, 6♀♀, KS 57926, 1♂ (Fig. 14M), KS 57927, 6♂♂, 1♀, 20 Nov 1978–17 Jan 1979; KS 57928, 6♂♂, 6♀♀, 14 Feb 1979; KS 57929, 1♂, 14 Mar–11 Apr 1979; KS 57930, 1♂, 1♀, 11 Apr–17 Jun 1979; ANIC, 1♀, Mt Keira Scout camp, 320 m, L.C. Calder, 4–5 Mar 1981, litter Berlese.

Other material. Illawara: AM KS 57931, 2♀♀, KS 57932, 2♂♂, 1♀ (DNA voucher specimens), KS 58466, 9♂♂ (Fig. 8C,D), 6♀♀, Mt Barrengarry, 6.8 km N of Hampden Bridge, 34°42'S 150°30'E, GDE and ZJ, 2 Mar 1997, 13 Nov 1997, 30 Sep 2000, rainforest; CAS, 5♂♂, 5♀♀, Robertson, 760 m, E.S. Ross and D.Q. Cavagnaro, 8 Dec 1962. Budawang Range: AM KS 57933, 2♂♂, Budawang NP, Clyde Mountain, 35°33'S 149°57'E, GDE and ZJ, 2 Jan 2000, hand collected in litter, open eucalypt forest. Blue Mountains: AM KS 35600, 1♀, KS 35826, 1♂, KS 35828, 1♂, KS 35861, 2♂♂, KS 35865, 2♂♂, KS 57934, 5♂♂, Cathedral of Ferns, Mt Wilson, 33°30'S 150°23'E, MRG and C. Horseman, Jun 1978–Jun 1979, pitfall; KS 30391, 1♂, Kanangra-Boyd NP, Boyd Plateau, 33°44'S 150°25'E, MRG, 15 May 1971; AM KS 57935, 1♂ and 1♀, road to Ingar picnic area, 33°46'05"S 150°24'30"E, Australian Museum Business Services, 3 Oct 1996; AM KS 57936 (DNA voucher specimen), Ingar picnic area, 33°46'S 150°28'E, GDE, G. Giribet and ZJ, 21 Apr 2000. Barrington Tops: AM KS 57937, 1♀ (Fig. 16A), Chichester SF, Mt Allyn Rd, adjacent to Mt Allyn Forest Park, 32°07'04"S 151°25'33"E, 970 m, GC and MRG, 4 Feb–9 Apr 1993, pitfall; AM KS 57938, 1♂, from Chichester SF, 1.8 km N of ford on Karuah River on Karuah River Rd, 32°05'58"S 151°43'18"E, GC and MRG, 4 Feb–9 Apr 1993, pitfall; AM KS 57939, 1♂, Barrington Tops SF, W of junction of Thunderbolts Track and Devils Hole Track, 31°54'S 151°28'E, 1420 m, MRG and GC, 4 Feb–9 Apr 1993, pitfall; AM KS 57940, 1♀ (Fig. 15H–M; DNA voucher specimen), Chichester SF, Mt Allyn Forest Park, GDE and ZJ, 16 Mar 1999, rainforest.

Description. Length up to 32 mm; length of head shield up to 3.3 mm. Antennae and maxillipedes bright orange, antennae lighter distally; head shield and tergites mottled orange-brown, with darker pigment concentrated near

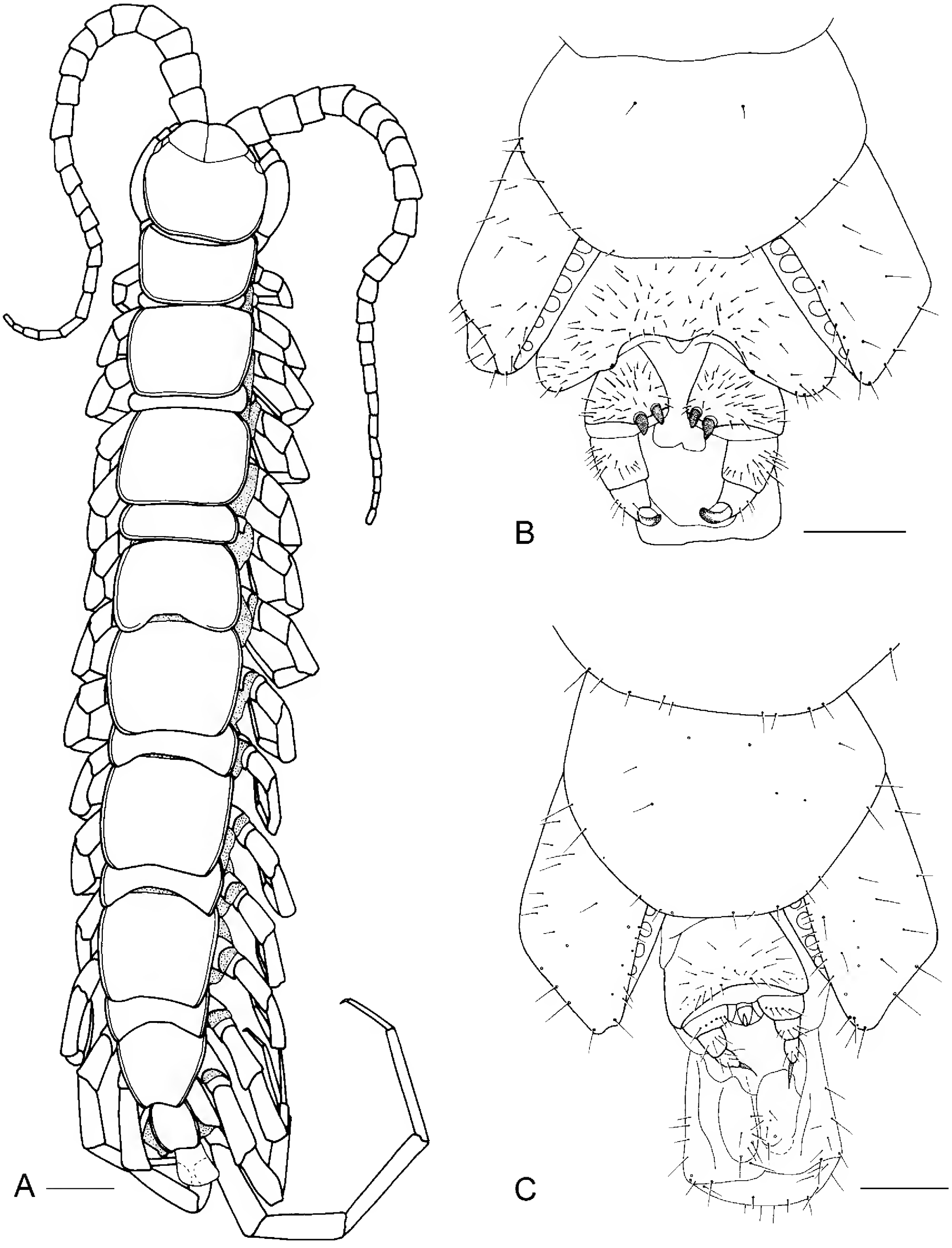

Figure 12. *Paralamyctes (Thingathinga) grayi* n.sp. Mt Keira Fauna Reserve, NSW. A, holotype ♂ AM KS 57912. Antennae incomplete distally; scale 2 mm. B, paratype ♀ AM KS 57924, terminal segments and gonopods; scale 0.5 mm. C, paratype ♂ AM KS 57923, terminal segments and gonopods; scale 0.5 mm.

lateral and posterior borders; sternites mottled, predominantly yellowish or light orange in anterior segments, darker orange-brown in posterior segments; legs relatively uniformly orange, pigmentation of tarsus only slightly deeper than tibia.

Head shield smooth. Frontal margin with strong, short median notch (Fig. 12A); posterior margin gently concave. Median furrow extends back to transverse suture, length about 30% that of head shield, deep throughout. Antenna extending back to T5 or T6 (Fig. 12A); 22–29 antennal articles, most commonly 23 at Mt Wilson (range from 22–28), 25 at Mt Keira (range 23–29); basal two articles large, succeeding six or so of similar length and width, some wider than long (Figs. 13B, 15C), more distal articles considerably longer than wide; distal article variably longer than preceding one, typically about 40% longer; antennal articles

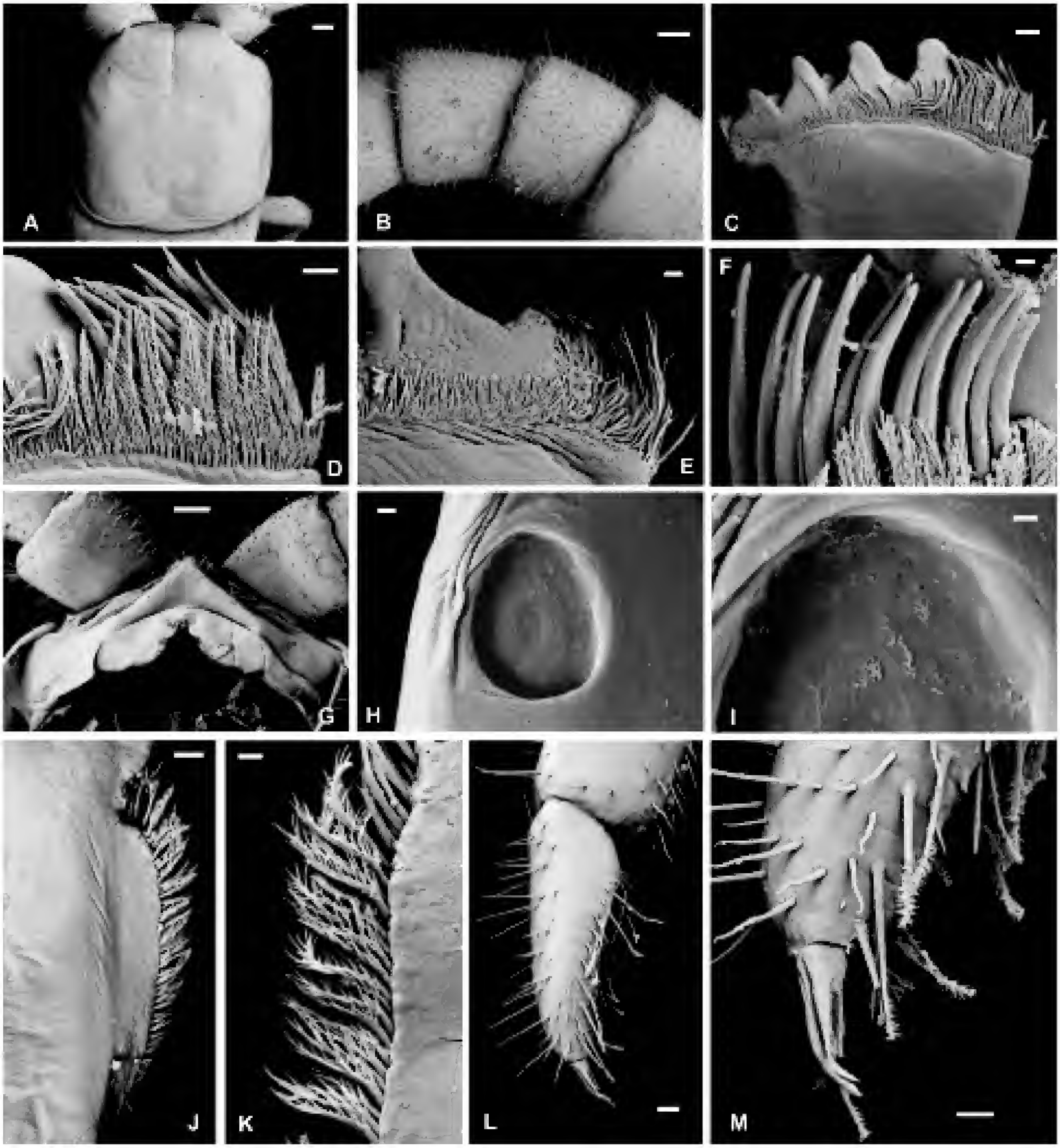

Figure 13. *Paralamyctes (Thingathinga) grayi* n.sp. Mount Keira Fauna Reserve, NSW. Scanning electron micrographs. A,B, ♂ AM KS 57914. A, head shield, scale 300 µm; B, proximal antennal articles, scale 200 µm. C–E,G–M, AM KS 57922. C, gnathal lobe of mandible, scale 50 µm; D, fringe of branching bristles and aciculae of mandible, scale 30 µm; E, furry pad on mandible, scale 10 µm; G, ventral view of head, scale 300 µm; H,I, Tömösváry organ, scales 10 µm, 5 µm; J,K, labral margin and detail of branching bristles on margin, scales 30 µm, 10 µm; L,M, distal part of telopod of second maxilla, scales 60 µm, 30 µm. F, ♀ AM KS 57915, mandibular aciculae, scale 10 µm.

densely, finely setose, with distinctly longer setae (ridged trichoid sensilla) encircling distal edge (Fig. 13B); basal articles with sparser, more robust setae (Figs. 13G, 14A). One to three (usually two) finger-shaped thin-walled basiconic sensilla (Fig. 8D) and one to four (usually two or three) shorter, conical thick-walled basiconic sensilla at anterior edge of antennal articles (Fig. 8C); cluster of thick-walled basiconic sensilla (*blasse Borsten*) at tip of distal article; stop (*Kragen*) at base of trichoid sensilla as described for *P. (P.) monteithi*. Ocellus whitish, gently bulging. Tömösváry organ moderately large, ovate, with outer edge at margin of cephalic pleurite (Figs. 13H, 14J), membranous

Figure 14. *Paralamyctes (Thingathinga) grayi* n.sp. Mount Keira Fauna Reserve, NSW. Scanning electron micrographs. A–C,J,K, ♂ AM KS 57914. A, ventral view of head, scale 200 µm; B,C, first maxillae and detail of distal article of telopod, scales 100 µm; J, cephalic pleurite, scale 100 µm; K, pectinate setae on inner margin of distal article of first maxillary telopod, scale 30 µm. D–F,L, ♀ AM KS 57915. D, maxillae, scale 200 µm; E, first maxillae and coxosternite of second maxillae, scale 100 µm; F, coxa of second maxilla, scale 100 µm; L, tarsus and claw of second maxilla, scale 10 µm. G–I, AM KS 57922. G, first maxillae, scale 100 µm; H, coxal processes of first maxillae, scale 50 µm; I, basiconic sensilla between coxal process and telopod of first maxilla, scale 5 µm. M, ♂ AM KS 57926, gonopod flagellum, scale 10 µm.

medially, numerous small pores (openings of gland ducts) scattered around edges of inner surface (Fig. 13I). Head shield sparsely setose, two pairs of setae on frontal margin outside median notch, a few setae around ocellus and along lateral border.

Tergites nearly smooth. T1 trapeziform, smaller than T3, very slightly narrower than head shield (Fig. 12A), about 90% width of widest tergite (T8), posterior angles rounded and posterior margin faintly concave; lateral borders subparallel anteriorly in TT3 and 5, posterior angles

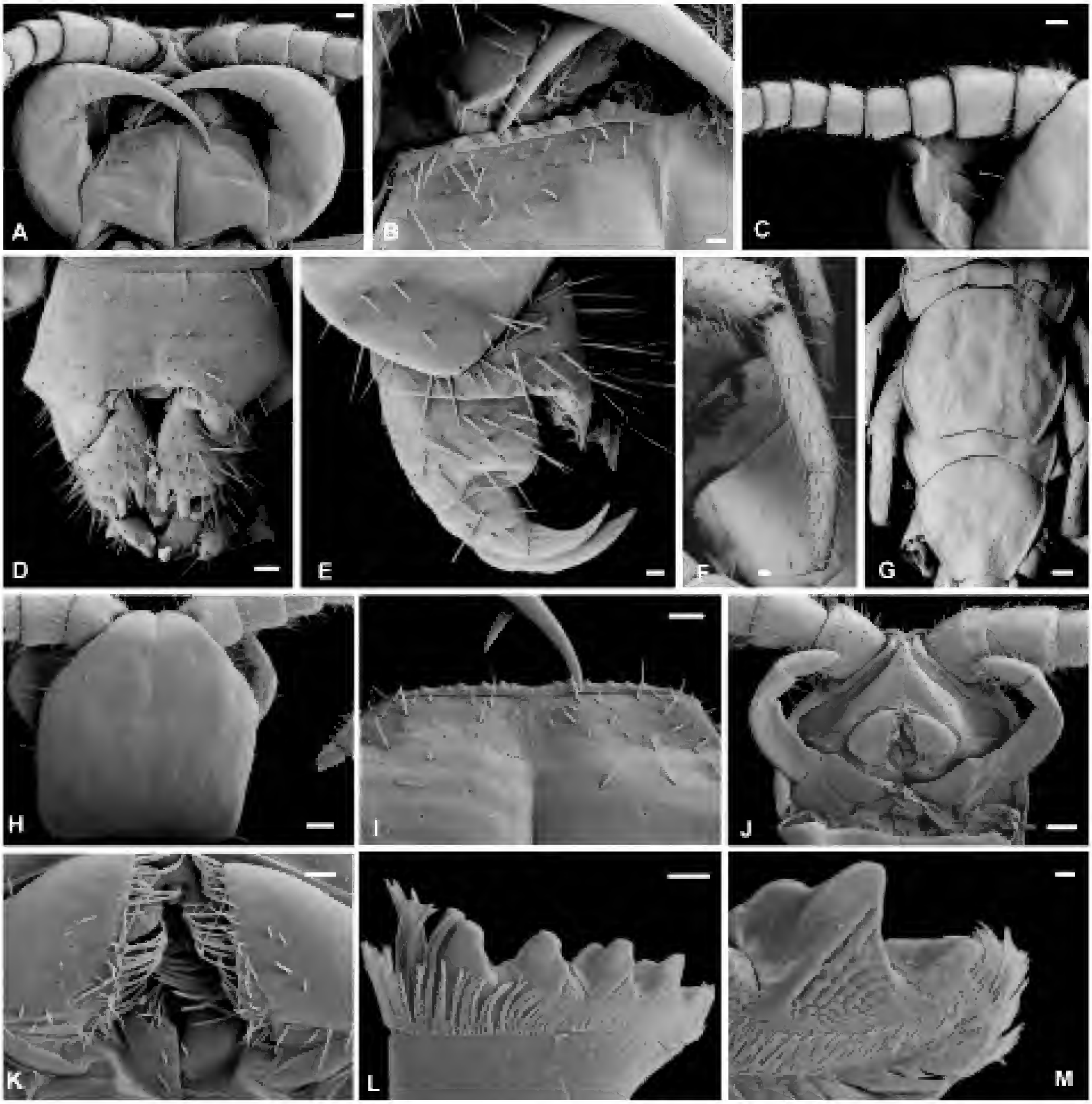

Figure 15. A–G, H–M?, *Paralamyctes (Thingathinga) grayi* n.sp. A–G, Mount Keira Fauna Reserve, NSW. A–E, ♀ AM KS 57913. A, ventral view of head, scale 200 µm; B, dental margin of maxillipede coxosternite, scale 50 µm; C, proximal part of antenna, scale 200 µm; D, sternite of first genital segment and gonopods, scale 100 µm; E, gonopods, scale 40 µm. F, ♂ AM KS 57914, tibia, tarsus and pretarsus of leg 1, scale 60 µm. G, ♂ AM KS 35858, tergites 10–14, scale 400 µm. H–M, ♀ AM KS 57940, Chichester SF, Barrington Tops, NSW. H, head shield, scale 200 µm; I, dental margin of maxillipede coxosternite, scale 100 µm; J, ventral view of head to show maxillae, scale 200 µm; K, telopods and coxal processes of first maxillae, scale 50 µm; L, gnathal lobe of mandible, scale 50 µm; M, accessory denticles and furry pad on mandible, scale 10 µm.

rounded, posterior borders weakly concave; TT1, 3 and 5 bordered posteriorly; lateral border of T7 gently convergent posteriorly, border incomplete posteriorly, posterior margin with pronounced embayment, transverse or slightly convex across medial quarter of width; TT8–14 bordered laterally; posterior margin of T8 gently concave, posterior angle rounded, TT10 and 12 more concave posteriorly, posterior angles form obtuse, sharp corners; TT9 and 11 embayed, with transverse posteromedial third; posterior angle of T9 blunt, TT11 and 13 angular; lateral margin of T14 convex, posterior margin concave (Fig. 15G); tergite of intermediate segment elongate subhexagonal, slightly wider in females, posterior margin concave in both sexes; no tergites toothed at posterior angles. TT3, 5 and 7 with most abundant setae on anterior/anterolateral part, sparsely setose elsewhere except for numerous short setae along lateral borders

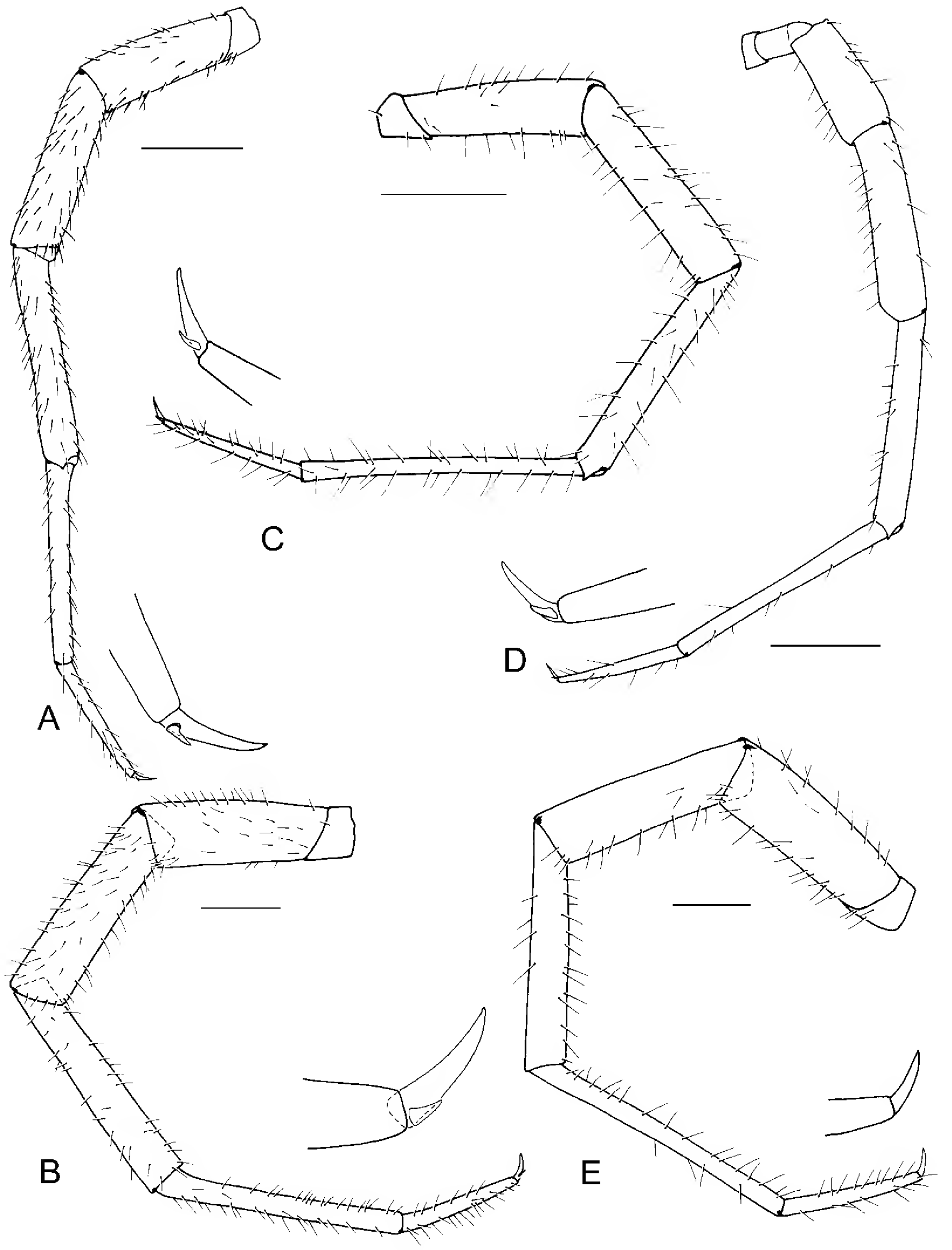

Figure 16. Anal legs of *Paralamyctes (Thingathinga)* and *P. (Nothofagobius)*, with details of pretarsi. A, *P. (Thingathinga)* ?*grayi* n.sp., ♀ AM KS 57937, Chichester SF, Barrington Tops, NSW. B, *P. (Thingathinga) grayi* n.sp., ♀ AM KS 41430, Mt Keira Fauna Reserve, NSW. C, *P. (Nothofagobius) mesibovi* n.sp., QVMAG 23/23009, holotype ♀, Wombat Hill, Waratah, Tasmania. D, *P. (Nothofagobius) cassisi* n.sp., ♂ QM S42670, Gibraltar Range NP, NSW. E, *P. (Nothofagobius) chilensis* (Gervais in Walckenaer & Gervais, 1847), ♀ ZMUC , Colonía Suiza, San Carlos de Bariloche, Argentina. Scales 1 mm except E, 0.5 mm.

(present on all tergites); setae more evenly scattered over surface of posterior long tergites (Fig. 15G).

Transverse seta projects medially from labral sidepiece. Labral margin with rounded shoulder beside midpiece, with marked break in curvature where dense fringe of branching bristles overhangs margin (Fig. 13G,J); bristles generally branch as uneven, elongate bifurcations along nearly their entire length (Fig. 13K).

Dental margin of maxillipede coxosternite broad, each half approximately straight, gently sloping backwards laterally, set off by transverse furrow (Fig. 15B); teeth small, blunt, 6–10 teeth per margin, most commonly 7, in Mt Keira sample; 7–12 teeth per margin, most commonly 9, in Mt Wilson sample; median notch in coxosternite shallow or lacking; maximum length of coxosternite 60% of its maximum width (Fig. 15A); setae concentrated on anterior/

anterolateral part of coxosternite, longer anterolaterally. Duct of poison gland short, extending to anterior one-third of tibia, tubular. Tarsungulum long, slender (Fig. 15A). Setae on forcipule concentrated on inner part of trochantero-prefemur, femur and tibia and scattered over tarsal part of tarsungulum.

Mandible: Trunk with single fissure defining lamina condylifera. Four paired teeth (Fig. 13C), small, unpaired fifth tooth dorsally on one side. Outer fringe of bifid bristles skirts aciculae, evenly shortening dorsally to a narrow band, with branches along entire length of each bristle (Fig. 13D). 12–15 curved aciculae, all lacking marginal branchings (Fig. 13F). Accessory denticle field delimited by strong groove on two or three dorsal teeth; largest denticles tubercle-like, grading into rod-shaped scales then small elongate scales near fringe of branching bristles. Furry pad strongly differentiated from accessory denticles / gnathal lobe, developed as an isolated cluster of bristles with a few short branchings (Fig. 13E).

First maxilla: Bell-shaped sternite of typical size for genus, anterolateral margins against narrow unsclerotised strip on inner edge of coxa, sternite and coxa separated by strong suture just in front of posterior margin of maxilla (Fig. 14B,E,G). Coxal process with blunt, transverse tip bearing dense cluster of 14–25 simple, ridged setae (Fig. 14H); cluster of about seven tiny, barb-like basiconic sensilla between coxal process and telopod (Fig. 14I). Distal article of telopod with two rows of long, plumose setae along inner margin (Fig. 14C); branches developed along distal half of these setae (Fig. 14K); numerous relatively short, simple setae on inner half of distal article, longer simple setae on lateral part, separated by a non-setose patch (Fig. 14C).

Second maxilla: Sternite small, trapezoidal, fused with coxae (Fig. 14D,E). Short setae along anterior part of coxa relatively weakly developed (Fig. 14F). Tarsus bearing straight, ridged setae on outer surface, many plumose setae on inner surface (Fig. 13L); branches on plumose setae mostly along less than half of length (Figs. 13M, 14L). Claw composed of four or five digits, with median digit enlarged (Fig. 14L).

Strong, sharp distal spinose projection on tibiae of legs 1–14. Premur and femur with rather evenly scattered setae on anterior and posterior faces as well as dorsally, setae longest against ventral prefemoral recess; fringe of numerous setae encircling distal margin of femur; tibial setae mostly shorter, of varied thickness, slightly thicker seta at ventrodistal end of tibia; tarsal setae fine, of varied length, aligned as two rows on ventral margin without precise pairing of larger setae. Articulation between tarsomeres relatively strong on anterior legs (Fig. 15F), indistinct along a narrow extent on dorsal edge, typically preserved with substantial flexure. Distitarsus 50 to nearly 60% length of basitarsus on anal leg; anal leg basitarsus 9–10 times longer than broad (Fig. 16B). Pretarsal claws relatively long, curved; pair of accessory claws symmetrical, 25–30% length of main claw (Fig. 16B).

Longitudinal median furrow confined to anterior part of sternite, not extending past anterior third even in posteriormost sternites. Sternites sparsely setose, most consistent setae in a transverse band across anterior third and along anterolateral and posterolateral margins. Posterior margins of sternites usually convex.

Coxal pores: 5–8 pores (most commonly 6 or 7) on each of legs 12–15; most coxal pores ovate, in larger specimens some pores slightly constricted medially or figure eight-shaped; coxal pore field in deep groove, separated from anteroventral face of coxa by sharp fold (Fig. 12B,C).

Male (Fig. 12C): Sternite of segment 15 transverse or gently convex posteriorly, with rounded posterolateral corners. Sternite of first genital segment bearing numerous short setae scattered on posterior two-thirds, more abundant along posterior edge, with well-defined transverse row of setae just in front of posterior margin; sternite undivided medially. Gonopod of three articles and tapering, seta-like (exceptionally bifurcate) terminal process, the three articles bearing 5–7, 4–5, and 4–8 short setae (proximally to distally); setae on proximal two articles in a transverse row; terminal process short, about as long as third article of gonopod, with numerous slender barb-like projections concentrated in a narrow band along one side (Fig. 14M). Penis a small, conical projection, extending about as far back as articulation between first and second articles of gonopod.

Female (Fig. 12B): Sternite of segment 15 transverse posteromedially. Tergite of first genital segment and telson strongly sclerotised, telson typically with a lightly sclerotised band medially, scattered with short setae. Sternite of first genital segment large, with posterior margin concave between condyles at which gonopods articulate (Fig. 15D); short, rounded medial bulge variably developed in this concavity; nearly entire surface of sternite bearing abundant, short setae. First article of gonopod bearing two bullet-shaped spurs, the inner spur slightly smaller; gonopods bearing many short setae, including a few on third article. Claw undivided (Fig. 15E), with numerous elongate ridges externally and internally.

Discussion. The most distinctive characters of this species are the abundance of small, blunt teeth on the maxillipede coxosternite, the weakly convex ocellus (flattened in *P. hornerae*; more domed in *P. validus*), small penis, short terminal process on the male gonopod, and the deep grooves in which the coxal pores are set.

The only consistent difference that has been detected between specimens from the Illawara region (Mt Keira and Mt Barrengarry) and those from the Blue Mountains (Mt Wilson and Boyd Plateau) is the yellow-brown colour of the preserved specimens from the Blue Mountains, versus orange-brown for the Illawara specimens. Blue Mountains specimens have a higher modal number of teeth on the maxillipede coxosternite (nine teeth is most common versus seven in the Illawara material), though the observed range overlaps completely.

Specimens of *Paralamyctes (Thingathinga)* from the Barrington Tops share several distinctive (derived) characters with typical *P. grayi*, notably the abundant small teeth on the maxillipede coxosternite (6–10 in Barrington Tops specimens; Fig. 15I), the strong embayment of the posterior margin of the seventh tergite, and the weakly convex ocellus (Fig. 15H). However, the embedding of the coxal pores in a groove that is observed in other parts of the species' range is inconsistently developed in specimens from the Barrington Tops. The only Barrington Tops specimen with the anal leg preserved displays a distal spinose projection on the tibia (Fig. 16A), a feature otherwise unrecorded in *P. grayi* (Fig. 16B), and both males from the Barrington Tops have fewer coxal pores than any specimens from the Blue Mountains, Illawara or Budawang Range (3455/4554 and 3444/2444). It is likely that the Barrington Tops material represents a distinct species closely related to *P. grayi*, but the few available specimens do not permit confident diagnosis, particularly given the limited data on the anal leg. The description of *P. grayi* above excludes the Barrington Tops specimens.

Among previously described species, most closely allied to *Paralamyctes (Thingathinga) grayi* is *P. validus* Archey, 1917, a widespread species in New Zealand (ranging from the Waitakere Ranges and islands off Auckland on North Island to Queenstown on South Island). With *P. grayi, P. validus* shares coxal pores that are set in deep grooves, largely concealed by the anteroventral face of the coxa, and a proliferation of small teeth on the dental margin of the maxillipede coxosternite. Compared to *P. validus, P. grayi* has stronger articulations between tarsomeres (Fig. 15F), blunter teeth on the maxillipede dental margin (Fig. 15B), a narrower dorsal section of the fringe of branching bristles on the mandible (Fig. 13E), and a distinctive embayment of the margin of tergite 7 (Fig. 12A).

The morphology and distribution of basiconic sensilla on the antenna described for *P. (T.) grayi* and *P. (P.) monteithi* (Fig. 8) are identical with those in *Lithobius* (Rilling, 1968: fig. 36C,D; Lewis, 1981: fig. 88). Such similarity between Henicopidae and Lithobiidae suggests that details of these sensilla may provide synapomorphies for Lithobiomorpha (e.g., discrete clusters of thick- and thin-walled basiconic sensilla at the anterior margin of the antennal articles).

Paralamyctes (Thingathinga) hornerae n.sp.

Figs. 17, 18

Etymology. For B. Elizabeth Horner, who sponsored the description of this species.

Diagnosis. *Paralamyctes (Thingathinga)* with 20–22 antennal articles; ocellus flattened; dental margin of maxillipede coxosternite nearly transverse, lacking median notch, with 6–8 small teeth on each side; few (4–6) setae on tip of coxal process of first maxilla; faint trace of articulation defining tarsomeres on legs 1–12.

Type material. HOLOTYPE AM KS 57941, ♂ (Fig. 17A,C), bottom end of Cliffs Trail, about 3.8 km NE of Oxley Rd, Styx River SF, NSW, 30°33'S 152°21'E, 1180 m, MRG and GC, Feb 4–Apr 9 1993, pitfall. PARATYPES: AM KS 57942 (Fig. 17B), 57943 (Fig. 18), 2♀♀, from type locality, same collection.

Description. Length up to 17 mm; length of head shield up to 1.4 mm. Tergites (of specimens in 70% ethanol) yellowish brown or mauve, darker posteriorly; antennae and maxillipedes yellow; prefemur to tibia mauve, particularly on posterior legs of trunk; tarsi yellow.

21/22 and 21/20 antennomeres in specimens with complete antennae; basal two articles stout, with long setae, rest of antenna with uniform dense, shorter setae, longer setae encircling distal end of each article; many articles not substantially longer than wide, even in distal part of antenna. Median furrow deep to transverse suture. Ocellus indicated by faint convexity and subdued pigmentation, margins obscure. Tömösváry organ at anterolateral edge of cephalic pleurite, moderately large (size, position and shape as for *P. grayi*).

Tergites smooth; shapes, proportions and borders (Fig. 17A) as described for *P. grayi*.

Labral margin transverse adjacent to midpiece, then abruptly flexed backward where fringe of bristles overhangs margin (Fig. 18C); bristles irregularly pectinate (Fig. 18J), branching along entire fringe.

Dental margin of maxillipede nearly transverse, each half faintly convex forwards, bearing 6–8 small, blunt teeth, median notch absent (Fig. 18E); dental margin delimited by pronounced transverse furrow; coxosternite broadly trapezoidal, maximum length 60% of maximum width (Fig. 18D); anterolateral corner of coxosternite bearing a few long setae, shorter setae on anteromedial part; median suture shallowed anteriorly; tarsungulum relatively long and slender.

Mandible: Four paired teeth (Fig. 18A). Outer fringe of pectinate bristles with short branches along entire length of each bristle (Fig. 18B); eight simple, sickle-shaped aciculae lacking marginal pinnules (Fig. 18K); furry pad composed of dense seta-like processes that birfurcate or trifurcate near their tips.

First maxilla: Sternite triangular, size and sutures as in *P. grayi* (Fig. 18F). Coxal process with cluster of 4–6 simple setae clustered at tip, one strong seta towards base (Fig. 18G). Distal article of telopod with evenly scattered simple setae, pairs of plumose setae aligned on inner margin.

Second maxilla as described for *P. grayi*; pretarsus of five digits (Fig. 18H).

Distal spinose projection on tibia of legs 1–14; anal leg unknown. Tarsi 1–12 entirely unflexed, faint trace of articulation at 55–60% of length. Setae on legs as in similar sized specimens of *P. grayi* except for slightly finer tibial setae (Fig. 18L); tarsal setae uniformly fine. Pretarsal claws relatively long, curved; pair of accessory claws symmetrical, about 40% length of main claw (Fig. 18M).

Longitudinal median furrow extends to midlength of posterior sternites.

Coxal pores on legs 12–15 round, 2344/2444 in male, 3455/4555 and 3445/3555 in females; pore rows in shallow grooves.

Male (Fig. 17C): Short setae evenly scattered on sternite of first genital segment. Three setae encircling distal end of first segment of gonopod; one seta on second article; third article slightly elongated, bearing a few setae; terminal process long, flagelliform. Penis small, conical, about as long as first article of gonopod.

Female (Fig. 17B): Two spurs on basal article of gonopod; spurs bullet-shaped, pointed, dorsal surface concave; inner spur smaller than outer one (Fig. 18I); third article of gonopod lacking setae.

Discussion. *Paralamyctes hornerae* differs from all congeneric species in having only faint tarsal articulations on legs 1–12. These articulations do not demonstrate any

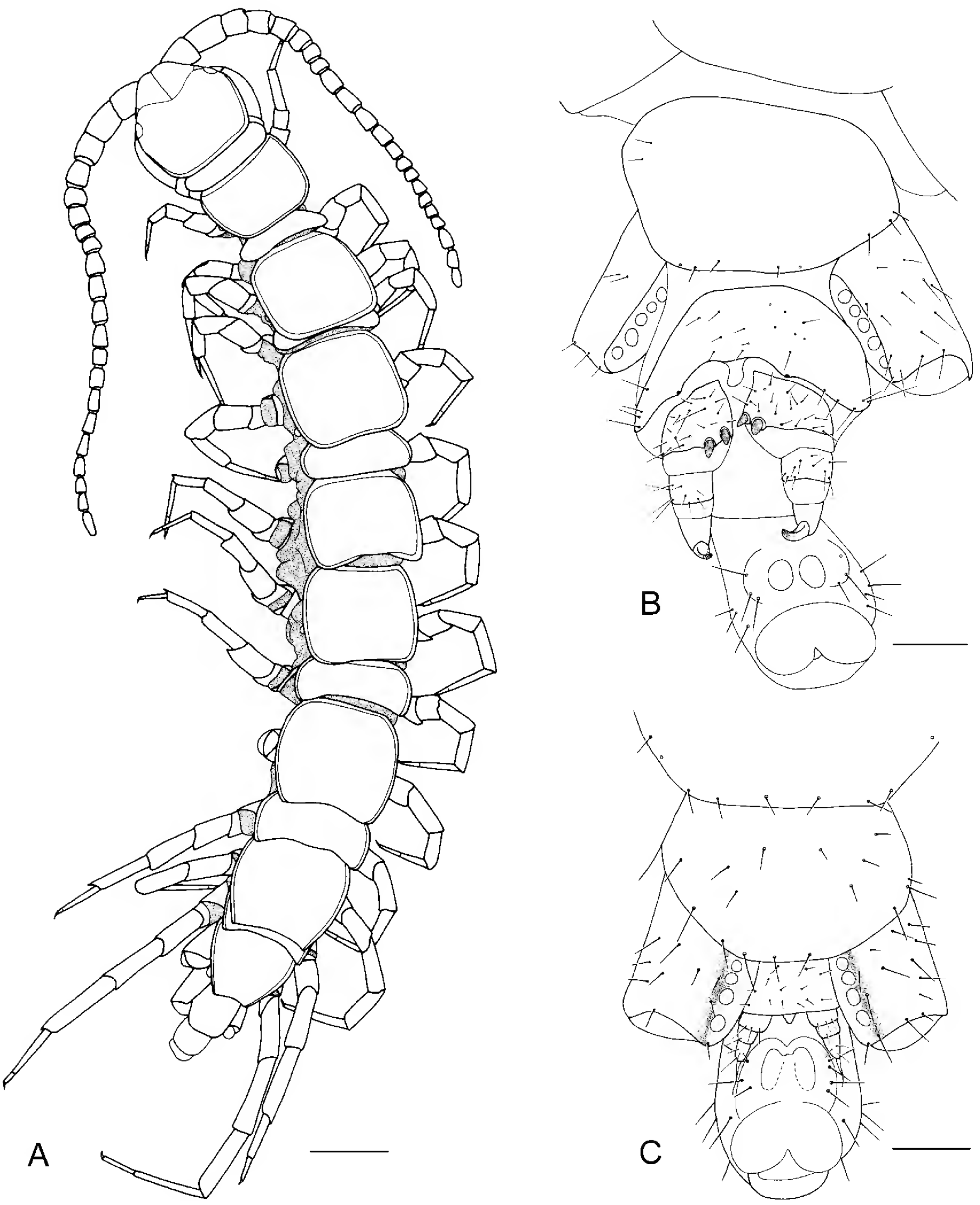

Figure 17. *Paralamyctes (Thingathinga) hornerae* n.sp. Cliffs Trail, Styx River SF, NSW. A,C, holotype ♂ AM KS 57941; C, terminal segments and gonopods; scales 1 mm, 0.25 mm. B, paratype ♀ AM KS 57942, terminal segments and gonopods; scale 0.25 mm.

flexure and are evidently non-functional. A possible relationship to *Haasiella* could be considered based on the weak tarsal jointing, though in *Haasiella* the tarsus is entirely unjointed. Also suggestive of *Haasiella* is the transverse dental margin of the maxillipede (Fig. 18E) (more curved in most other henicopines). However, the shape of the coxosternite differs markedly from New Zealand species of *Haasiella*. The overall proportions are considerably broader, and it lacks the prominently narrowed extension that bears the teeth in the New Zealand species. As well, a median notch is lacking (present in New Zealand species). In each of these respects *P. hornerae* resembles species of *Paralamyctes (Thingathinga)*. A transverse, unnotched margin of the maxillipede is similarly developed in *P. (Thingathinga)* from the Barrington Tops (Fig. 15I). Membership in *Thingathinga* is indicated by the aciculae of the mandible being simple (Fig. 18K), rather than bipinnulate. The simple aciculae are not widely distributed in the Henicopinae, but are shared with *P. grayi* and *P. validus*. In *Haasiella trailli* the aciculae are bipinnulate

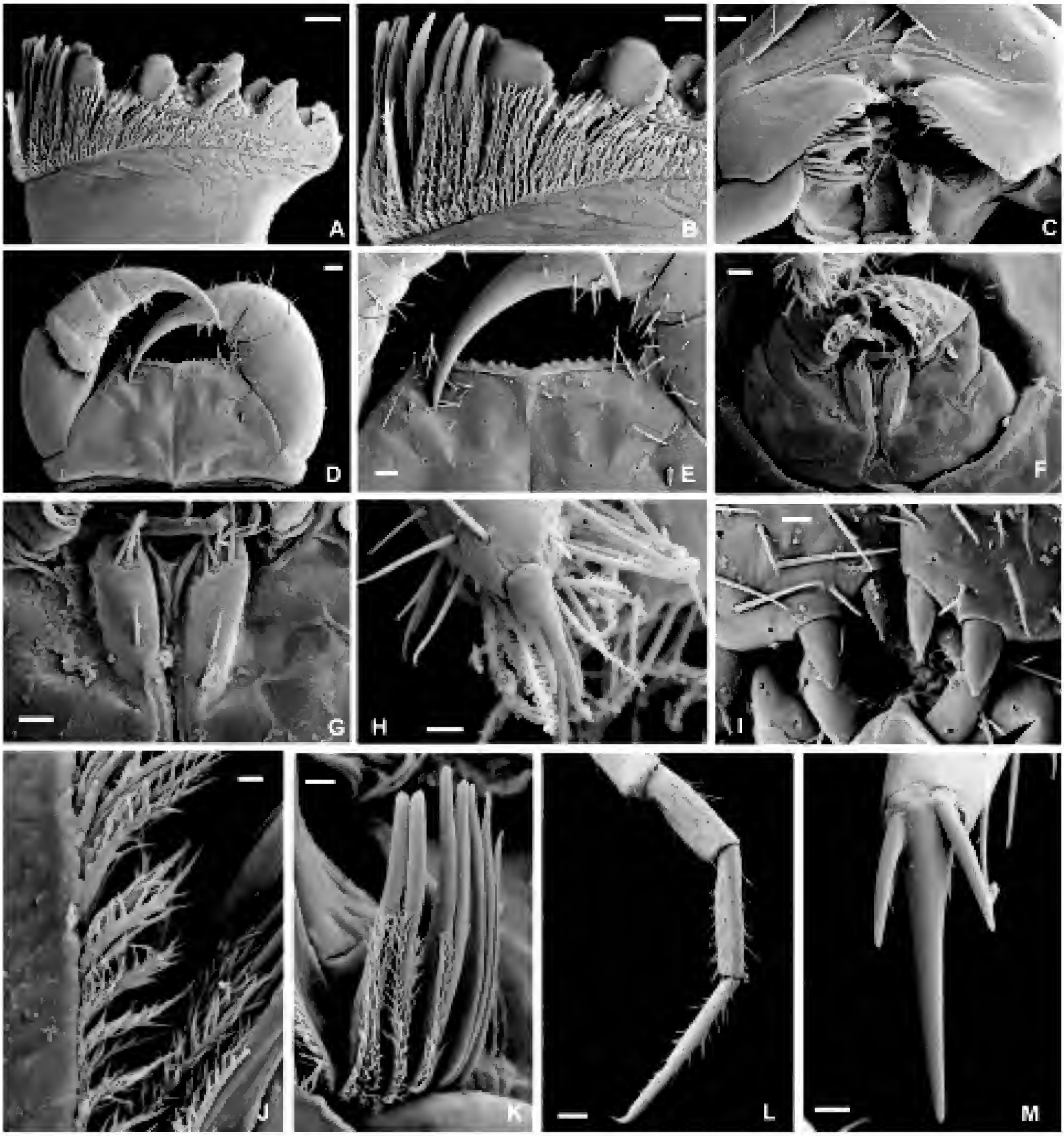

Figure 18. *Paralamyctes (Thingathinga) hornerae* n.sp. Paratype ♀ AM KS 57943, Cliffs Trail, Styx River SF, NSW. Scanning electron micrographs. A,B, gnathal lobe of mandible, scales 30 µm, 20 µm; C, labrum and right mandible, scale 50 µm; D,E, maxillipede and detail of dental margin, scales 100 µm, 60 µm; F,G, first maxilla and detail of coxal processes, scales 50 µm, 30 µm; H, tarsus and claw of second maxilla, scale 20 µm; I, spurs on female gonopod, scale 30 µm; J, branching bristles on labral margin, scale 5 µm; K, mandibular aciculae, scale 10 µm; L, posterior view of leg 12, scale 200 µm; M, pretarsus of leg 13, scale 20 µm.

(Edgecombe *et al*., 2001: fig 5B), and they are likewise bipinnulate (with short barbs) in Tasmanian *Haasiella* (see below). The weakly tapering coxal process of the first maxilla in *P. hornerae*, with its concentration of setae on the blunt tip (Fig. 18G), is typical of *P. (Thingathinga)*.

The flattened eye of *P. hornerae* resembles the condition in other New South Wales species of *Paralamyctes (Thingathinga)*, such as the Barrington Tops material assigned to *P. (T.) grayi*. However, also closely comparable in having a flattened eye is an undescribed species from Tasmania (*Wailamyctes* sp. of Mesibov, 1986) that is resolved as sister to New Zealand species of *Haasiella* (Edgecombe *et al*., 2001: figs. 15, 16). Maxillipede morphology is similar between the Tasmanian species and

P. hornerae, notably in the proportions of the coxosternite. The Tasmanian species resembles New Zealand *Haasiella* in having the tarsi of legs 1–12 fully fused, without the feeble joint that is present in *P. hornerae*, as well as in having the median furrow of the head shield extended behind the transverse suture. Archey (1937) cited the posterior extension of the median furrow as a diagnostic character of *Haasiella* (= *Wailamyctes*).

Paralamyctes (Thingathinga) species from New South Wales (*P. grayi* and *P. hornerae*) are united by an apparent synapomorphy in the shape of tergite 7. In both species, T7 is strongly embayed, a transverse posteromedial sector being flanked by curved posterolateral sectors, with a flange-like ventral expansion along the median embayment. Another character that may prove to be of value for grouping the New South Wales species of *P. (Thingathinga)* is the size of the penis, though this is affected by the extent of its retraction above the sternite. In both *P. (T.) grayi* and *P. (T.) hornerae*, the penis is comparatively small (about the length of the first article of the gonopod). Australian species belonging to *P. (Paralamyctes)* and *P. (Nothofagobius)* have relatively larger penes (Figs. 4C, 19C), as does *P. (Thingathinga) validus* (Archey, 1937: pl. 21, fig. 4). The larger penis appears to be the plesiomorphic state for *Paralamyctes* (see Attems, 1928: text-fig. 14 for *Lamyctes*).

Paralamyctes (Nothofagobius) n.subgen.

Etymology. Compounding *Nothofagus* and the common lithobiomorph suffix—*obius*, for the trans-Antarctic distribution of this clade and occurrence of species in *Nothofagus* forest.

Type species. *Paralamyctes (Nothofagobius) cassisi* n.sp.

Diagnosis. *Paralamyctes* with small T1, distinctly narrower than head and T3; maxillipede coxosternite with narrow, curved dental margin bearing 4 or 5 large teeth; tarsi slender, relatively sparsely setose; sternite of first genital segment of male with posterior margin convex between gonopods; basal article of female gonopod extended as a short process.

Assigned species. *Henicops chilensis* Gervais in Walckenaer & Gervais, 1847; *Paralamyctes (Nothofagobius) mesibovi* n.sp.

Distribution. Chile and Argentina (northern Patagonia), Tasmania, northern New South Wales.

Discussion. A female gonopod bearing three spurs is synapomorphic for *Paralamyctes cassisi* from northern New South Wales and *P. mesibovi* from Tasmania (rather than the plesiomorphic condition of two spurs seen in all congeners, as well as most other henicopid genera). In both species the basal article of the gonopod is extended as a process. The only other species showing a similar (though shorter) extension of the gonopod is *P. chilensis* (Gervais) from Patagonian Chile/Argentina (Fig. 24B), and this character is interpreted as a synapomorphy. A particularly narrow anterior part of the trunk (i.e., body narrowed across a small T1) is also shared by *P. cassisi, P. mesibovi* and *P. chilensis*. The homology can be described by T1 being distinctly narrower than the head and T3 in these three species, versus T1 nearly equally wide as the head and T3 in other species of *Paralamyctes* and in relevant outgroups (e.g., *Lamyctes, Lamyctinus, Lamyctopristus* and *Henicops*). A relative elongation of the tarsi in *P. (Nothofagobius)* (compare Figs. 16C–E with Figs. 9, 16A,B) may be expressed in terms of the proportions of the anal leg basitarsus. In *P. (Nothofagobius)*, the basitarsus is 12–17 times longer than its proximal width, versus a length 9–11 times width in *P. (Paralamyctes)* and *P. (Thingathinga)*.

Paralamyctes chilensis also resembles the Australian *P. mesibovi* and *P. cassisi* in having the posterior margin of the first genital sternite of the male convex between the gonopods, versus approximately transverse in other *Paralamyctes*. This posterior bulge in the sternite may account for the concealment of the penis in specimens of *P. mesibovi* (Fig. 22C) and *P. chilensis* (Fig. 24C), the penis presumed to be retracted above the sternite.

Paralamyctes (Nothofagobius) cassisi n.sp.

Figs. 16D, 19, 20, 21A–H

Etymology. For Gerasimos Cassis, Australian Museum, whose 1993 survey uncovered this species, and who accompanied me in the hunt for *Paralamyctes* in Queensland and Western Australia.

Diagnosis. *Paralamyctes (Nothofagobius)* with 24–29 antennal articles; cephalic pleurite short; dental margin of maxillipede coxosternite bearing four (exceptionally five) robust teeth; trunk tergites gently wrinkled; three spurs on female gonopod, set on moderately long projection; terminal process on male gonopod as long as rest of gonopod.

Type material. HOLOTYPE QM S42670, ♂ (Fig. 19A), Gibraltar Range NP, NSW, 10 km W of northern park headquarters, 29°32'45"S 152°14'22"E, 990 m, GBM, 1980–1981, pitfall, rainforest. PARATYPES: QM S42671 1♂, QM S48111 1♂ (Fig. 19C), from type locality, collection details as for holotype.

Other material. Northern NSW pitfall collections, MRG and GC, 4 Feb–9 Apr 1993: AM KS 57944, 1♀ (Fig. 19B), AM KS 57945, 4♂♂, 2♀♀, Dorrigo NP, Wonga Walk, about 600 m N of Tristania Falls, 30°22'S 152°44'E, 730 m; AM KS 57946, 1♀ (Figs. 20, 21A–H), AM KS 57947, 5♂♂, 2♀♀, Dorrigo NP, Wonga Walk, about 200 m SW of Hardwood Lookout, 30°22'S 152°44'E, 630 m; AM KS 57948, 1♀, Styx River SF, bottom end of Cliffs Trail, about 1.3 km from Oxley Rd, 30°33'S 152°20'E, 1080 m; AM KS 57949, 1♀, Mount Hyland Nature Reserve, 1.9 km along Chaelundi Rd from Big Bull Creek Rd, 30°08'S 152°26'E, 1160 m; AM KS 57950, 2♂♂, Marengo SF, Big Bull Creek, 2.7 km NE along Foamy Creek Rd from Chaelundi Rd, 30°07'S 152°25'E, 920 m; AM KS 57951, 1♂, Marengo SF, Opossum Creek, upstream of Foamy Creek Rd, 30°06'S 152°25'E, 830 m; AM KS 57952, 1♂, Washpool NP, track off Cedar Trail, 29°28'S 152°20'E, 950 m; AM KS 57953, 1♂, Washpool NP, Cedar Creek, Cedar Trail, 920 m; AM KS 57954, 1♂, Boorook SF, 1 km E of main road, 28°49'S 152°11'E, 900 m. ANIC, 1♂, Richmond Range SF, NSW, 28°48'S 152°59'E, ca 600 m, T. Weir and A. Calder, 13–14 Feb 1983; QM S42666, 1♀, Dorrigo NP, NSW, Never Never, 700 m, GBM, 1980–1981, pitfall, rainforest; QM S42668, 1♂, New England NP, NSW, 200 m from Tom's Cabin towards summit, 30°29'48"S 152°23'48"E, 1300 m, GBM, 1980–1981, pitfall,

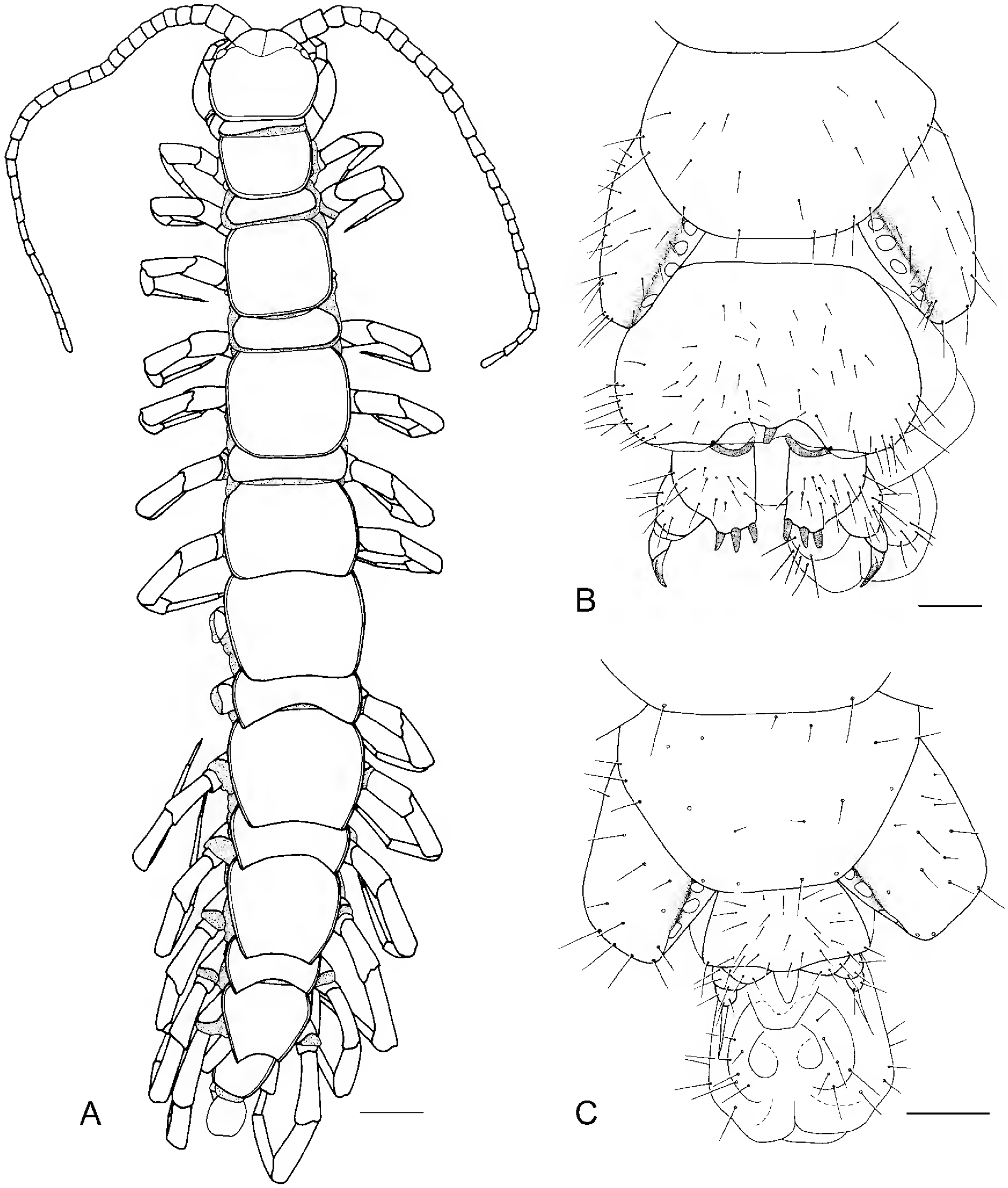

Figure 19. *Paralamyctes (Nothofagobius) cassisi* n.sp. A, holotype ♂ QM S42670, Gibraltar Range NP, NSW; scale 1 mm. B, ♀ AM KS 57944, Dorrigo NP, Wonga Walk, terminal segments and gonopods; scale 0.25 mm. C, paratype ♂ QM S42811, Gibraltar Range NP, terminal segments and gonopods; scale 0.25 mm.

Nothofagus rainforest; QM S42672, S 42673, 2♂♂, Poverty Point, SE of Tenterfield, NSW, 29°06'S 152°19'E, 1160 m, GBM, 1978–1979, pitfall, rainforest; QM S42674, 1♂, Poverty Point, NSW, GBM, 22 Feb 1979.

Description. Length up to 20 mm; length of head shield up to 1.8 mm. Colour known only from specimens preserved in 70% ethanol: head red-brown, trunk usually lighter yellow-brown, often with purplish tinge; maxillipede pale orange, with brownish coxosternite; sternites and coxae light brown, darker in posterior segments; prefemur, femur and tibia may be purplish, tarsi and distal part of antennae yellow.

Head shield smooth. Frontal margin with strong median notch; posterior margin of head shield weakly concave. Median furrow deep to transverse suture. Antennae extending back to TT5–7 (Fig. 19A); 24–29 antennal articles, basal two moderately larger than succeeding articles; most of articles 3–9 of about equal length and width, distal articles substantially longer than wide; setation fine, dense from third article, mix of short and moderately long setae. Ocellus strongly bulging. Tömösváry organ moderately large, ovate, at anterolateral corner of cephalic pleurite (Fig. 20L); openings of gland ducts marked by pores

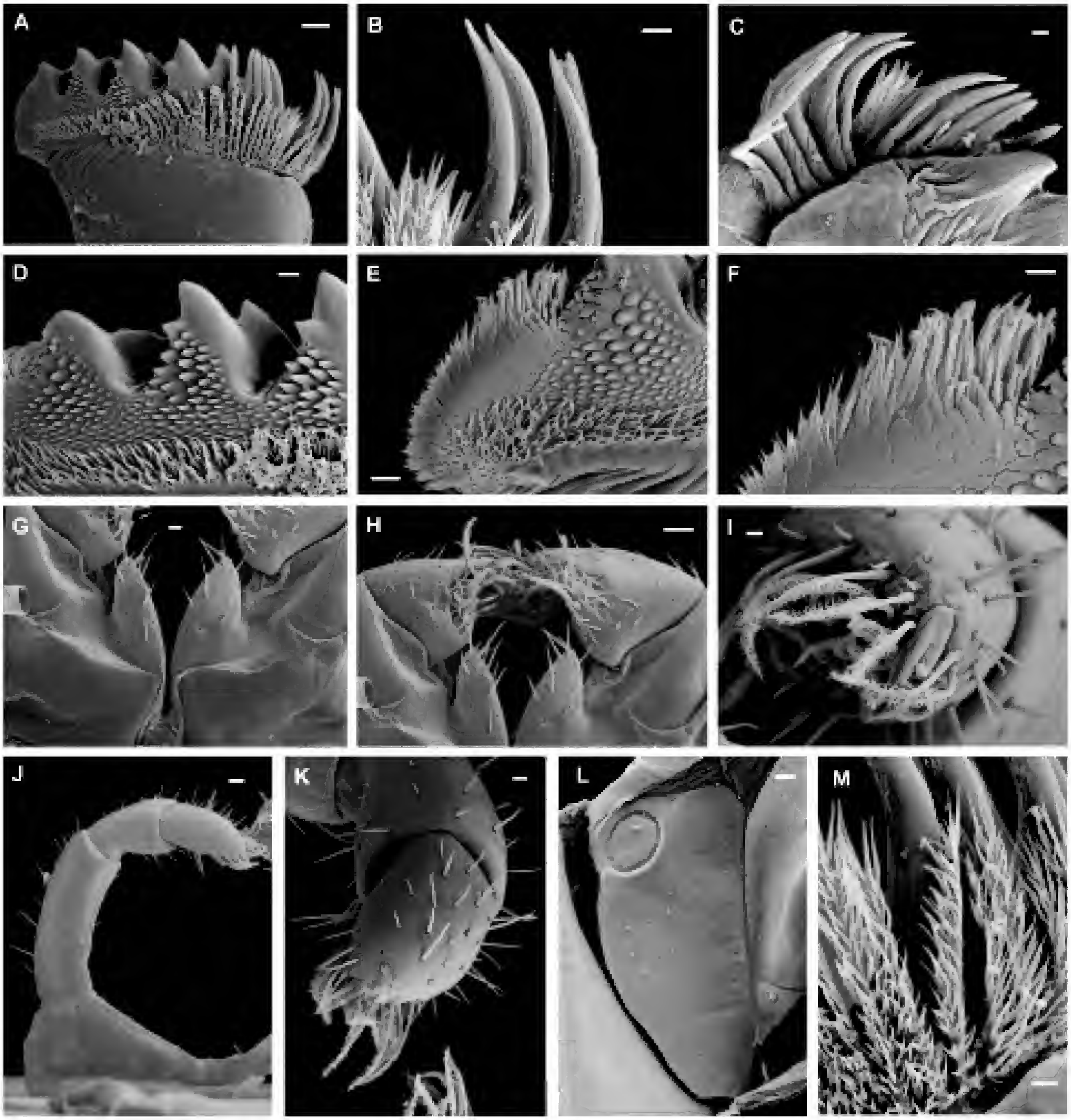

Figure 20. *Paralamyctes (Nothofagobius) cassisi* n.sp. ♀ AM KS 57946, Wonga Walk, Dorrigo NP, NSW. Scanning electron micrographs. A, gnathal lobe of mandible, scale 30 µm; B,C, mandibular aciculae viewed externally and internally, scales 10 µm; D, mandibular teeth, scale 10 µm; E,F, furry pad on mandible, scales 10 µm, 5 µm; G,H, first maxillae, scales 20 µm, 50 µm; I, tarsus and claw of second maxilla, scale 10 µm; J, second maxilla, scale 60 µm; K, distal part of telopod of second maxilla, scale 20 µm; L, cephalic pleurite with Tömösváry organ, scale 20 µm; M, fringe of branching bristles skirting mandibular aciculae, scale 5 µm.

scattered around outer groove of Tömösváry organ. Pleurite relatively short, length slightly more than twice width. Main setae on head shield consist of two pairs on frontal margin, a pair at anterior end of ocellus, one seta beneath rear edge of ocellus, a few on posterolateral border.

Posteromedial part of clypeus with usual transverse row of four setae (Fig. 21A). Seta projecting transversely from labral side piece. Inner margin of labrum gently concave backwards between midpiece and termination of bristle fringe, without a marked inflection or shoulder; bristles overhanging margin moderately long (Fig. 21B), branching into several rami a short distance outside labral margin, these rami often bifid (Fig. 21C).

Trunk tergites wrinkled with short, linear ridges and grooves having weak relief. T1 trapeziform, considerably smaller than T3, distinctly narrower than head shield (Fig.

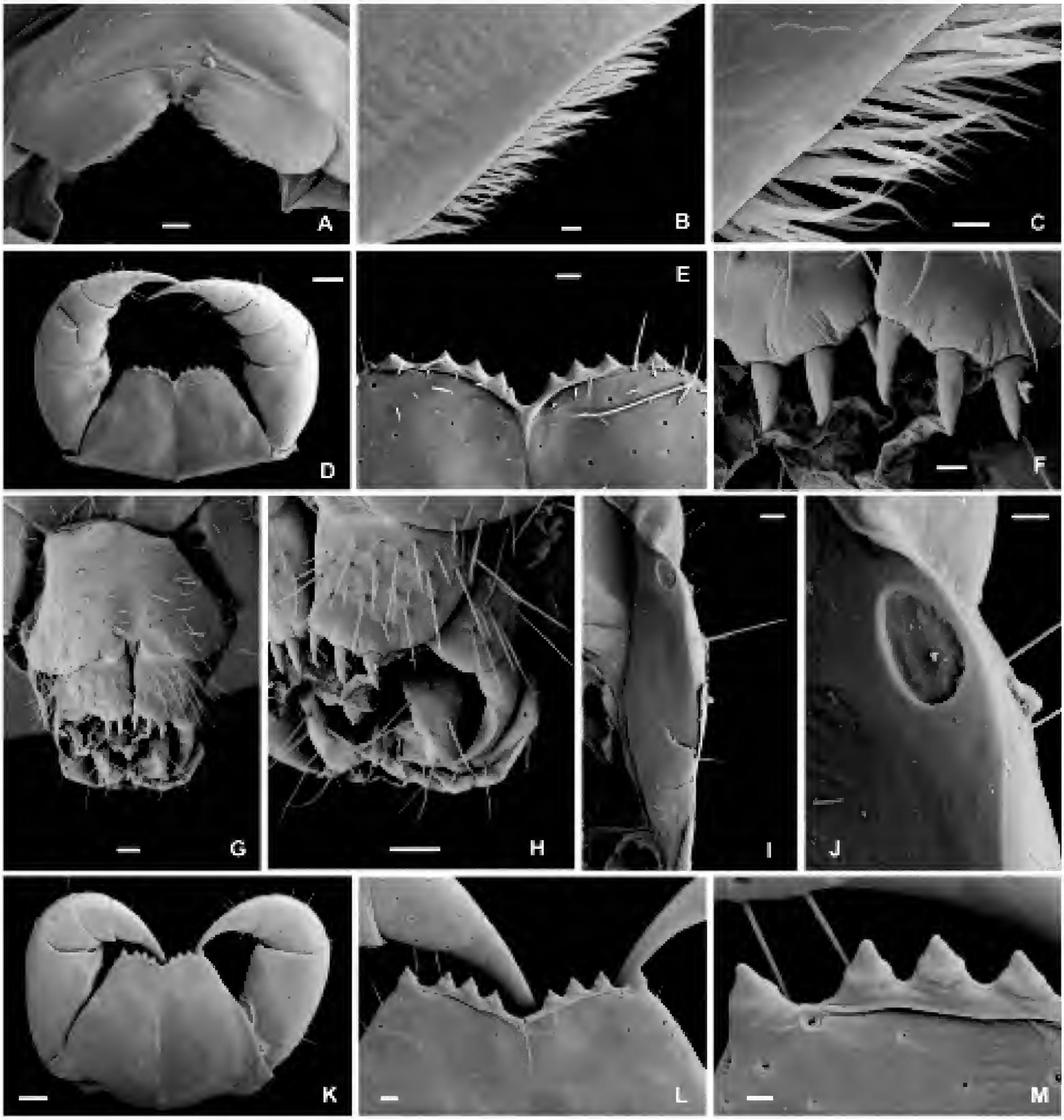

Figure 21. A–H, *Paralamyctes (Nothofagobius) cassisi* n.sp. ♀ AM KS 57946, Wonga Walk, Dorrigo NP, NSW. A–C, labrum, with details of branching bristles on margin, scales 50 µm, 10 µm, 5 µm; D,E, maxillipede and detail of dental margin, scales 200 µm, 50 µm; F–H, gonopod, showing detail of spurs, ventral view and ventrolateral view, scales 30 µm, 100 µm, 100 µm. I–M, *Paralamyctes (Nothofagobius) mesibovi* n.sp. Paratype ♀ QVMAG 23/23010, Wombat Hill, Waratah, Tasmania. I, cephalic pleurite, scale 50 µm; J, Tömösváry organ, scale 20 µm; K–M, maxillipede and details of dental margin, scales 200 µm, 40 µm, 20 µm.

19A), about two-thirds width of widest tergite (T8), posterior angles strongly rounded and posterior margin transverse medially or convex; lateral borders parallel in TT3 and 5, posterior angles rounded, posterior borders nearly transverse; TT1, 3 and 5 bordered posteriorly; TT7–14 bordered laterally; lateral borders of T7–T14 convex; posterior margins of TT7–8 gently concave, T7 more so, posterior angles rounded; TT10, 12 and 14 progressively more concave posteriorly; posterior angle of T10 an obtuse corner, T12 angular, T14 sharply angular but without a tooth-like extension; posterior margins of TT9, 11 and 13 deeply concave, posterior angles sharp, not toothed. Setae on long tergites in anterior part of trunk sparse, mostly confined to an anterior band and on/against lateral border; setae evenly scattered over surface of posterior tergites, including a row along posterior margin on TT7–14.

Dental margin of maxillipede coxosternite convex, sloping posteromedially, with moderately deep median notch (Fig. 21E); teeth robust, most specimens having 4+4 teeth, a few having 4+5 (with small inner tooth); width across dental margin half maximum width of coxosternite; setae scattered on anterior and medial part of coxosternite. Tarsungulum relatively small, tarsal and pretarsal sections equal in length (Fig. 21D).

Mandible: Four paired teeth (Fig. 20A), three ventral tooth pairs bearing a third, triangular cusp on outer edge of larger tooth; three dorsal teeth with abundant, scale-like, triangular accessory denticles (Fig. 20D); accessory denticle field without grooves on teeth, continuous between teeth. Fringe of branching bristles with branches along entire length of each narrow-based bristle (Fig. 20M); fringe evenly narrowing dorsally, evenly grading into multifurcating scales on dorsal part of mandible (Fig. 20E). 10–11 simple, curved aciculae, lacking marginal branchings (Fig. 20B,C); basal part of aciculae with suture-like striations, distal half with a few strong linear ridges, well developed on inner surface of aciculae. Band of polygonal scales between accessory denticles and furry pad (Fig. 20E); furry pad composed of short, terminally-branching bristles that grade into multifurcating scales (Fig. 20F).

First maxilla: Bell-shaped sternite distinctly set off from coxa by sutures at posterolateral margin. Coxal process conical, bearing 8–9 simple setae on tip and scattered along medial edge, without significant clustering at tip (Fig. 20G); three additional setae more posteriorly; cluster of tiny, barb-like basiconic sensilla between coxal process and telopod. Distal article of telopod with two rows of long, plumose setae along inner margin; branches developed along distal half of these setae; rest of distal article evenly scattered with numerous simple setae, slightly shorter than those on coxal process (Fig. 20H).

Second maxilla (Fig. 20I–K) as described above for *P. (Paralamyctes) monteithi* (no differences in proportions, setal patterns or structure, or pretarsus form observed).

Strong, sharp distal spinose projections on tibia of legs 1–15. Prefemur, femur and tibia fairly evenly scattered with distinctly pigmented (orange-brown) setae of varied length, at most moderately long; several setae encircling distal margin of femur; tarsal setae more uniformly slender; weak development of two rows of setae ventrally along tarsus, without pairing on each side of leg. Articulation between tarsomeres relatively weak on anterior legs, continuous dorsally, anterior tarsi usually preserved unflexed. Distitarsus about 50% length of basitarsus on anal leg; anal leg basitarsus about 12 times longer than broad (Fig. 16D). Pretarsal claws relatively long, gently curved; pair of accessory claws symmetrical, 30% length of main claw (Fig. 16D).

Sternites with longitudinal median furrow not well defined on anterior segments, usually lightly impressed on anterior third of sternite from mid trunk, not significantly developed behind midlength on posterior segments. Posterior margins of most sternites convex, subtransverse on posterior few segments in both sexes. Sternal setation consists of a few fairly long setae on anterolateral and posterolateral margins, transverse band at about one-quarter length of sternite; sternal setae of equivalent diameter to largest setae on legs.

Coxal pores on legs 12–15. Coxal pore field set off from anteroventral face of coxa by curved edge, without fold or groove. Pores usually round, some slightly ovoid (Fig. 19B,C); most females with 4444/4444 coxal pores, one with 4333/3333; most males with 3333/3333 pores, sometimes one or a few coxae with two pores.

Male (Fig. 19C): Tergite of intermediate segment broadly barrel-shaped, with transverse posterior margin, relatively narrower than in female; other tergites without sexual dimorphism. Sternite of first genital segment undivided, setae evenly scattered, with a transverse row just in front of posterior margin; margin convex backwards between gonopods. Gonopod of three articles and tapering, needle-like terminal process, the first two articles each bearing three or four relatively long setae, those on first article in a transverse row, third article bearing two or three setae; terminal process as long as rest of gonopod. Penis a prominent cone.

Female (Fig. 19B): Tergite of intermediate segment with more concave posterior margin than in male. Tergites of first genital segment and telson fairly well sclerotised, though much less so than other tergites; first genital tergite bearing several setae along its posterolateral margin; telson tergite with numerous slender setae posterolaterally. Sternite of first genital segment equal in width to S15; margin concave between gonopod condyles, with rounded posteromedial bulge; most of sternite bearing moderately dense, short setae (Fig. 21G), several longer setae at posterolateral margin; first article of gonopod bearing three or four pointed spurs (five specimens with 3+3 spurs, one with 3+4), all about equal in size, curved such that tip points dorsally (Fig. 21F,H); many fairly long setae on first article, about seven similarly long setae on second article (Fig. 21H); third article lacking setae.

Discussion. Close affinity to the Tasmanian *P. mesibovi* n.sp. is most obviously indicated by female gonopod morphology. Distinction between the two species is addressed under *P. mesibovi*.

Paralamyctes (Nothofagobius) mesibovi n.sp.

Figs. 16C, 21I–M, 22, 23

Etymology. For Robert Mesibov, guru of Tasmanian myriapodology, who discovered this species.

Diagnosis. *Paralamyctes (Nothofagobius)* with narrow dental margin of maxillipede coxosternite bearing four teeth; simple aciculae on mandible; distal spinose projection on tibia of legs 14 and 15; first article of female gonopod with three spurs (all shared with *P. cassisi*). Nearly all antennal articles substantially longer than wide; cephalic pleurite elongate; posterior margin of tergite 7 relatively deeply sinuate; female gonopod spurs on a long, slender projection.

Type material. HOLOTYPE Queen Victoria Museum and Art Gallery (QVMAG) 23/23009, ♀ (Figs. 16C, 22A), Wombat Hill, Waratah, Tasmania, CQ 702 064, 41°29'00"S 145°26'42"E, 680 m, R. Mesibov, 19 Sep 1990. PARATYPES: QVMAG 23/41725, 1♀ (Fig. 22B), from type locality; collection details as for holotype; QVMAG 23/23010, 1♀ (Figs. 21I–M, 23), Wombat Hill, Waratah, CQ 704 066 (ca. 250 m from type locality), 41°28'53"S 145°26'51"E, R. Mesibov, 30 Sep 1990.

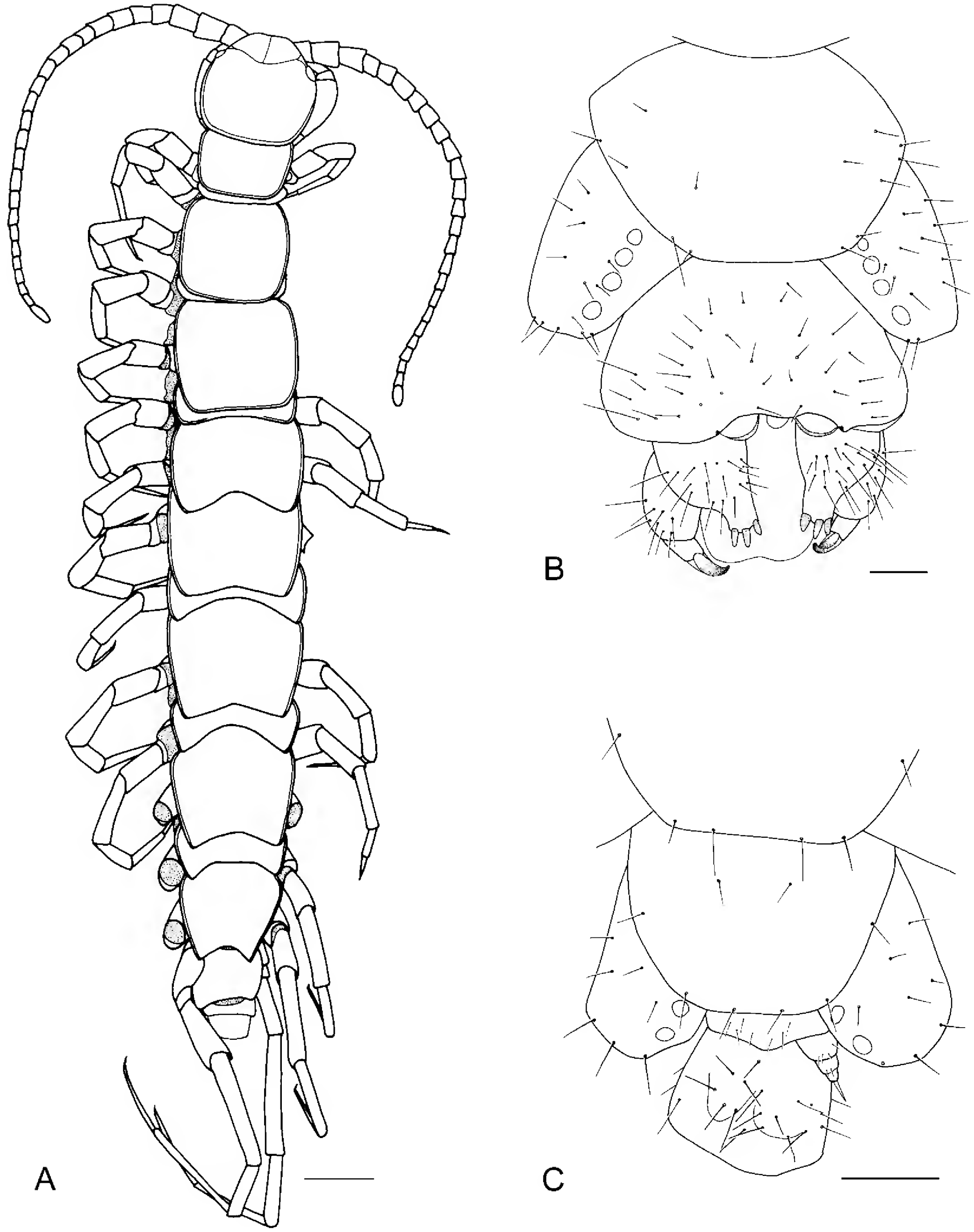

Figure 22. *Paralamyctes (Nothofagobius) mesibovi* n.sp. A, holotype ♀ QVMAG 23/23009, Wombat Hill, Waratah, Tasmania; scale 1 mm. B, paratype ♀ QVMAG 23/41725, Wombat Hill, Waratah, Tasmania, terminal segments and gonopods; scale 0.25 mm. C, ♂ QVMAG 23/11817, Western Creek, Tasmania, terminal segments and gonopods; scale 0.25 mm.

Other material. QVMAG 23/11817 1♂ (Fig. 22C), Western Creek, Tasmania, DP 581 848, 41°41'14"S 146°29'47"E, 1150 m, R. Mesibov, 8 Aug 1993; QVMAG 23/21593, 1♀, Simons Rd, Tasmania, EQ 435 212, 41°21'33"S 147°31'12"E,800 m, P. Greenslade, 8 Mar 1989; QVMAG 23/21594, 1♀, Mt Michael, Tasmania, EQ 845 406, 41°10'53"S 148°00'26"E, 740 m, H. Mitchell, 29 Nov 1989; QVMAG 23/41377, 1♂ (DNA voucher specimen), Coldstream River, Tasmania, CQ 768027, 600 m, 41°31'03"S 145°31'24"E, R. Mesibov, 9 Mar 2000.

Description. Because this species is identical in most respects to *P. cassisi*, described in full above, only features of potentially diagnostic value and standard meristic characters are described here, as well as colour for a specimen in near absolute ethanol (these data lacking for *P. cassisi*).

Length of head shield up to 1.7 mm. Head and tergites orange, with red-brown mottled network concentrated in longitudinal median band and near borders; antennae deep

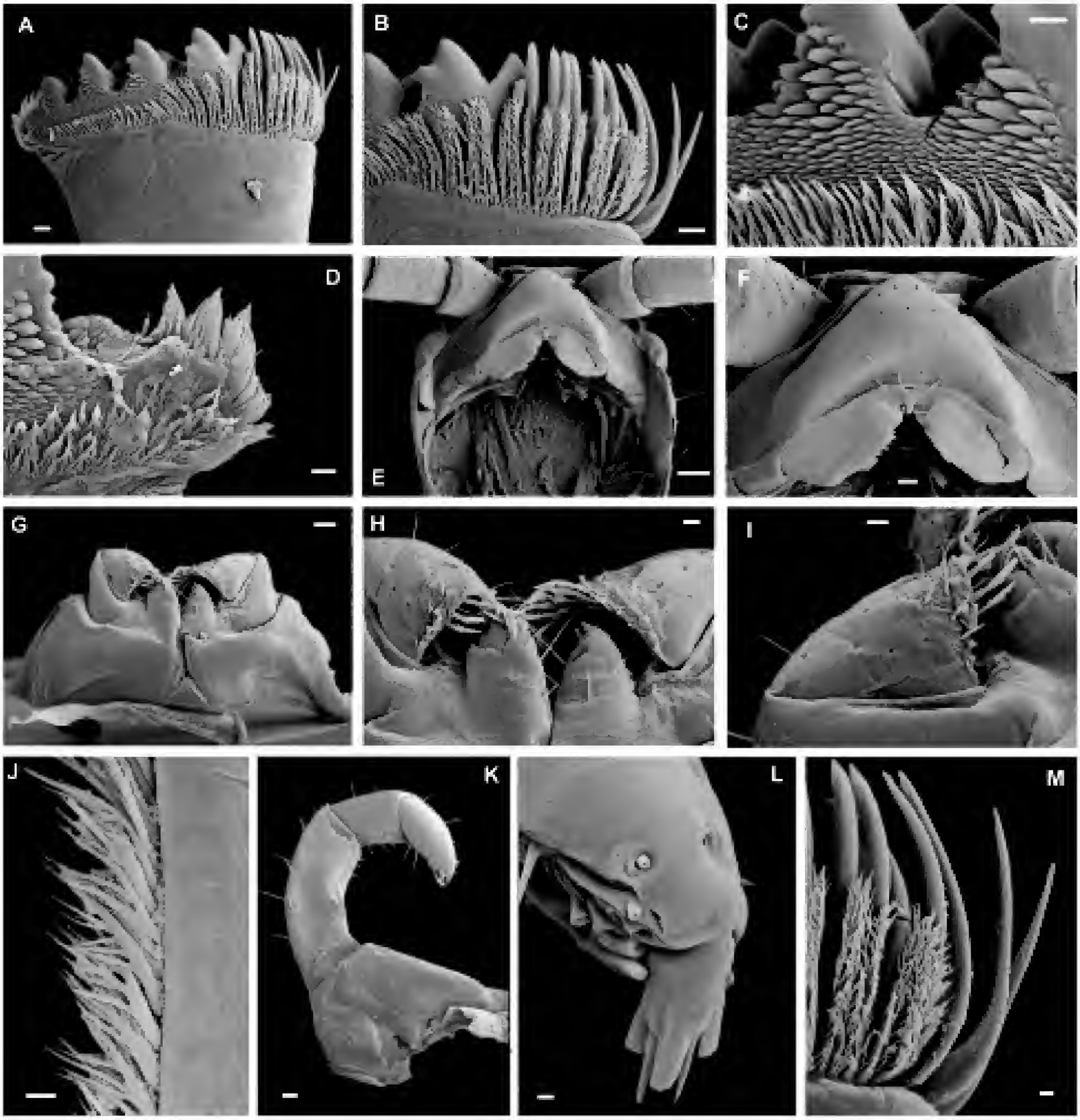

Figure 23. *Paralamyctes (Nothofagobius) mesibovi* n.sp. Paratype ♀ QVMAG 23/23010, Wombat Hill, Waratah, Tasmania. Scanning electron micrographs. A, gnathal lobe of mandible, scale 20 µm; B,M, mandibular aciculae and fringe of branching bristles, scales 20 µm, 5 µm; C, accessory denticles on mandibular teeth, scale 10 µm; D, furry pad on mandible, scale 10 µm; E,F, ventral view of head, showing clypeus and labrum, scales 200 µm, 60 µ; G, first maxillae, scale 60 µm; H,I, coxal processes and distal segments of telopod of first maxillae, scales 20 µm; J, branching bristles on labral margin, scale 5 µm; K, second maxilla, scale 60 µm; L, tarsus and claw of second maxilla, scale 5 µm.

orange; maxillipede pale orange; sternites yellow, without significant purple/chestnut mottling; tarsi of similar pale orange/yellow colour to proximal part of leg. 25–28 antennal articles, all but one or two articles substantially longer than wide. Eye strongly domed, white. Cephalic pleurite elongate, of typical size and shape for genus (Figs. 21I, 23E). Anal leg basitarsus 13–17 times longer than broad (Fig. 16C). Four coxal pores on legs 13–15 in females, two to five on leg 12; large male with three coxal pores on each of legs 12–15. Penis apparently concealed above sternite of first genital segment in both known males. Terminal process on male gonopod equal in length to second and third articles of gonopod (Fig. 22C). Female gonopods as for *P. cassisi* except for longer spur-bearing process on first article (Fig. 22B).

Discussion. The morphology of the female gonopods is particularly distinctive in *P. mesibovi*, it and *P. cassisi* n.sp. being the only *Paralamyctes* with three (rather than the plesiomorphic two) spurs. In both species the spurs are based on a longer projection than is developed in *P. (N.) chilensis*, this peculiar character certainly being a synapomorphy. These species are similar in several other characters that are rarely developed or unique within *Paralamyctes*. Probable synapomorphies include: four large teeth on the maxillipede coxosternite (Fig. 21L,M); a relatively short fringe of labral bristles, with the bristles branching into several rami (Figs. 21C, 23J) rather than having many branches arising as pectinations from a main shaft (Figs. 11D, 13K, 18J); a continuous field of accessory denticles on the mandible, with the denticles being a distinctive triangular shape (Figs. 20D, 23C); simple, non-pinnulate aciculae on the mandible, with a few strong lineations on the sides of the aciculae (Figs. 20B, 23M) and; a distal spinose projection present on the tibia of leg 15.

Distinction between the Tasmanian and northern New South Wales taxa can, in fact, be made based on only a few characters. *Paralamyctes mesibovi* is distinguished by its more elongate cephalic pleurite (Fig. 20L versus Fig. 21I), more embayed posterior margin of tergite 7 (Fig. 19A versus Fig. 22A) and by the longer, more slender projection of the first article of the female gonopod (Figs. 19B, 21G,H versus Fig. 22B). The pleurite of *P. mesibovi* is identical to that of most other species of *Paralamyctes*, and certainly represents the plesiomorphic state relative to the peculiarly shortened pleurite of *P. (N.) cassisi*. The Tömösváry organ is of the same absolute size in the two species, but it occupies a larger area of the pleurite in *P. (N.) cassisi*. *Paralamyctes (N.) mesibovi* has fewer short antennal articles, only a few articles being of subequal length and width versus several in *P. (N.) cassisi*. The two species also appear to differ with respect to the length of the terminal process on the male gonopod (Fig. 19C versus Fig. 22C), but since only one gonopod is known from a relatively small male of *P. mesibovi* (the gonopods being unexposed on the second, larger male QVMAG 23/41377), the significance of this difference should not be overstated. *Paralamyctes cassisi* has a relatively longer terminal process than any other Australian *Paralamyctes*, whereas the terminal process of *P. mesibovi* is considerably shorter (compare Figs. 19C, 22C).

As noted above, the affinities of *P. mesibovi* and *P. cassisi* appear to be with *P. chilensis* from southern Chile and Argentina (see treatment of that species below). *Paralamyctes mesibovi* and *P. cassisi* are both distinguished from *P. chilensis* by their longer antennae, with a larger number of articles (usually 19 in *P. chilensis)*, a larger Tömösváry organ, the absence of a groove delimiting the accessory denticle field on the mandible (Figs. 20D, 23C versus Fig. 25H), simple (Figs. 20A–C, 23M) versus bipinnulate (Fig. 25I,K) aciculae, a typically higher coxal pore count, presence of a distal spinose projection on the tibia of the anal leg, and a longer spur-bearing process on the female gonopod.

Based on the distribution of the *P. mesibovi/P. cassisi* clade in Tasmania and northern New South Wales, a predicted occurrence of the group might be in *Nothofagus* forests in southern Victoria. A comprehensive sampling of *Nothofagus* forests in the Otway Range, Strezlecki Range, and Victorian Central Highlands by the Museum of Victoria has not yet uncovered any *Paralamyctes* (examination of this collection by the author in February 2000).

Paralamyctes (Nothofagobius) chilensis (Gervais in Walckenaer & Gervais, 1847)

Figs. 16E, 24, 25

Henicops chilensis Gervais in Walckenaer & Gervais, 1847: 239.
Henicops chilien.–Gay, 1849: 65, fig. 6a,b.
Henicops chilensis.–Silvestri, 1899: 242.
Paralamyctes chilensis.–Silvestri, 1905: 749.
Paralamyctes chilensis.–Attems, 1928: 67.
Paralamyctes chilensis.–Archey, 1937: 81, 82.
Paralamyctes chilensis.–Chamberlin, 1955: 54.

Type material. Syntypes have not been identified; Gervais (1847) had access to two specimens, collected by M. Claude Gay from an unspecified locality in Chile. Two specimens (♂ and ♀: BMNH [E] 200408 Chilo.1910-.6.17.39) from Patagonia in the Natural History Museum, London, were labelled as probable syntypes by R.E. Crabill. This determination is unlikely because antennal segmentation of one specimen disagrees substantially with the original description of the species, and the specimens are labelled as part of the Silvestri collection, dated 1900. The types have not been identified in the Muséum national d'Histoire naturelle, Paris (J.-J. Geoffroy, pers. comm. 2000).

Material examined. TMAG COLLECTION BY R. MESIBOV, 1983—CHILE, Xth region: 1♀, Proyecto Polincay sawmill complex, under bark of fallen *Drimys winteri* along road to sawmill, ca. 20 km NE of Puerto Montt, 13 May 1983; juvenile, Proyecto Polincay, lightly cut-over *Nothofagus dombeyi/Saxegothea conspicua* forest above sawmill, ca. 20 km NE of Puerto Montt, 10 May 1983; 2♀♀ (Fig. 24A,B), 1♂, Correntoso, under bark of fallen trees in heavily cut-over forest S of park office (Parque Alerce Andino), 5 Jun 1983; 2♀♀, Lago San Antonio, Isla Chiloé, under bark of fallen tree near creek in forest owned by I. Martini of Quellón, 9 Jun 1983; 2♂♂ (Figs. 24C, 25), Lenca, under bark on track, cut-over rainforest ca. 3 and 5 km E of sawmill, 14 Jun 1983; 1♂ and 1♀, Maullín, lightly cut-over ñadi forest ca. 7 km along road to Carelmapú, 15 Jun 1983. ZMUC COLLECTION—CHILE: 1♀, Osorno 53: Parque Nacional Puyehue, Anticura, 300 m, Misión Científica Danesa, 7–8 Mar 1979; 2♀♀, Osorno 37: Parque Nacional Puyehue, Antillanca, 1100–1300 m, Nielsen and Karsbolt, 14 Nov 1981. ARGENTINA: 1♀ (Fig. 16E), Rio Negro 7: S.C. de Bariloche, Colonía Suiza, 810 m, Misión Científica Danesa, 22 Nov 1978; sex undet., Neuquen 18: Lago Tromen, Rodeo Grande, 900 m, Misión Científica Danesa, 12 Mar 1979.

Diagnosis. *Paralamyctes (Nothofagobius)* with relatively short antenna of 17–21 (usually 19) articles; Tömösváry organ relatively small; 4 or 5 teeth on dental margin of maxillipede coxosternite; short, sharp pinnules on both sides of mandibular aciculae; distal spinose projection on tibia of legs 1–14; two or three coxal pores on legs 12–15 in both sexes, fourth pore small when present; two spurs on female gonopod set on short process.

Discussion. *Paralamyctes (Nothofagobius) chilensis* is poorly known from published accounts, and previous attempts to decipher its morphology are in part contra-

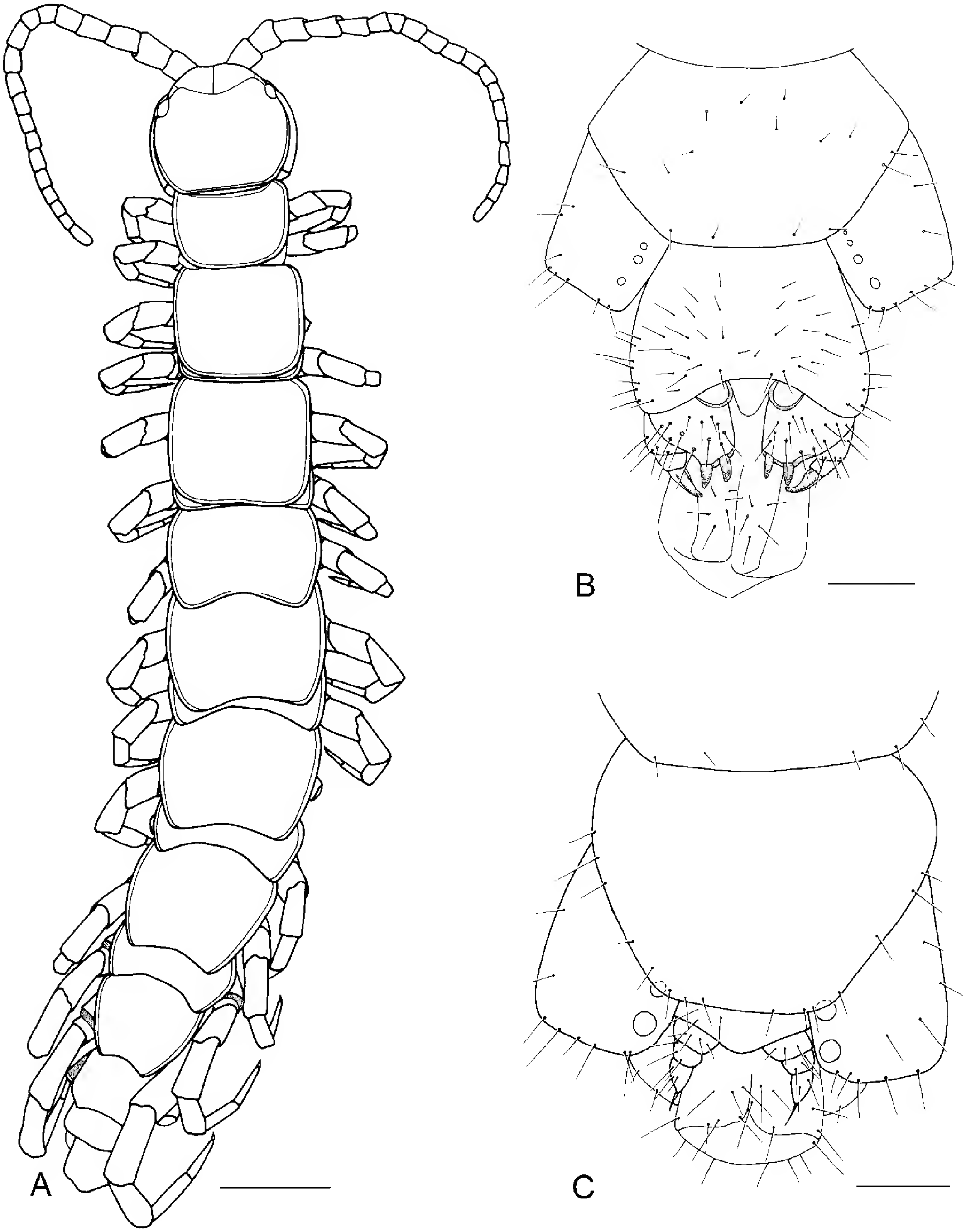

Figure 24. *Paralamyctes (Nothofagobius) chilensis* (Gervais in Walckenaer & Gervais, 1847). A,B, ♀ TMAG, Correntoso, Parque Alerce Andino, Xth Region, Chile; B, terminal segments and gonopods; scales 1 mm, 0.25 mm. C, ♂ TMAG, Lenca, Xth Region, Chile, terminal segments and gonopods; scale 0.25 mm.

dictory. The description by Gervais (1847) notes few potentially diagnostic attributes, many characters being general for henicopids. Gervais described 17 antennal articles, whereas the illustration of a specimen in Gay (1849) depicted 17 articles on one antenna and 18 on the other. Following a description by Silvestri (1905), Attems (1928) listed purportedly diagnostic characters that disagree with the description and illustrations by Gervais and Gay (i.e., posterior margin of T7 with a deep angular notch, the angles toothed; antenna 19 jointed).

The only locality data published for *Paralamyctes chilensis* are Silvestri's (1905) record of it at San Vicente (Talcahuano). A single species of *Paralamyctes (Nothofagobius)* is the only henicopid represented in collections made by R. Mesibov from near Puerto Montt and Maullín and on Isla Chiloé in the Xth region of Chile (see list of sites in "Material examined"); this material is conspecific with the BMNH specimens cited under "Type material", and the same species occurs in adjacent parts of the Argentinian Lake District (Fig. 16E). Most specimens have 19 antennal articles, thus matching

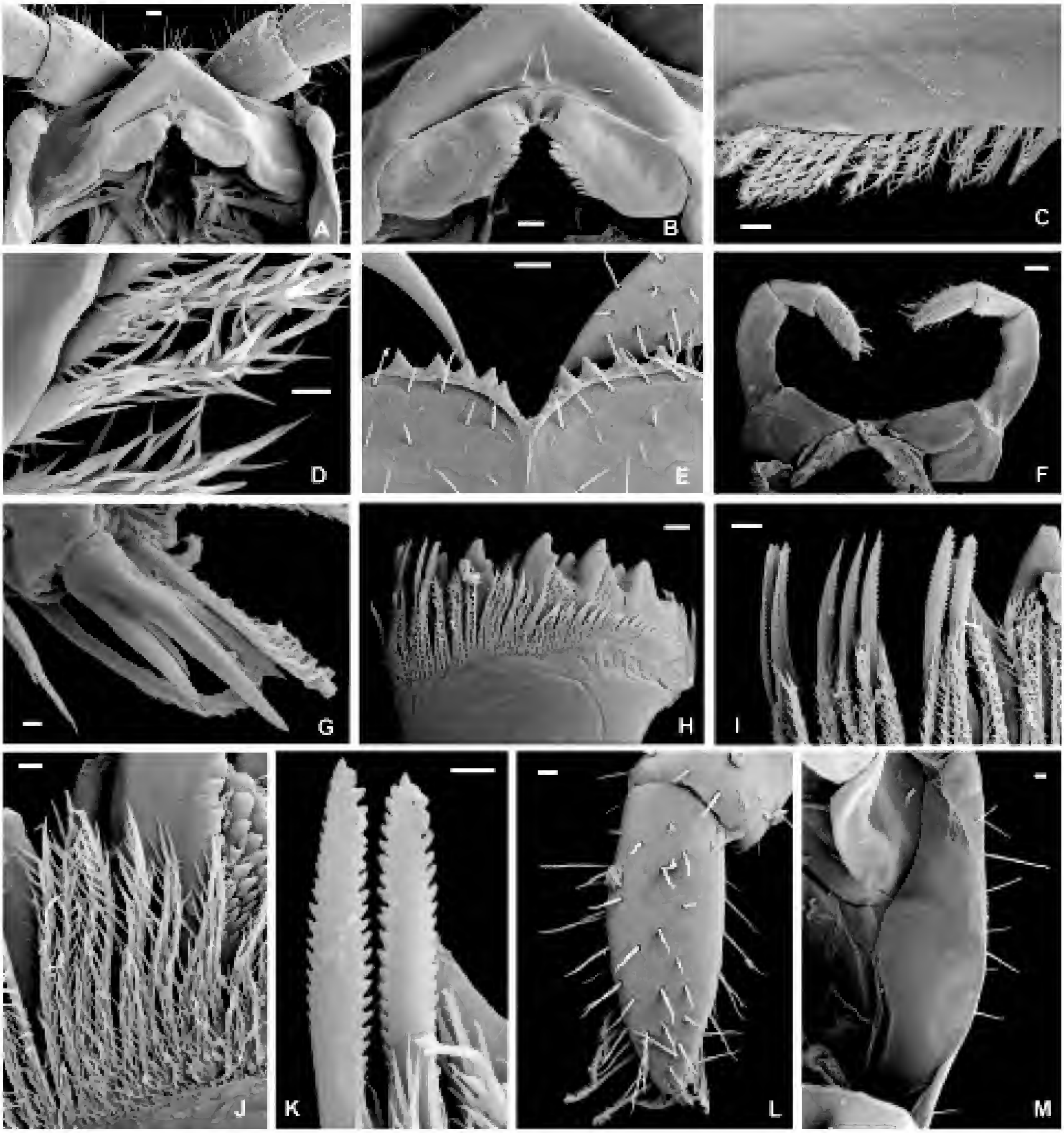

Figure 25. *Paralamyctes (Nothofagobius) chilensis* (Gervais in Walckenaer & Gervais, 1847). ♂ TMAG, Lenca, Xth Region, Chile. Scanning electron micrographs. A,B, ventral views of head, showing clypeus and labrum, scales 50 µm; C,D, branching bristles on labral margin, scales 10 µm, 5 µm; E, dental margin of maxillipede coxosternite, scale 50 µm; F, second maxillae, scale 100 µm; G, claw of second maxilla, scale 5 µm; H, gnathal lobe of mandible, scale 20 µm. I,K, mandibular aciculae, scales 10 µm, 5 µm; J, fringe of branching bristles on mandible, scale 5 µm; L, tarsus and claw of second maxilla, scale 20 µm; M, cephalic pleurite, scale 20 µm.

Silvestri's (1905) description, though the margins of T7 are untoothed and usually not deeply notched (Fig. 24A). Only one specimen (ZMUC: San Carlos de Bariloche, Argentina) has a subangular notch in the posterior margin of T7. The only specimen with more than with more than 19 antennal articles is one of the two identified by Crabill as probable syntypes; it has 21/19 articles. Silvestri (1905) cited 5+5 coxosternal teeth on the maxillipede in *P. chilensis*; specimens examined in this study have 4+4 or 5+5 teeth occurring in about equal frequency (Fig. 25E). Because a single species of *Paralamyctes* is present in the examined Patagonian collections, I consider it likely that this species is *P. chilensis*, though the vagaries of prior taxonomic treatments do not make this certain. Regardless of nomenclatural ambiguities, the species documented here confirms the presence of *Paralamyctes* in Patagonia.

Paralamyctes (Haasiella) Pocock, 1901

= *Wailamyctes* Archey, 1917

Type species. *Henicops insularis* Haase, 1887 (= *Wailamyctes munroi* Archey, 1923).

Diagnosis. *Paralamyctes* with median furrow on head shield extending behind transverse suture; mandibular aciculae bipinnulate; tarsi of legs 1–12 fused into single article.

Assigned species. *Wailamyctes halli* Archey, 1917; *Wailamyctes trailli* Archey, 1917; undescribed species from Tasmania (*Wailamyctes* sp. of Mesibov, 1986).

Distribution. New Zealand (South Island, Stewart Island, Auckland Islands, Campbell Island), Tasmania.

Discussion. Pocock (1901) erected *Haasiella* for the aberrant *Henicops insularis* Haase, 1887, from the Auckland Islands. Johns (1964) indicated that a subsequently-named Auckland Islands species, *Wailamyctes munroi* Archey, 1923, is a subjective synonym of *H. insularis*, the holotype of which merely has unregenerated anal legs. With this synonymy, *Wailamyctes* Archey, 1917, which had served (e.g., Archey, 1937) to group the New Zealand clade composed of *H. insularis* (= *W. munroi*), *H. trailli* (Archey, 1917), and *H. halli* (Archey, 1917), is recognized as *Haasiella*. *Haasiella* is employed as a subordinate taxon (subgenus) within *Paralamyctes* because its removal renders *Paralamyctes* paraphyletic; molecular sequence data indicate a particularly close relationship between *P. (Haasiella)* and *P. (Thingathinga)* (Edgecombe *et al*., 2001). Description of the only known Australian member of *P. (Haasiella)*, the Tasmanian species identified by Mesibov (1986), is in preparation.

Key to Australian genera of Lithobiomorpha and species of *Paralamyctes*

To assist in the identification of species described in this work and place these species in the context of Lithobiomorpha known from Australia, the following key is offered. Characters are specific to taxa occurring in Australia (i.e., large genera like the introduced *Lithobius* may deviate from certain of these characters in other regions).

1 Cluster of ocelli. Pleurite of maxillipede segment interrupted ventromedially, not forming a band between maxillipede coxosternite and sternite of first pedigerous segment. Tibia lacking distal spinose projection. One or more articulated spurs at distal ends of at least a few podomeres on all legs. Female gonopod with dorsal and ventral denticle on each side of main claw. Male gonopod small, single segmented. Anal pores absent except in larva and early post-larval stages .... 2 (Lithobiidae)

—— Ocellus single or absent. Pleurite of maxillipede segment continuous ventromedially, forming a band between maxillipede coxosternite and sternite of first pedigerous segment. Distal spinose projection on tibia of at least legs 1–11. No articulated spurs at distal ends of podomeres. Female gonopod simple, lacking denticles against main claw. Male gonopod flagelliform, composed of three articles and seta-like terminal process. Anal pores present in adult .... 3 (Henicopidae)

2 23 or more antennal articles. Outer tooth on maxillipede coxosternite of similar size to inner tooth/teeth, more anteriorly placed than inner tooth/teeth. Porodont at outer edge of maxillipede tooth row or between teeth on outer part of row. Tergites smooth or gently wrinkled .... *Lithobius*

—— 17–22 (overwhelmingly 20) antennal articles. Outer tooth on maxillipede coxosternite smaller and more posteriorly placed than inner teeth. Porodont among the maxillipede teeth on inner half of tooth row, typically between second and third teeth (as numbered from medial to lateral). Tergites with pronounced longitudinal wrinkling .... *Australobius*

3 14–17 antennal articles. Spiracle absent on first pedigerous segment. Coxal pores lacking on legs 12–13. Coxa of leg 15 with long, lobate process ending in a spine. Prefemur of leg 15 with a single ventral spur .... 4 (Anopsobiinae)

—— 18 or more antennal articles. Spiracle present on first pedigerous segment. Coxal pores present on legs 12–15. Coxa of leg 15 lacking distal spinose process. Prefemur of leg 15 lacking a ventral spur .... 5 (Henicopinae: Henicopini)

4 Spiracle present on segment 8 .... *Anopsobius*

—— Spiracle absent on segment 8 .... *Dichelobius*

5 Median furrow absent or confined to anterior part of head shield. Small, triangular sternite on first maxilla. First genital sternite of male divided longitudinally 6

—— Median furrow on head shield deep, continuous to transverse suture. Large, bell-shaped sternite on first maxilla. First genital sternite of male undivided .... 8 (*Paralamyctes*)

6 All tergites with rounded posterior angles. Tarsi of legs 1–12 unjointed, tarsi of legs 13–15 bipartite. Distal spinose projection absent on tibia of legs 13–14 7

—— Several tergites with projections on posterior angles. Tarsi of legs 1–12 bipartite or tripartite, tarsi of legs 13–15 at least tripartite. Distal spinose projection present on tibia of legs 13–14 .... *Henicops*

7 Ocellus absent. Most antennal articles evenly short .... *Lamyctinus*

—— Ocellus present. Antennal article length uneven, with short, paired articles interspersed between groups of longer ones .... *Lamyctes*

8 Tarsi of legs 1–12 unjointed. Median furrow on head shield extends behind transverse suture. Aciculae on mandible bipinnulate .... *Paralamyctes (Haasiella)*

—— Tarsi of legs 1–12 bipartite. Median furrow on head shield terminates at transverse suture. Aciculae on mandible simple or with pinnules along dorsal side only (not bipinnulate) 9

9 Tergite 1 markedly narrower than head shield. Basal article of female gonopod extended as a process bearing three spurs .. 10 (*Paralamyctes (Nothofagobius)*)

—— Tergite 1 of similar width to head shield. Basal article of female gonopod not extended, bearing two spurs 11

10 Several antennal articles as wide as long. Posterior margin of tergite 7 gently concave. Spur-bearing process on female gonopod moderately long .... *P. (Nothofagobius) cassisi*

—— Nearly all antennal articles substantially longer than wide. Posterior margin of tergite 7 deeply sinuate. Spur-bearing process on female gonopod long, slender .... *P. (Nothofagobius) mesibovi*

11 Maxillipede tarsungulum relatively short, with pretarsal part equal in length to tarsal part. Teeth on maxillipede coxosternite large, pointed .... *P. (Paralamyctes) neverneverensis*

—— Maxillipede tarsungulum long, slender, with pretarsal part substantially longer than tarsal part. Teeth on maxillipede coxosternite small, blunt 12

12 All antennal articles longer than wide. Ocellus bulging. Tömösváry organ on margin of head, with cephalic pleurite constricted behind organ. Aciculae of mandible with pinnules along dorsal side. Posterior margin of tergite 7 with shallow median embayment .... *P. (Paralamyctes) monteithi*

—— Some antennal articles as wide as long. Ocellus gently convex or flattened. Tömösváry organ on surface of cephalic pleurite. Aciculae of mandible simple, lacking pinnules. Posterior of margin of T7 with strong, medially-transverse embayment 13

13 Ocellus gently convex. Dental margin of maxillipede gently sloping backwards laterally. Strong joints between tarsomeres on legs 1–12 .... *P. (Thingathinga) grayi*

—— Ocellus flattened. Dental margin of maxillipede nearly transverse. Faint trace of joints between tarsomeres on legs 1–12 .... *P. (Thingathinga) hornerae*

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A New Seahorse Species (Syngnathidae: *Hippocampus*) From the Great Barrier Reef

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ABSTRACT. A new seahorse, *Hippocampus queenslandicus* (family Syngnathidae) is described from northern Queensland, Australia. Diagnostic characters include meristics: 15–18 dorsal-fin rays, 16–17 pectoral-fin rays, 10–11 trunk rings, 34–36 tail rings, and the presence of body and tail spines, as well as a moderately low coronet with five distinct spines.

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Seahorses, pipefishes and seadragons collectively belong to the family Syngnathidae. Syngnathids occur in coastal waters of temperate and tropical regions of the world in habitats ranging from sand, seagrass beds to sponge, algae, rubble and coral reefs (Vincent, 1997; Kuiter, 2000). A recent revision of the seahorses, genus *Hippocampus*, recognizes 32 species world-wide (Lourie *et al.*, 1999). The number of valid Australian seahorse species has been estimated at seven (Gomon, 1997) and 13 (Lourie *et al.*, 1999).

Materials and methods

A total of 226 specimens (height range: 56–143 mm, 111 males, 115 females) of a new *Hippocampus* species, together with five specimens of *H. zebra* Whitley, 1964, and four of *H. dahli* Ogilby, 1908, were collected between October 1997 and December 1998. Seahorses found dead in trawl nets were immediately frozen. Upon return to shore, frozen seahorses were placed in FAACC (formaldehyde–acetic acid–calcium chloride fixative) for 48 hours then removed to 100% ethanol.

Macroscopic description of seahorses included sex, number of body segments and colour morphs. Standard seahorse measurement protocol was followed (Lourie *et al.*, 1999). Meristic values were recorded to within 0.1 mm using dial callipers and include; height (measured from top of crown to tip of tail, HT), wet weight, head length (HL), snout length and snout depth, eye diameter (horizontal measurement of the left eye), tail length, dorsal-fin length (length of fin base) and abdominal width. In males, the pouch length (measurement from top of opening slit to ventral point where pouch meets tail) was also recorded. Using a stereo dissector the number of rays in the dorsal, anal and pectoral fins of each individual were counted. All specimens examined, including types, were collected by the author. Types are deposited in the Museum of Tropical Queensland in Townsville (QM), Museum Victoria (NMV) and the Australian Museum, Sydney (AMS).

***Hippocampus queenslandicus* n.sp.**

Hippocampus species 4 (Kuiter, 2000)

Holotype, QM I24445, ♂, HT 103.9 mm, collected by trawl, 50 m depth off John Brewer Reef, 18°37'S 147°03'E, October 1999. Paratypes: QM I24446 ♀, HT 102.8 mm, collected with holotype; NMV A 21578 ♂, collected by trawl, 50 m depth off Britomart Reef, 18°14'S 146°35'E, February 1999; NMV A 21579 4 ♀♀, collected by trawl, 50 m depth off Britomart Reef, February 1999; AMS I.40832-001 ♀, HT 100 mm, collected by trawl, 40 m depth off Bait Reef, 19°47'S 149°06'E, December 1998; AMS I.40833-001 ♂, HT 111.2 mm, collected by trawl, 50 m depth, off John Brewer Reef, 18°37'S 147°03'E, November 1998.

Non-type material: 217 specimens, 115 ♀♀, 111 ♂♂, (HT range 56–143 mm), collected by trawl, 30–50 m depth, north Queensland, Great Barrier Reef, October 1997–December 1998.

Diagnosis. Number of dorsal fin-rays 15–18, (17 in 67% of specimens). Pectoral fin-rays 16–17, (17 in 77% of specimens). Snout length 35.9–54.2%, snout depth HL 8.2–11.2%; coronet moderately low HT 2.3 mm (2.2–2.4 mm) with 5 spines; inferior tail ridge with moderate spines along pouch section of males, filaments absent; nasal spine absent; 1–2 cheek spines, length 1.4 mm (1.2–1.8 mm); eye spine present, 1.1 mm (0.9–1.5 mm) in length; first trunk ring spine large, 2.8 mm (2.4–2.9 mm) in length; lateral head spine 1.8 mm (1.17–2.1 mm) in length; trunk rings 10 or 11; tail rings 34–36.

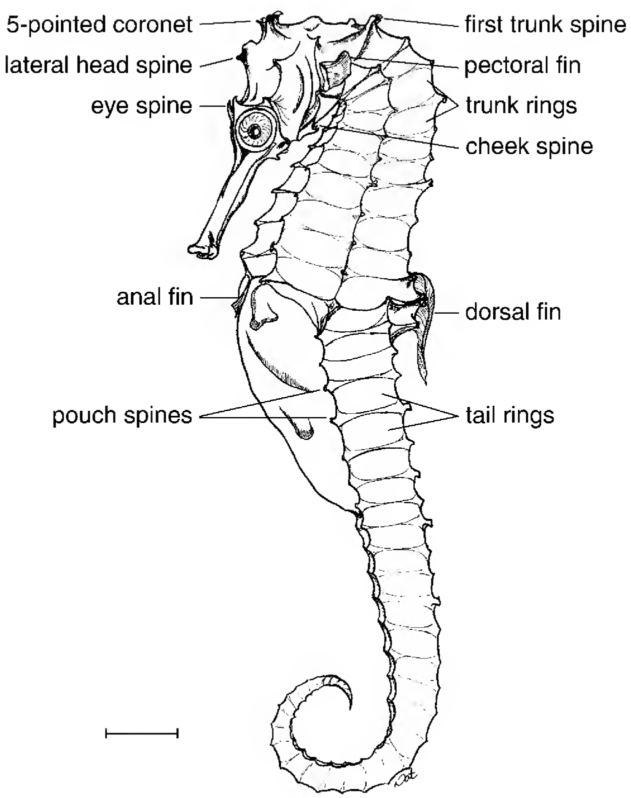

Figure 1. Composite diagram of male *Hippocampus queenslandicus*. Scale 1 cm.

Description. Values are for the holotype, with ranges given between parentheses based on other material examined (Table 1). Holotype height (HT) 103.9 mm (56–143.4 mm). Wet weight of holotype 6.89 g (1.8–14 g). The head prominent and relatively mobile, maintained at an angle of approximately 90° to the axis of the trunk. Head length (HL) 27.9% HT (30.3–35.8). Snout length 47% HL (35.9–54.2). Snout depth 9.3% HL (8.2–11.2). Eye diameter 11.1% HL (5.2–16.4). Abdominal width 14.5% HT (12.8–23.0). Tail length 51% HT (37.8–64.4). Holotype pouch length 23% HT (11.2–27.7). Colour patterns vary among individuals (see colour photos in Kuiter, 2000: 38–39); holotype orange; colour range among paratypes: red, purple, white, brown, silvery grey and orange.

Table 1. Morphometric values for *Hippocampus queenslandicus* holotype and opther specimens (paratypes and non-type material).

	holotype (mm)	**holotype proportion**	**n**	**range (mm)**	**range proportion**
height (HT)	103.9	—	226	56–143.4	—
head length (HL)	29.0	27.9% HT	226	17–39.7	30.3–35.8% HT
snout length	13.6	47.0% HL	226	6.1–18.6	35.9–54.2% HL
snout depth	2.7	9.3% HL	226	2.3–3.1	8.2–11.2% HL
eye diameter	3.2	11.1% HL	226	1.2–4.8	5.2–16.4% HL
abdominal width	15.1	14.5% HT	226	7.2–28.9	12.8–23% HT
tail length	53.2	51.0% HT	226	28–81.3	37.8–64.4% HT
pouch length	23.8	23.0% HT	111	11.2–33	11.2–27.7% HT
wet weight (g)	6.9	—	226	1.8–14.0	—

Table 2. Selected meristic values for three *Hippocampus* species; data from Lourie *et al.* (1999) marked by asterisk.

species	dorsal fin-rays (mode)	pectoral fin-rays (mode)	anal fin-rays	trunk rings (mode)	tail rings (mode)
H. queenslandicus	15–18 (17)	16–17 (17)	4	10–11 (10)	34–36
H. taeniopterus *	17–18	15–18 (16)	4	11	34–38
H. spinosissimus *	16–20	16–19 (17)	4	11	33–39

The holotype coronet is moderately low and has five distinct, pointed spines, forming a pentamerous crown (Fig. 1). A single distinguishable spine occurs above each orbit, termed "eye spine" (length in holotype 1.1 mm). A single prominent lateral spine on the sides of the head preceding the coronet, termed "head spine" is apparent (length in holotype 1.8 mm). Holotype has one large cheek spine, some paratypes with 2, length 1.4 mm. The first spine on the dorsal first trunk ring is extremely prominent, (length 2.8 mm in holotype, Fig. 1). Inferior tail ridge with moderate spines along pouch section of males. Nasal spine is absent in this species. Filaments are absent in this species.

Holotype possesses 10 trunk rings (range 10–11) and 34 tail rings (range 34–36), with the trunk of moderate length. The male pouch occupies most of the abdominal cavity and is ventral to the last two trunk and first seven tail segments. The dorsal fin is relatively small with 17 rays (range 15–18) and a length of 8.0 mm (range 5–10.5 mm). The number of pectoral fin-rays in holotype is 17 (range 16–17) and there are 4 anal fin-rays.

Distribution and ecology. *Hippocampus queenslandicus* was recorded from Feather Reef (17°00'S 146°10'E), East of Innisfail in the northern section of the Great Barrier Reef, to Bait Reef (19°47'S 149°06'E). The highest recorded numbers over the 14–month sampling period were at John Brewer Reef (18°37'S 147°4'E), East of Ingham. The species was collected by trawl, at depths between 30 and 50 m and was usually caught in a sponge or seagrass habitat, often attached to hard and soft coral species.

Comparisons. Species in the genus *Hippocampus* are often distinguished by fin-ray counts together with number of body, dorsal and tail rings (Whitley & Allen, 1958; Lovett, 1969; Vari, 1982; Lourie *et al.*, 1999).

Along with this new species there are a number of other seahorse species occurring in the north Queensland waters of the Great Barrier Reef, namely *Hippocampus zebra* Whitley, 1964, *H. bargibanti* Whitley, 1970, *H. dahli* Ogilby, 1908, *H. taeniopterus* Bleeker, 1852, and an undescribed species: the wing-spined seahorse (Lourie *et al.*, 1999; Kuiter, 2000). *Hippocampus zebra* is a small species (HT range in this study 79.2–88.4 mm), with distinctive black (or dark brown) and white stripes over its external body and head, clearly differentiating it from *H. queenslandicus*. *Hippocampus bargibanti* differs from *H. queenslandicus* by its small size (adult height < 20 mm) and its "fleshy" appearance, mostly without recognizable body rings and its extremely short snout. The external surface of *H. dahli* is relatively smooth, with reduced, low spines that form ridges around each body segment, in contrast to the spiny external surface of *H. queenslandicus*. *Hippocampus dahli* is long, slender and thin, with a narrow head, flattened body shape and with the coronet laterally flattened. The wing-spined seahorse often displays filaments on the larger spines of the head and back, clearly differing from *H. queenslandicus* which completely lacks filaments.

Hippocampus queenslandicus superficially resembles two other species of the genus, *H. taeniopterus* and *H. spinosissimus* Weber, 1913. *Hippocampus queenslandicus* differs in its spinous ornamentation and fin-ray counts (Table 2). *Hippocampus taeniopterus* a species often confused with *Hippocampus kuda* Bleeker, 1852 (see Kuiter, 2000), is a commonly occurring inshore species in the northern section of the Great Barrier Reef. *Hippocampus taeniopterus* differs from *H. queenslandicus* in having 17–18 dorsal fin-rays, 15–18 (mode of 16) pectoral fin-rays, 11 trunk rings and 34–38 tail rings (Table 2). *Hippocampus taeniopterus* has a deep cheek area, a thick snout and a deep abdominal area giving it a more rounded and stout appearance than *H. queenslandicus*. *Hippocampus taeniopterus* lacks well-developed spines, appearing relatively smooth, with a number of irregularly spaced, rounded tubercles covering the external surface (Dawson, 1986; Lourie *et al.*, 1999; Kuiter, 2000), in contrast to the spinous exterior of *H. queenslandicus*. The coronet of *H. taeniopterus* is more rounded than the five-spined coronet of *H. queenslandicus* and the coronet points backwards on the head of *H. taeniopterus*. Male *H. taeniopterus* are often drab coloured with striations over the head and small black spots over the trunk; females are often yellow with several large dark spots on the trunk. Male and female *H. queenslandicus* often are bright orange or red. Another notable difference between these two species is the differing sizes of the young: the average height of juvenile *H. queenslandicus* is 5.63 mm, whereas juvenile *H. taeniopterus* examined by Rick Brayley (pers. comm., 1999) are almost three times larger.

Hippocampus spinosissimus has similar meristic values to those of *H. queenslandicus* (Table 2). However, *H. spinosissimus* has a large eye spine, a medium to high coronet with four or five spines, a generally spinous exterior and strongly developed, blunt spines bordering the pouch in males (Lourie *et al.*, 1999). By comparison, *H.*

queenslandicus, has a relatively reduced spinous exterior, lacks long pouch spines and has a shorter coronet with four or five spines. *Hippocampus spinosissimus* has not been recorded in the northern waters of the Great Barrier Reef to date.

In summary, *H. queenslandicus* differs in meristic values and physical appearance from other seahorse species found in the northern section of the Great Barrier Reef and from similar species found elsewhere (Lourie *et al*., 1999; Kuiter, 2000). This species seems restricted to the northeast coast of Queensland, Australia, hence the name *H. queenslandicus*.

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Two New Species of Fairy Shrimp (Crustacea: Anostraca: Thamnocephalidae: *Branchinella*) from the Paroo, Inland Australia

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ABSTRACT. Two new species of fairy shrimp, *Branchinella budjiti* and *B. campbelli*, are described from intermittent wetlands in northwestern NSW. Both have very distinctive frontal appendages, second antennae and other features that defy classification into established groups within the genus.

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The genus *Branchinella* Sayce, 1903, is one of the most speciose genera of fairy shrimps in the world with 33 species so far described (Belk & Brtek, 1995). Geddes' (1981) review of Australian *Branchinella* recognized 18 species, but Belk & Brtek (1995) elevated three of his subspecies to specific rank, enlarging the Australian fauna to 20 species, all endemic. Forty percent of these are known from a very limited area or just the type locality in the arid zone. It is not surprising then that intensive collecting in one such area, the middle Paroo catchment of northwestern NSW and southwestern Qld, has yielded many new distribution records and two new species (Hancock & Timms, in review; Sanders, 1999; Timms, 1993, 1997). In addition, a new genus in the family Branchipodidae and a new species of *Parastreptocephalus* (Streptocephalidae) have been found (Timms, unpublished data). It is the purpose of this paper to describe the new species of *Branchinella* and to attempt to place them into the groupings of *Branchinella* proposed by Geddes (1981).

Taxonomy

Thamnocephalidae

Branchinella Sayce, 1903

Branchinella budjiti n.sp.

Fig. 1

Type material. HOLOTYPE: ♂, Australian Museum (AM hereafter), AM P58543, length 16.1 mm; ALLOTYPE: 1♀, AM P58544, length 13.9 mm; PARATYPES 4♂♂ (length 15.9±0.6 mm) and 3♀♀ (length 13.3±0.6 mm) AM P58545.

Type locality. An unnamed claypan c. 500 m NW of Muella Station homestead, 130 km NW of Bourke, NSW, 29°31'S 144°56'E, altitude 120 m a.s.l., collected by the author, 6 December 1999.

Other material. 20♂♂, 10♀♀ from Sues Pan, Bloodwood Station, 132 km NW Bourke, NSW, AM P58546; collected by the author 17 November 1999. Unnamed Yapunyah swamp, 22 km NE of Currawinya homestead on Eulo Rd, Currawinya National Park, Queensland, Queensland Museum (QMB hereafter) W25187; collected by the author 18 May 1996. Collections by author from 18 sites, some at multiple dates during 1988–2000, on Bloodwood, Muella and Tredega Stations, 130–150 km NW Bourke. Collections by author from 28 sites, some at multiple dates during 1987–2000, at Currawinya National Park, via Hungerford, Qld. Collections by author from 5 sites during 1995–2000 on Rockwell Station, 145 km SW of Cunnamulla, Qld.

Etymology. Named in honour of the Budjiti tribe, first human inhabitants of the middle Paroo country.

Description of male

Length 16.1 mm. Cephalothorax slightly longer than the abdomen minus the cercopods. Antenna I reaches a little beyond the apex of the basal segment of antenna II (Fig. 1A). Antenna II (Fig. 1B) basal segment at c. 70° to body axis (instead of c. 20–40° as in typical *Branchinella* species). This segment with two raised pads anterodistally bearing a few short thin setae, and an outgrowth at its posterolateral corner. This outgrowth lamellar, smooth and serrate on the anterior margin and about one third to half the length of the distal segment. Distal segment a little longer than basal segment, sclerotized, flattened and bending medially c. 20°. Medial margin with a medial swelling and bearing small serrations. Apex tapering and truncated.

Frontal appendage (Fig. 1C) large and elaborate, carried curled beneath the thorax and reaching up to half its length and doubling the depth of the thorax. Basal section fused into a trunk bearing three long papillae on the lateral margins. This supports two large wing-like branches, each a little longer than wide and bearing an expanded distal margin, particularly at the posterolateral corners. Numerous papillae on the lateral margins and lower surface; those on a central thickened area underneath each branch longer than the rest, except for c. 7 long papillae on the outer distal corners of each branch. Density of papillae varies, least on the ventral area of the fused trunk and inner area of the branches, and most numerous towards the outer distal corners.

Thoracopods (Fig. 1F) with endopodite smoothly rounded (but first thoracopod has a shallow notch anterodistally) and bearing long setae. On thoracopod 5, but not thoracopods 1 and 11, the bases of the anterodistal region of endopodite with a rounded knob on one side. Endites 1 and 2 very setose and each with an anterior setae, the first about half the length of the second. Endites 3–4 each bear 2 anterior setae and endite 5 bears 1 anterior setae on phyllopods 1, 5 and 11. Exite longer than endopodite but narrower and more setose. Epipodite sausage-shaped and smooth. Preepipodite expanded and serrated; no notch on its border.

Penis (Fig. 1D) short, extending back one or at most two abdominal segments when everted. Armed with c. 9 large asymmetrical teeth on the lateral (convex) face and with numerous long papillae on the side and medial (concave) face. These papillae shorter near the distal end. Distal end lobed on the inner curvature and bears a harder asymmetrical tooth on the outer apex. Base of penis bare of teeth or papillae. No swelling lateral to the penes. Cercopods of telson (Fig. 1E) heavily setulated on both margins and subequal in length to the last two abdominal segments.

Description of female

Length 13.9 mm. Antenna I almost twice the length of the eye and eye stalk (Fig. 1G). Antenna II (Fig. 1G) equal in length to antenna I. Foliaceous, about twice as long as wide and ending in a narrow, sharp protrusion from a shouldered distal portion. Numerous small thin setae on the distal margin. Brood pouch (Fig. 1H) extending posteriorly over a little more than four abdominal segments. Distal part curved away from abdomen and with a small neck before the ovipore. Thoracopods similar to those of male, but knobs on the bases of endopodite setae not as well developed. Cercopods as in the male.

Description of other material

Length variable but around 10–15 mm in males and slightly smaller in females (Table 1).

The frontal appendage of the male in life can be opened into a large sheet considerably wider than the body and about the length of the thorax. Trunk of frontal appendage with 2–5 (usually 3–4) papillae on lateral margins. Outer distal corners of each branch of frontal appendage with 5–

Table 1. Length (mean±SD) of *Branchinella budjiti* from different localities. Ten males and ten females from each locality measured, except entry marked ([a]): only 7 specimens measured.

locality	length of ♂♂	length of ♀♀
RA Pan, Currawinya NP (Dec 96)	9.7±1.0 mm	8.5±0.8 mm
RC Pan, Currawinya NP (Jun 99)	14.6±0.9 mm	13.0±1.8 mm
Sues Pan, Bloodwood (May 98)	15.3±1.2 mm	14.7±0.8 mm[a]
Goat Pan, Muella (Jun 99)	14.2±1.0 mm	12.6±0.9 mm

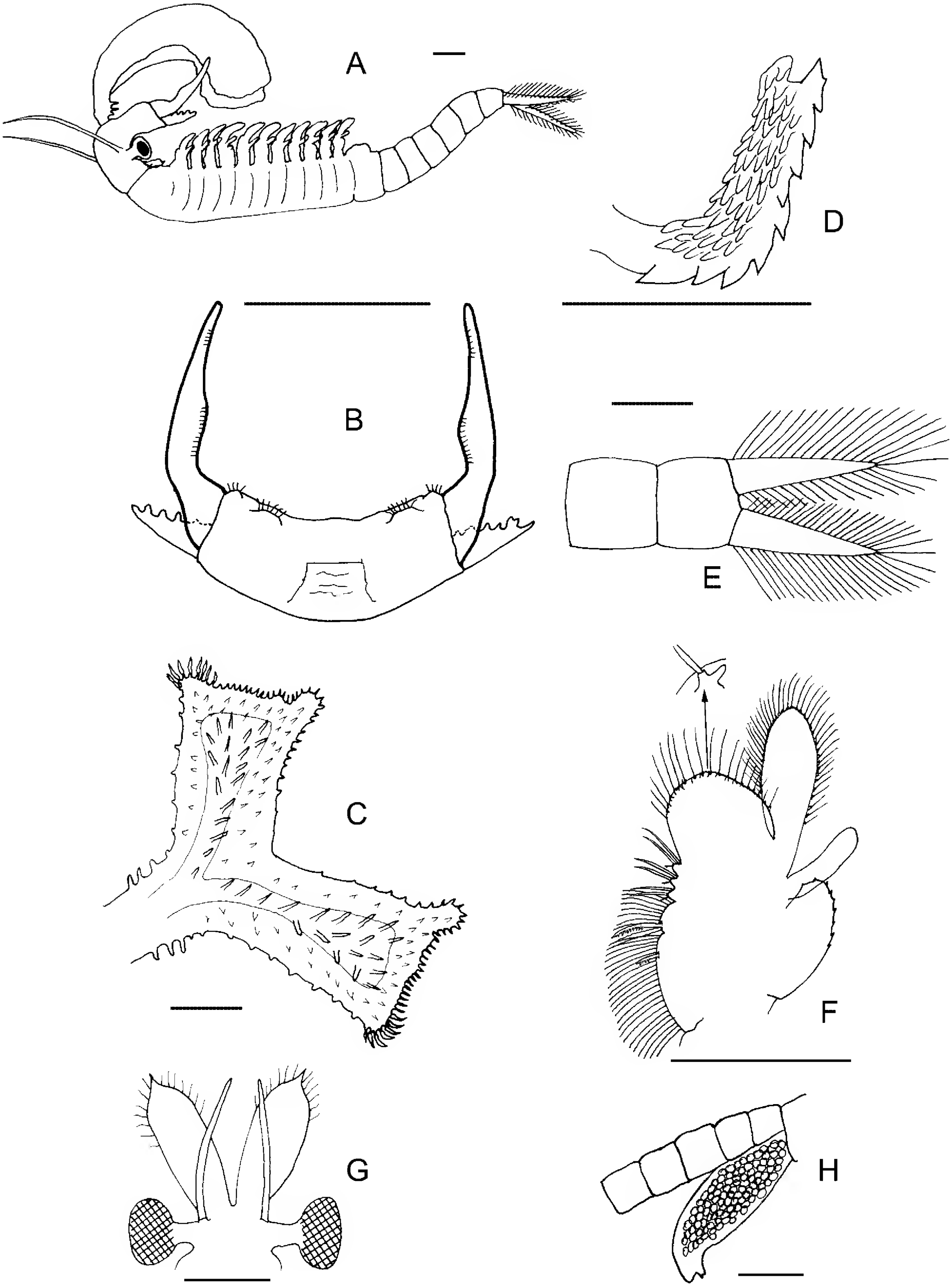

Figure 1. *Branchinella budjiti* n.sp. Male holotype A–F, female allotype G and H. A, lateral view of whole animal; B, dorsal view of antenna II with frontal appendage removed; C, ventral view of frontal appendage; D, penis; E, telson and cercopods; F, anterior view of right 5th phyllopod; G, dorsal view of head, antennae I and II; H, lateral view brood pouch and associated abdominal segments. Each scale bar represents 1 mm.

8 longer papillae. Papillae on lateral margins and lower surface variable in density between specimens, though they are always sparcest on the ventral areas of the fused trunk and inner area of branches and most numerous towards the outer distal corners.

Endites 3–5 of thoracopods normally bear 2 setae but sometimes only one is present and this occurs mostly on endite 5.

In females the size and shape of the brood pouch is variable, with the length varying between four and five abdominal segments and the small neck before the ovipore sometimes absent.

Differential diagnosis

In Geddes' (1981) key to Australian species of *Branchinella, B. budjiti* straddles both halves of couplet 9, so it needs to be separated the step beforehand—after couplet 7 part 2 (basal segments of antenna II with medial swellings or outgrowths elsewhere). This can be achieved by adding a couplet:

—— Trunk of frontal appendage shorter than branches, branches flattened, large and with many papillae, especially on posterolateral margin .... *B. budjiti*

—— Trunk of frontal appendage longer than branches and if branches expanded distally, then relatively small and no concentration of papillae on posterolateral margin 9

The only species likely to be confused with *B. budjiti* is *B. denticulata* from Kalgoorlie, Western Australia. Both have a lamellar outgrowth from the posterodistal corner of the basal segment of antenna II (not the anterodistal corner in *B. denticulata* as shown in Linder [1941] and Geddes [1981]), and both have the two branches of the frontal appendage expanded distally. However, the lamellar outgrowth in *B. budjiti* always has a markedly serrate anterior margin (with 4–6 serrations), but in *B. denticulata* the anterior margin is weakly serrate (with c. 2 serrations) as shown in Linder (1941) and repeated in Geddes (1981) and as seen in the paratypes (C. Rogers, pers. comm.). Furthermore, the lamellar outgrowth is carried parallel to the axis of the basal segment in *B. budjiti*, but in *B. denticulata* its position is variable, either at right angles (as reported by Linder [1941] and repeated by Geddes [1981]), or parallel with the axis of the basal segment (C. Rogers, pers. comm.). It is possible that this variation in position of the lamellar outgrowth is an artifact due to preservation; how the lamellar outgrowth is carried in life is unknown. The frontal appendages of the two species are also superficially similar, but in *B. budjiti* the trunk is short and the two branches much longer, while the reverse applies in *B. denticulata*. The diagram of *B. denticulata* in Linder (1941) and repeated by Geddes (1981) is unrepresentative, showing perhaps a juvenile specimen, since adults among the paratypes examined by C. Rogers (pers. comm.), have the branches more expanded and with papillae on the edges and some denticles or spines scattered over the dorsal surface. The difference between the two species in the branches of the frontal appendage lies in much greater relative size and the larger number of posterolateral papillae in *B. budjiti*. Further differences between the two species are in antenna II in the adornment of the basal segment and in the shape of the second segment. In *B. denticulata* the basal segment has a few papillae scattered on its medial upper surface and the second segment is evenly arched and lacks any thickening along its length. By contrast in *B. budjiti* there are two medial distal swellings bearing hairs on the basal segment and the second segment has a medial swelling and is unevenly bent at this point. In conclusion the two species seem closely related, but are distinctly different in many key features.

Distribution and habitat

Widespread and common in temporary turbid waters in the middle portion of the Paroo catchment in northwestern NSW and southwestern Qld (Sanders, 1999). The most common habitat is a very turbid (Secchi disc depth <5 cm) claypan that holds water for a month or two after filling (Sanders, 1999; Timms, 1997).

Branchinella campbelli n.sp.

Fig. 2

Type material. HOLOTYPE: ♂, AM P58547, length 12.4 mm; ALLOTYPE: 1♀, AM P58548, length 15.4 mm; PARATYPES: 10♂♂ (length 12.2±0.6 mm), 10♀♀ (length 13.0±1.2 mm), AM P58549.

Type locality. Lake Muella, Tredega Station, 140 km NW Bourke, NSW, 29°31'S 144°53'E, altitude c. 119 m a.s.l. Collected by the author 17 November 1999.

Other material. Five males and three females from Carters swamp, 12 km N of homestead, Muella Station, 130 km NW of Bourke, NSW, AM P58550. Collections by the author from five localities, some on multiple occasions, during 1995–2000 on Bloodwood, Muella and Tredega Stations, 130–150 km NW Bourke.

Etymology. Named for Steve Campbell, Manager of Muella Station for many years.

Description of male

Length 12.4 mm. Cephalothorax slightly longer than the abdomen minus the cercopods. Antenna I a little longer than the basal segment of antenna II (Fig. 2A). Antenna II (Fig. 2A) of normal relative size and angle of repose (c. 20–40° to body axis) for *Branchinella*. Bases fused for almost half their length. Basal segment with a well defined mound about one-third of the way along the free inner surface. Mound clothed with numerous very short thin setae. Apical segment about equal in length to the basal joint, curved and tapering to a wide point. For much of its length the inner surface bears numerous weakly developed transverse ridges.

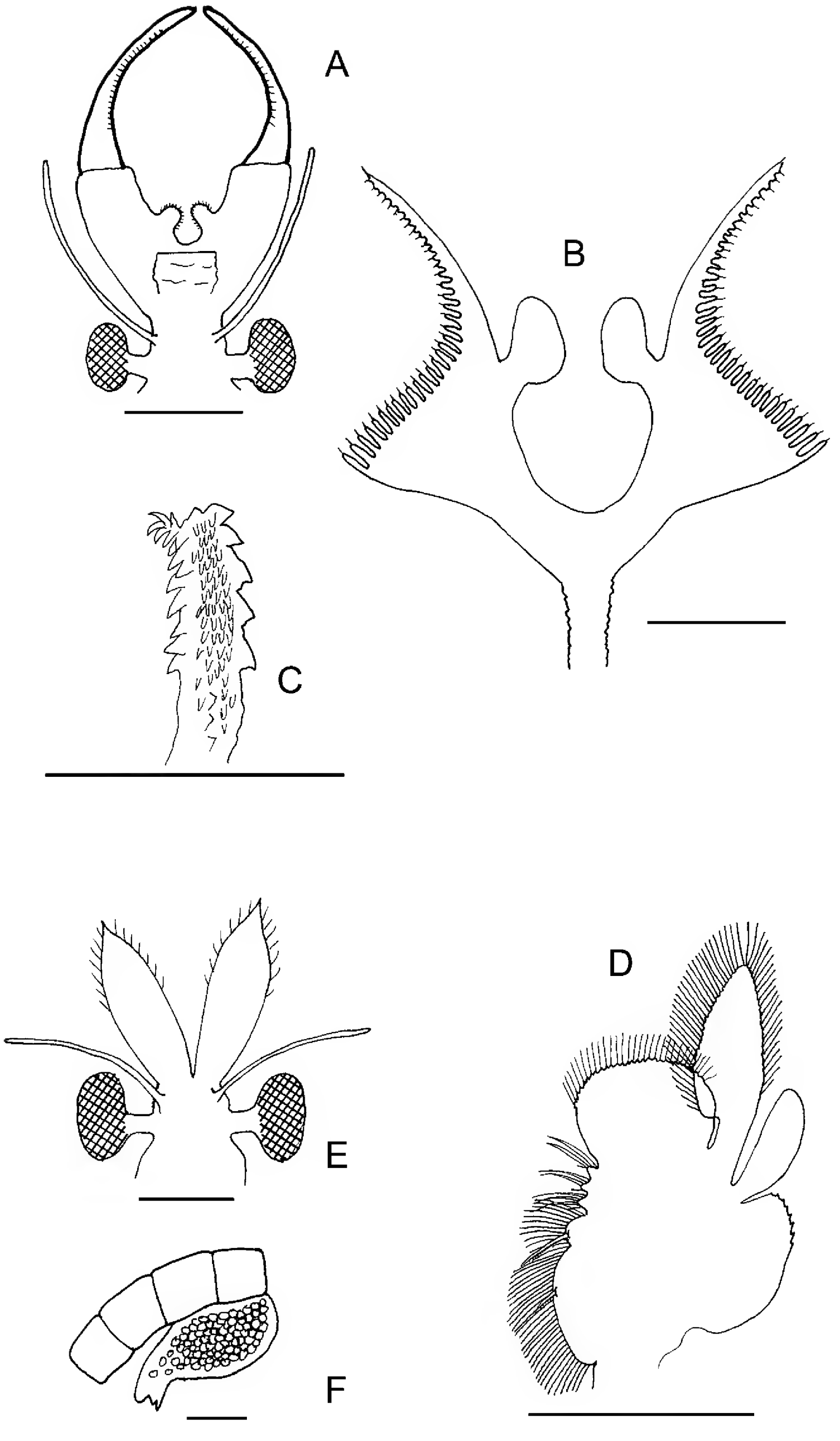

Figure 2. *Branchinella campbelli* n.sp. Male holotype A–D, female allotype E and F. A, dorsal view of head, antennae I and II with frontal appendage removed; B, dorsal view of frontal appendage; C, penis; D, anterior view of right 5th phyllopod; E, dorsal view of head, antennae I and II; F, lateral view of brood pouch and associated abdominal segments. Each scale bar represents 1 mm.

Frontal appendage (Fig. 2B) moderately large and elaborate, approximately equal in bulk to antennae II proper and reaching almost half way along the cephalothorax. Basal section fused into an unadorned trunk, though the trunk is ringed. Terminal branch with an unadorned flange protruding medially and attached by a wide stem to the inner margin about two-fifths along its length; and expanded basolaterally into a roughly equilateral triangle tapering distally into a long flagellum-like process. The outer margin of the expanded base and flagellum bordered with finger-like papillae, each terminating in a spine. These papillae number c. 35. The first 20 papillae of similar size, but those towards the tip of the flagellum decrease in size until the last few are swellings rather than papillae.

Fifth thoracopod (Fig. 2D) with endopodite broadly rounded and bearing numerous setae. No knobs on the bases of endopodite setae. Endites 1 and 2 heavily setulated and each with a stout anterior seta, the first about half the length of the second. Endite 3 and 4 with 2 anterior setae and endite 5 with one anterior setae. Exite much longer than endopodite, narrow and with many more and longer setae than endopodite. Epipodite sausage-shaped and smooth. Preepipodite expanded and with a few small sharp denticles on its distal border; no notch on this border. Thoracopods 1 and 11 essentially similar to 5th thoracopod, but smaller and slightly different in proportions.

Penis (Fig. 2C) short, extending back one abdominal segment when everted. Armed on the outer lateral (convex) side with about five broadly based asymmetrical teeth and on the medial (concave) side with numerous (c. 15–21) sharp teeth crowded distally. Innerside teeth more symmetrical, but curved, particularly those near the tip of the penis. Area between the two sets of teeth with thin papillae and some weakly developed, broad-based teeth. No swelling lateral to the penes.

Telson with cercopods heavily setulated on both margins. Cercopods equal in length to the last two abdominal segments.

Description of female

Length 15.4 mm. Antenna I (Fig. 2E) about one and three-quarters the length of the eye and eye stalk. Antenna II (Fig. 2E) equal in length to antenna I, foliaceous, almost three times as long as wide and tapering to a sharp protrusion distally. Numerous small thin setae on the distal margin. Brood pouch (Fig. 2F) deep-bodied and extending backwards over almost four abdominal segments. Thoracopods and cercopods as in the male.

Description of other material

Length variable between 8 and 15 mm (Table 2).

In live males the long apical flagellum of the frontal appendage reaches three quarters the length of the cephalothorax and the basolateral part of the side branches reach somewhat beyond (by a factor of one and a half) the cephalothorax. In many mature specimens this basolateral expansion of the side branches protrudes at its distal corner to make another flagellum-like process, but not as long as the apical process.

Differential diagnosis

In Geddes' (1981) key to Australian species of *Branchinella*, *B. campbelli* keys to couplet 11, but neither alternative offered in this couplet is applicable. An additional couplet is needed after couplet 10:

—— Frontal appendage with two simple branches 11

—— Frontal appendage with each branch having medially directed flange and a large triangular expansion basolaterally ...... *B. campbelli*

Branchinella pinnata and to a lesser extent *B. frondosa* and *B. arborea* are the species most like *B. campbelli*, all bearing ramification (fine branches of each main branch) of the frontal appendages. In *B. frondosa* and *B. arborea* many of these sub-branches of the frontal appendage are further branched (secondary ramification) whereas in *B. pinnata* and *B. campbelli* all sub-branches are whole. In *B. pinnata* most sub-branches of each branch are long and some are placed on the upper inner surface of each main branch. However in *B. campbelli* each sub-branch is very short and papilla-like (so much so that they do not seem to be the main structure of the frontal appendage as when they are long in *B. pinnata, B. arborea* and *B. frondosa*). *Branchinella campbelli* therefore should not key to these species in couplet 5 of Geddes' key. Also none of the sub-

Table 2. Length (mean±SD) of *Branchinella campbelli* from different localities. Number of specimens measured in brackets.

locality and date	length of ♂♂	length of ♀♀
Lower Crescent Pool (Bloodwood) (Oct 96)	15.0 mm (1)	18.0 mm (1)
Carters Swamp (Dec 97)	8.0±0.0 mm (2)	8.7±0.4 mm (6)
Lake Muella (Jun 98)	11.9±1.6 mm (9)	14.0±0.2 mm (4)
Carrols Swamp (Jun 99)	9.2±0.8 mm (6)	10.2±1.0 mm (5)

branches/papillae is placed on the inner surface of the two main branches in *B. campbelli*. Furthermore, this species has an inwardly directed flange along the medial surface of each branch and a large triangular expansion basolaterally on each branch. A further distinguishing feature between the two species is the presence of a spine at the distal end of the first segment of antenna II in *B. pinnata*.

Distribution and habitat

Restricted to a small area about 50 km^2 on Bloodwood, Muella and Tredega Stations, 130–150 km NW of Bourke, NSW. It is generally found in temporary clear-water wetlands with few macrophytes in the water column, but occasionally occurs in limited numbers in creek pools where it is probably washed in from wetlands elsewhere (Sanders, 1999).

Discussion

These two species are distinctive and easily distinguished from other Australian species of *Branchinella*. In *B. budjiti* the placement of the basal segments of antennae II at almost right angles to the body axis is characteristic, though a few other species, particularly *B. affinis*, approach this arrangement. Furthermore the lamellar outgrowth at the posterobasal corner of the basal joint is an uncommon feature, as is the large sheet-like frontal appendage. *Branchinella campbelli* is equally remarkable by virtue of its elaborate frontal organ, which has no close counterpart in other species. Certainly the flange protruding medially along the inner margin of each branch and the plate-like basal expansion with all its finger-like papillae are unique. Females of both species, like most in *Branchinella*, are unremarkable.

It is difficult to accommodate either species into any of the three groups of *Branchinella* erected by Geddes (1981). Certainly neither fit into his group I (*B. australiensis, B. occidentalis, B. compacta, B. nichollsi, B. buchananensis, B. hattahensis*) which are large, sturdy bodied, and males have lateral swellings to the penes and females have a long antenna II. Thoracopods have elongated distal endites only sparsely setulated medially and there are large numbers (10–20) of anterior setae on endites 3–5 of thoracopod 1. Both of the new species are of small to medium size (<15 mm), have a rounded distal endite, endites 3–5 with few (<3) anterior setae, no lateral swelling to the penes in males, and short antenna II in females.

Group II (*B. affinis, B. apophysata, B. denticulata, B. latzi, B. longirostris, B. probiscida*) animals are small to medium in size, with short distal endites, 2–4 anterior setae on endites 3–5 of thoracopod I, a frontal appendage consisting of a long trunk and two (usually simple) branches, and swellings lateral to the penes (Geddes, 1981). *Branchinella budjiti* has some affinities with this group by reason of small size, the gross structure of the frontal appendage, short distal endite and presence of 2–3 anterior setae on endites 3–5 of the cercopods. However it lacks lateral swellings to the penes, and the frontal appendage has a short trunk and greatly expanded branches.

Likewise *B. campbelli* shares many features with Group III (*B. arborea, B. basispina, B. dubia, B. frondosa, B. pinnata, B. wellardi*) such as frontal appendage complexly branched, no swellings lateral to the penes, absence of spines on the basal part of the penis, and endites 3–5 of thoracopod I with 2–7 anterior setae. Even so, endites 3–5 are small and not particularly bubble-like, and the animal is small compared to many other species in the group.

Two species (*B. lyrifera* and *B. simplex*) do not fit Geddes' groupings. Probably *B. budjiti* also should be ungrouped but it has some affinities with Group II, especially with *B. denticulata*, while *B. campbelli* is perhaps best considered a non-core member of Group III.

Branchinella budjiti is the sixth Australian *Branchinella* with an outgrowth from the distal end of the basal joint of antennae II. In *B. nichollsi, B. hattahensis* and *B. buchananensis* the outgrowth is from the inner corner and is about as long as the second segment (see Geddes, 1981: fig. 5a,b,c). Relative development of lateral papillae varies between the three species, from none in *B. hattahensis*, to a few papillae on the medial side in *B. nichollsi*, to many papillae on the lateral side in *B. buchananensis* (Geddes, 1981). In *B. budjiti* and *B. denticulata* the lamellar outgrowth is smaller and protrudes from the posterodistal corner. There are minor differences between the two species in its structure and angle of repose (see "Differential Diagnosis"). *Branchinella apophysata* also has a lamellar outgrowth of moderate length from the distal end of the first segment (Geddes, 1981: fig. 8f) but insufficient is known on its detailed structure for further comments to be made. In summary it seems that the outgrowths in *B. nichollsi, B. hattahensis* and *B. buchananensis* may be homologous (which is supported by Geddes considering them as subspecies within *B. nichollsi*), and those in *B. denticulata* and *B. budjiti* are quite different but perhaps also homologous. The outgrowth of *B. apophysata* may have some affinities with those in *B. budjiti* and *B. denticulata*. Interestingly, the first three species are placed in Group I and the second three in or near to Group II, showing that lamellar outgrowths are not basic features in the classification of *Branchinella* into groups, though the detail of the outgrowth may be of some value. Neither are lamellar outgrowths important generic determinants, for besides being found in some *Branchinella*, they occur in the related genus *Thamnocephalus* (Moore & Young, 1964).

The relationships among Australian *Branchinella* are further clouded by another character, a medial swelling on the basal joint of the second antennae, shared between otherwise unrelated species. Such a swelling occurs in both of the new species and in five other species shared between all three groups (*B. australiensis, B. compacta, B. probiscida, B. affinis* and *B. arborea*) as well as one (*B. lyrifera*) that does not fit into Geddes' groups. The swellings take different forms and are probably not homologous—those in *B. campbelli* are large and bulbous and look like the swellings in *B. affinis* and *B. lyrifera*, while those in *B. budjiti* are simply raised pads with thin setae, perhaps like those of *B. arborea*. These similarities cross Geddes' groupings (*B. campbelli* is similar to a Group II species and an ungrouped species, while *B. budjiti* is included with a Group III species). Because of these problems and others mentioned by Geddes (1981) meaningful grouping and phylogeny of Australian *Branchinella* probably cannot be achieved by conventional analysis, but DNA sequencing should be useful and is in progress (Hebert & Timms, in prep.)

Finally it is pertinent to note that while *B. budjiti* has a wide distribution within the Paroo, *B. campbelli* occurs in a very limited area (c. 50 km^2) despite searching over 3,000 collections over 13 years in the Paroo and adjacent areas. Given that nine species are known only from their type locality (*B. apophysata, B. basispina, B. hattahensis*) or from a very limited area (*B. buchananensis, B. campbelli, B. denticulata, B. nichollsi, B. simplex, B. wellardi*), all in the arid zone (Geddes, 1981), it is possible that more species of *Branchinella* await discovery in remote areas of Australia.

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Scaptodrosophila aclinata: A New *Hibiscus* Flower-breeding Species Related to *S. hibisci* (Diptera: Drosophilidae)

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ABSTRACT. Physiological, ecological and evolutionary studies of *Scaptodrosophila hibisci* have led to recognition of a second species in the Northern Territory (Australia) which is described here as *Scaptodrosophila aclinata* n.sp. The new species is readily distinguishable by reference to the first orbital: it is large and proclinate in *S. hibisci* and small and reclinate in *S. aclinata*. *Scaptodrosophila hibisci* has been collected from the flowers of five *Hibiscus* species in eastern Australia and *S. aclinata* uses eleven *Hibiscus* species in the Northern Territory. Only *H. meraukensis* is a host for both, and there is no evidence of narrow host-specialization. The distributions are apparently disjunct. The two species can be reared in the laboratory on cultured plants. Hybridization studies showed the two species to be partially interfertile; *S. aclinata* has delayed sexual maturation and extended copulation latency when compared to *S. hibisci*. This species pair is already the subject of various eco-physiological and reproductive-biological studies because of so many useful experimental attributes: they are interfertile and can be laboratory-cultured, their hosts and reproductive biology are known, they are abundant and easy to find, and research is underpinned by extensive genetic information already available for *Drosophila*.

MCEVEY, SHANE F., & J.S.F. BARKER, 2001. *Scaptodrosophila aclinata*: a new *Hibiscus* flower-breeding species related to *S. hibisci* (Diptera: Drosophilidae). *Records of the Australian Museum* 53(2): 255–262.

There are about 300 drosophilid species recorded from Australia, with some 90% of them described. The genus *Scaptodrosophila* Duda, 1923 (for many years treated as a subgenus of *Drosophila* but see Grimaldi [1990] for revised status) has 81 named species and is by far the largest. The predominance of *Scaptodrosophila* among the 36 genera represented, is striking and distinguishes the Australasian fauna from major drosophilid radiations in other regions—Afrotropical, Neotropical and Hawaiian. In Australia, the other large genera *Drosophila* (35 species), *Hirtodrosophila* (31 species), *Leucophenga* (25 species) and *Mycodrosophila* (24 species) are much smaller by comparison. In general, *Drosophila* species are attracted to fermenting fruit and may be reared easily in the laboratory; whereas *Scaptodrosophila* species have, in most cases, unknown resource requirements (van Klinken & Walter, 2001) and are difficult to rear in the laboratory. Only 10 of the 35 *Drosophila* species recorded in Australia are endemic and of these 10 only *D. birchii* and *D. serrata* have provided useful research opportunities. In contrast, *Drosophila* species that occur in natural habitats in North America and Africa have provided many important models in the study of evolution, behaviour, physiology and ecology, with field observations being further elaborated by genetic and controlled-laboratory experimentation. The opportunity to explore evolutionary and ecological aspects of the Australian *Scaptodrosophila* radiation, has until recently, been severely hampered by the lack of an amenable model for field and laboratory studies.

In this paper we report the discovery of a sibling species of *Scaptodrosophila hibisci* that offers many of the same—and some new—research opportunities as do some of the important and well-documented *Drosophila* models. This new species, *Scaptodrosophila aclinata*, is readily distinguishable morphologically, has a very specific host-plant relationship, can occur in very large numbers, can be reared under laboratory conditions and can be induced to hybridize (with some negative heterosis) with its sibling species *S. hibisci*.

Scaptodrosophila hibisci (Bock *in* Cook *et al.*, 1977) was found to breed in flowers of *Hibiscus splendens* and *H. heterophyllus*. Both these plant species have been recorded from central Queensland to the Wollongong district in southern New South Wales (Wilson, 1974). Collections of *S. hibisci* have since been made from *H. diversifolius* in New South Wales and Queensland, and from *H. divaricatus* and *H. meraukensis* in Queensland (Starmer *et al.*, 1997; Wolf *et al.*, 2000; Barker unpubl.). With its widespread distribution in eastern Australia, and utilization of a number of *Hibiscus* species as breeding sites, *S. hibisci* has already become a model for the study of population structure and genetic variation, and possible host-plant specialization. Completed studies of this species include ecological aspects, quantitative genetic analyses and reproductive biology (Starmer *et al.*, 1997, 1998, 2000; Polak *et al.*, 1998, 2001; Wolf *et al.*, 2000, 2001).

A number of *Hibiscus* species occur in the Northern Territory and not in eastern Australia. Collections were made in the Northern Territory from 11 *Hibiscus* species (*H. aneuthe, H. arnhemensis, H. byrnesii, H.* cf. *byrnesii, H. fallax, H. menzeliae, H. meraukensis, H. petherickii, H. riceae, H. symonii, H. zonatus*) at 22 locations in May, 1998. Differences between *S. hibisci* and the flies collected in the Northern Territory were noted in terms of the ovariole-number body-size relationship (Wolf *et al.*, 2000), and in microsatellite allele frequencies (Barker unpubl.). Here we describe the Northern Territory fly as a new species, and present results of host-plant specialization and its laboratory hybridization with *S. hibisci*. Given the diverse *Hibiscus* flora in northern Australia and the discovery of cryptic flower-breeding *Scaptodrosophila* species in a variety of *Hibiscus* species throughout the Afrotropical Region, Lachaise & Tsacas (1984) predicted that sibling species of *S. hibisci* would be found in northern Australia.

Taxonomy

Morphological terms and morphometric formulae have been given previously (Grimaldi, 1987; McEvey, 1990). Material has been lodged in the following museums:

AM	Australian Museum, Sydney
ANIC	Australian National Insect Collection, Canberra
NSMT	National Science Museum, Tokyo
NTM	Museum and Art Gallery of the Northern Territory, Darwin
QMB	Queensland Museum, Brisbane.

Specimens used for SEM images are preserved on stubs in the Australian Museum SEM Unit. Wing-length was measured from the humeral to the wing apex (W) cf. axillary area to apex (L). Specimens have been individually numbered by McEvey, this information is abbreviated "*Reg.*" below.

Scaptodrosophila aclinata n.sp.

Figs. 2, 6–8, 9–12

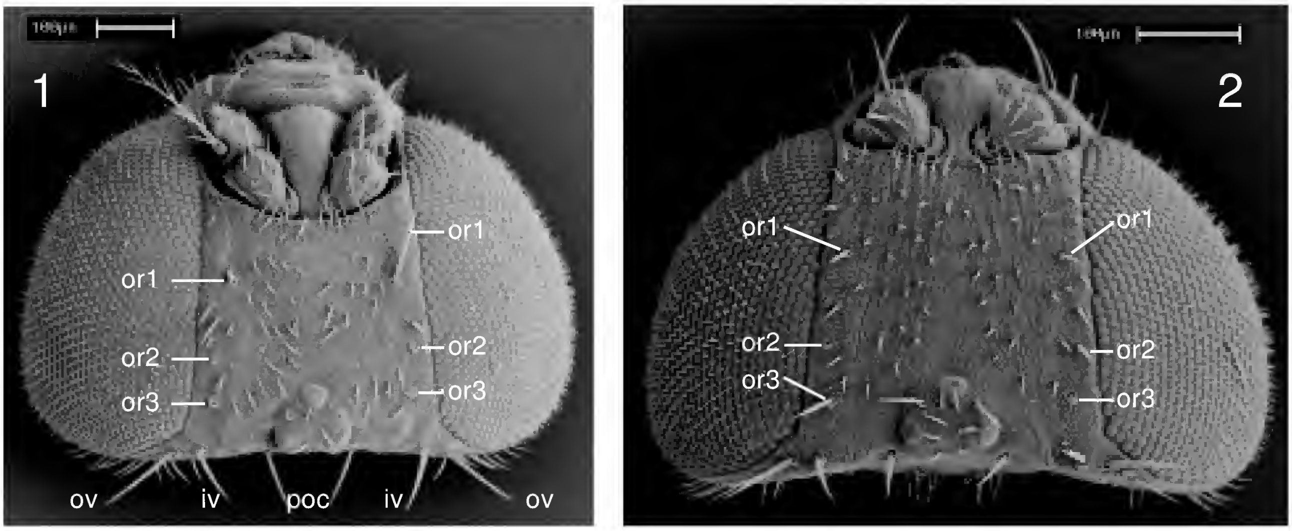
Type material. HOLOTYPE ♂, Nitmiluk NP, Northern Territory, 14°18.77'S 132°27.00'E, ex *Hibiscus menzeliae* flowers, March 2000, Rick Hope & J.S.F. Barker; *Reg.* 15345, Australian Museum K118208. PARATYPES (24♂♂, 40♀♀, all Northern Territory): same data as holotype but *Reg.* 15308–15310♂♂, QMB; *Reg.* 15311–15316♀♀, NTM; *Reg.* 15317–15318♂♂, NTM; *Reg.* 15332–3 & 15335–8♀♀, QMB; *Reg.* 15334♀ (AM K118230, SEM Unit); *Reg.* 15339–15344 (AM K118202–K118207, *Reg.*15342 in SEM Unit)♂♂; Bardedjilidji Walk, nr Cahill's Crossing [c. 12°26'S 132°58'E], Kakadu NP, *Hibiscus* flowers, 23 Feb. 1996, D.K. McAlpine & G.R. Brown, *Reg.* 15368–15383 (AM K118209–K118224)♀♀ and *Reg.* 15384–15388 (AM K118225–K118229) ♂♂, AM; Bukalara Plateau, 46 km SSW of Borroloola [c. 16°26'S 136°04'E], 23 Apr. 1976, D.H. Colless, on *Hibiscus* flowers, *Reg.* 15389–15398♀♀, *Reg.* 15399–15405♂♂, ANIC; McArthur River, 48 km SSW of Borroloola [c. 16°26'S 136°04'E], 14 Apr. 1976, D.H. Colless, malaise trap, *Reg.* 15406♀ and 15407♂, ANIC.

Distinguishing features. All three orbital setae are reclinate, and foretarsi are unmodified.

Description. Holotype measurements given with paratype range between parentheses where appropriate.

Body length. 2.0 mm (2.0–2.2 mm).

Head. Arista with 3 short, straight rays above and 2 below, plus a small terminal fork. Frons slightly longer than wide (fw:fl = 0.9); with numerous frontal hairs; blackish brown, paler anteriorly (Figs. 2, 8). Ocellar-triangle also blackish brown. Ocellars subequal in length to the postocellar and first orbital setae. Pedicel and first flagellomere yellowish brown. Carina prominent, narrow between pedicels, broad and square below, upper surface flat (Figs. 7, 8). Face yellowish brown. Palpus tan, rounded with 68 setae apically and subapically and about 4 ventrally. Gena curved, slightly broader anteriorly, about one tenth greatest diameter of eye, o:j = 13 (10–16), o:ch = 11 (10–14). Vibrissa single. Eye dark reddish brown with dense pile (Fig. 2). Orbitals short, barely distinguishable from frontal hairs (especially or2), anterior most orbital (or1) reclinate, or2 and or3 also reclinate, in approximate ratio 6:6:7, or1:or3 = 0.9 (0.8–0.9), or1:or2 = 1.0 (1.0–1.2) (Fig. 2). Ocellars (oc) short and pointing posterolaterally,



Figures 1, 2. Frontal setation of *Scaptodrosophila hibisci*, left (1), and *S. aclinata* n.sp., right (2). Note the prominent proclinate first orbital (or1) in *S. hibisci* (broken off on left side) and its diminutive reclinate form in *S. aclinata*; see text for abbreviations. (Specimens: *S. hibisci*, *Reg.* 15327, coll. Bellingen NSW, JSFB; *S. aclinata*, *Reg.* 15334, same data as holotype, head on stub in AM SEM Unit, rest of body in Collection). Scale bar = 100 µm.

postocellars (poc) as short as first orbitals, oc:or1 = 1.0 (1.0–1.3), poc:oc = 0.9 (0.9–1.3). Inner (iv) and outer (ov) vertical setae longer than the orbitals, or3:iv = 0.6 (0.6–0.8), iv:ov = 1.0 (0.8–1.1) (Figs. 6, 8).

Thorax. Mesoscutum subshining blackish brown. Dorsocentrals in two pairs; posterior dorsocentrals about twice the length of the anterior setae, and slightly shorter than the anterior scutellar setae, adc:pdc = 0.5 (0.5–0.7), pdc:asc = 0.8 (0.7–0.9). Scutellum and mesoscutum concolorous. Acrostichals in 8 rows, 6 between dorsocentrals. Prescutellar setae developed, adc:pre.sc = 1.0 but less well developed and shorter (0.6) in some paratypes. Halter yellowish brown. Fine propleural seta present. Anepisternum bare. Katepisternal setae barely distinguishable from hairs and all arising near upper edge of sternite, sterno-index = 1.0, m:a kepst = 0.9 (0.7–0.9), p.kepst:pdc = 0.3. Two short humerals; anterior supra-alar about twice as long. Legs and halters concolorous and paler than mesoscutum; forelegs with unmodified tarsi and with tarsal hairs strongly curved; mid tibia with 3–4 apical bristles, hind tibia with 2 short ventroapical bristles. Pre-apical bristles absent or not differentiated.

Wing. Length from axillary area to apex 1.56 mm (paratype range 1.45–1.78), length from humeral crossvein to apex 1.36 mm; C-index 1.44 (1.25–1.88), 4v-index 2.19 (2.00–2.70), 4c-index 1.50 (1.29–1.67), 5x-index 1.63 (1.25–1.80), M-index 0.65 (0.52–0.78), ac-index 4.80 (3.60–5.71), C3fringe 0.60 (0.56–0.67). Third and fourth longitudinal veins slightly convergent apically.

Abdomen. Uniformly dark brown, slightly paler than thorax.

Male terminalia (Figs. 9–12). Epandrium narrow, without lateral or ventral broadening, pale tan, with a single large seta ventrally and pubescent hairs restricted to small areas posterodorsally, posterolaterally and narrowly along posterior border in between. Cercus not indented, covered entirely with short hairs and with long setae becoming smaller and shorter ventrally (Figs. 9–10). Surstylus with row of c. 12 short stout prensisetae along inner margin and 6–7 longer setae arranged irregularly behind them. Hypandrium with two long submedian spines; aedeagus expanded apically, with curved apodeme slightly bulbous distally (Figs. 11–12); parameres rounded with cluster of fine sensilla apically.

Female. Forelegs with tarsal hairs only slightly curved (cf. strongly curved in males), otherwise external morphology similar to male.

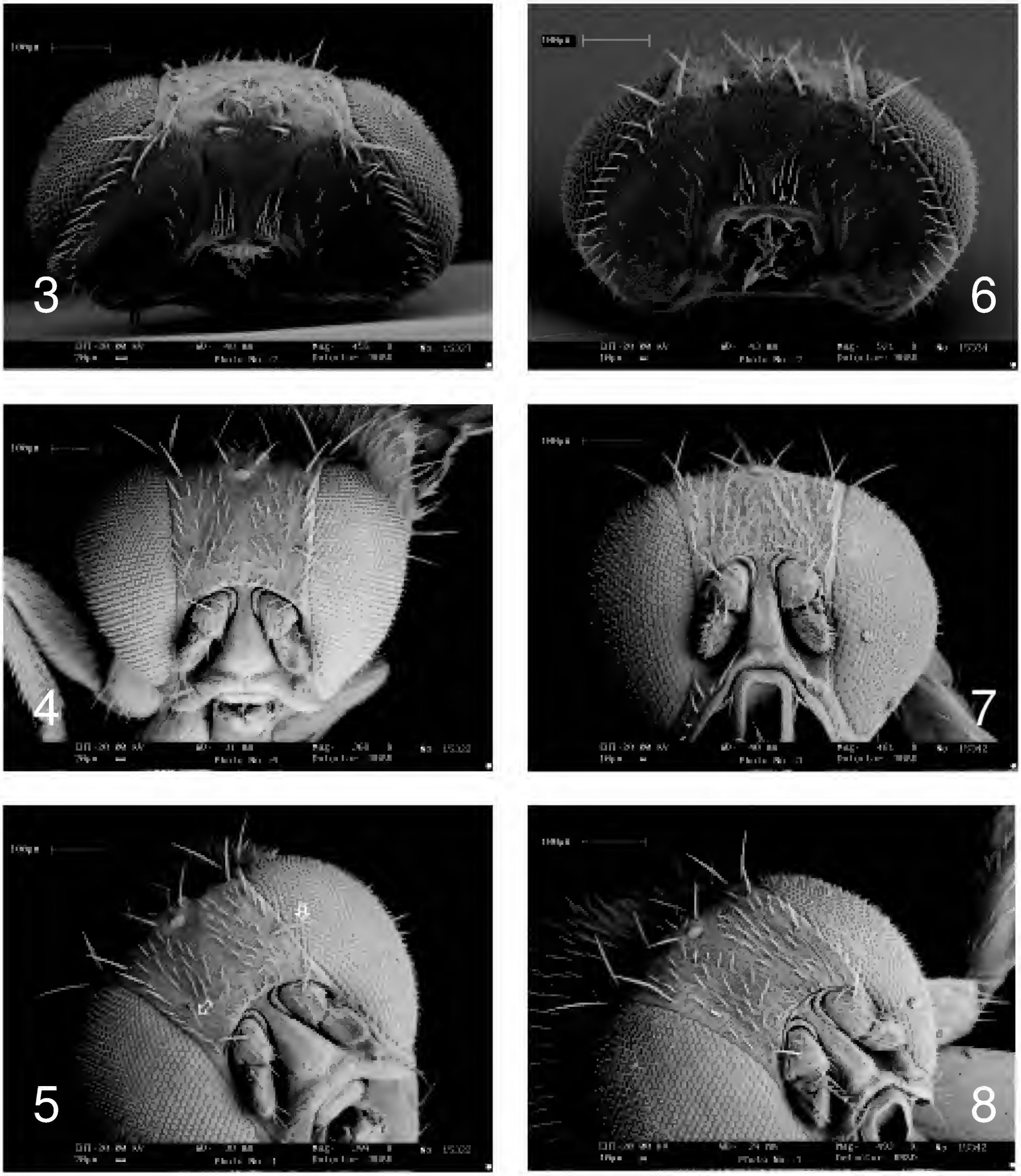
Female terminalia. Egg guide sclerotized with large marginal teeth.

Distribution (Fig. 13). Northern Territory north of 17°S.

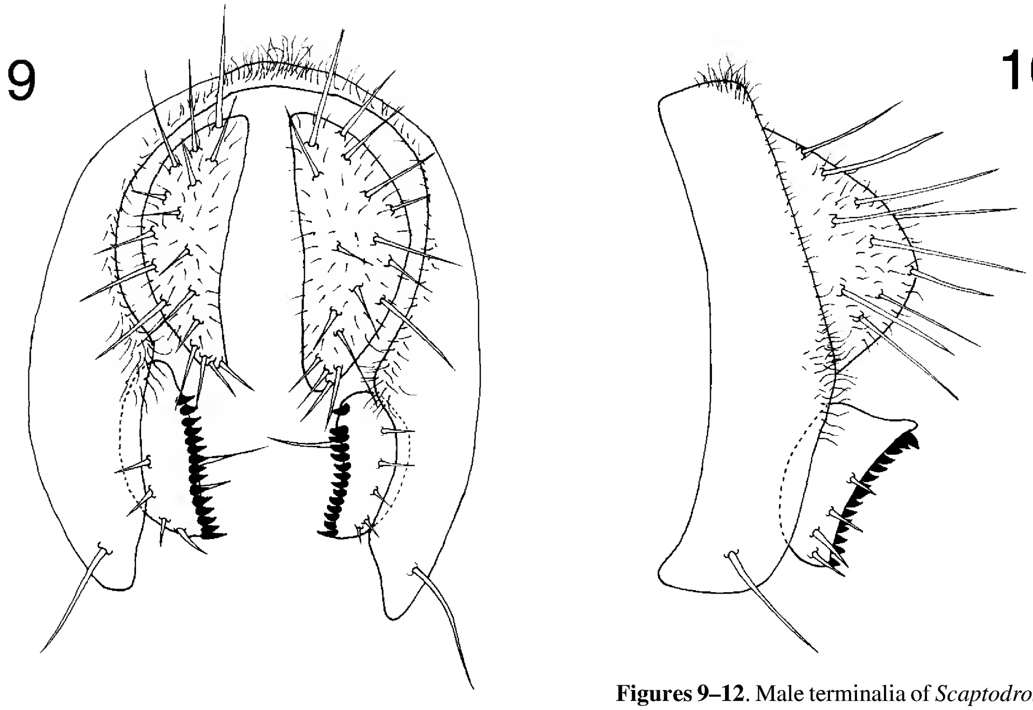
In January 2001 no *Hibiscus* plants were found west of Charters Towers on the Barkly Highway, south of 17°11.70'S 133°28.08'E on the Sturt Highway (Northern Territory) or southeast of Halls Creek in the Tanamai Desert (Western Australia–Northern Territory). Mr Terry A. Woodger (Richmond-based botanist, pers. comm.) reports *Hibiscus* from the Selwyn Ranges (c. 21.5°S 140.5°E) and further collecting in that region would be important in order to determine the extent to which populations of *S. aclinata* and *S. hibisci* are geographically isolated.

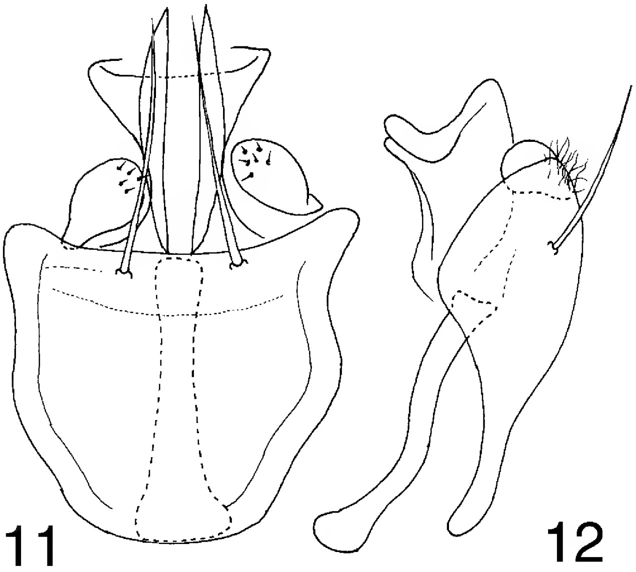
Other specimens examined. Specimens from eastern Australia in the AM and previously determined as *Scaptodrosophila hibisci* by Bock or McEvey were re-examined and found to be correctly identified. Mt Cahill specimens (ANIC, see paratype series above) were found to be incorrectly identified as *hibisci*. A series of *Scaptodrosophila aclinata* flies from Tolmer Falls, 13°11.60'S 130°42.32'E, Litchfield NP, Northern Territory, 1998, J.S.F. Barker, were dissected and discarded—this represents an additional locality for the new species.

Remarks. *Scaptodrosophila aclinata* n.sp. is closely related to *S. hibisci* (Bock *in* Cook *et al*., 1977) because it has very



Figures 3–8. Comparative views of the head of *Scaptodrosophila hibisci* (left) and *S. aclinata* n.sp. (right). View of the back of the head showing supracervical setae: Fig. 3, *S. hibisci* (*Reg*. 15327); Fig. 6, *S. aclinata* n.sp. (*Reg*. 15334). Frontal setation and facial morphology, Figs. 4–5, *S. hibisci* (*Reg*. 15322, coll. Bellingen NSW, JSFB); Figs. 7–8, *S. aclinata* n.sp. (*Reg*. 15342). Note the complete lack of proclinate setae (arrowed in *hibisci* Fig. 5) in the anterior frontal half of *S. aclinata* n.sp. (Fig. 8).





Figures 9–12. Male terminalia of *Scaptodrosophila aclinata* n.sp. (*Reg*. 15344, AM K118207) 9–10, hypandrium, caudal and lateral views; 11–12, epandrium, ventral and lateral views.

similar morphology (Figs. 1–8) and habitat preference, and it produces progeny—albeit with reduced fertility—when hybridized (Table 1). However, it is distinctly different by virtue of the first orbital being proclinate and relatively large in *hibisci* and reclinate and relatively small in *aclinata*. Of less significance is that the humeral setae are larger and the overall coloration darker in *S. hibisci*. Other differences have been noted in ovariole-number to body-size relationship (see "*Drosophila hibisci*—Northern Territory flies" in Wolf *et al*., 2000) and microsatellite allelic frequencies (Barker unpubl.).

The new species keys to couplet 80 in Bock's (1982) key to the Australian species of *Drosophila*. Formation of a triplet at that level with the addition of: "Frontal macrochaetae greatly reduced, first orbital not proclinate… *aclinata*" would lead to a correct identification.

Three other anthophilic drosophilids from northern Queensland and New Guinea are superficially similar: *Scaptodrosophila moana* (McEvey) from Torres Strait and Cape York Peninsula, and *S. aproclinata* (Okada & Carson) and *S. paraguma* (Okada & Carson) from Wau. *Scaptodrosophila moana* has a very distinctive arista with a single upper ray quite unlike the three rays above and two below arrangement in *aclinata* n.sp.; *moana* also has a well-differentiated and proclinate first orbital seta. *Scaptodrosophila aproclinata* and *S. paraguma* have not been examined but they are described as having only two reclinate orbitals, a condition that would make them very hard to separate from *aclinata* n.sp. However, *aproclinata* is also described as having extraordinary tarsal modification and finely pubescent arista (tarsi are unmodified and aristae are not finely pubescent in *aclinata* n.sp.); while *paraguma* is described as having an arista pubescent in the distal half, a mesopleural (= anepisternal) seta, and a deeply constricted cercus (the anepisternum is bare and the cercus is not constricted in *aclinata* n.sp.). The prensisetae of the *aclinata* surstylus are most unlike the arrangement in *S. paraguma*.

The unusually short rays of the arista and the overall reduction in cephalochaetae appears to be characteristic of a number of drosophilids associated with flowers.

Etymology. The specific name refers to the unusual inclination of the first orbital seta—proclinate in most other drosophilids including *Scaptodrosophila hibisci* but reclinate in this species.

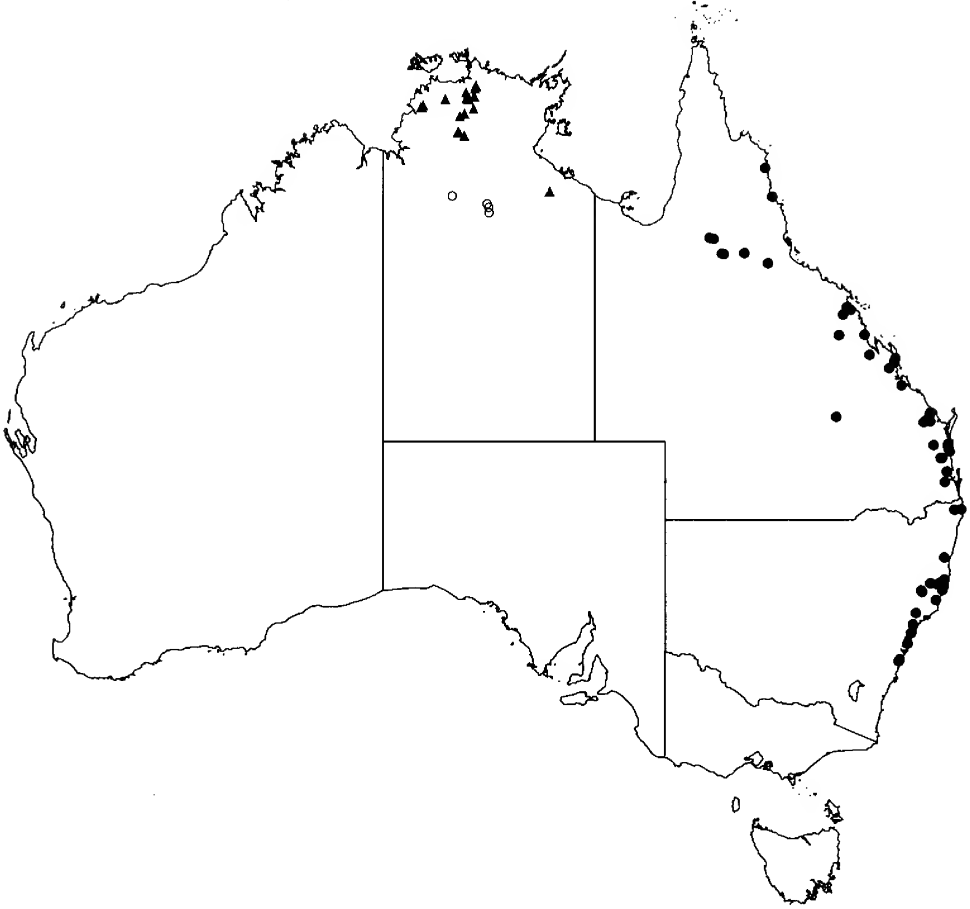


Figure 13. Distribution of *Scaptodrosophila aclinata* (▲) and *S. hibisci* (●) in Australia (Papua New Guinea record for *S. hibisci* not shown). *Hibiscus* flowers examined for *Scaptodrosophila* flies (January 2001) without result (o).

Host-plant specialization

Two populations of *S. hibisci*, each derived from a locality in nature that has only one of the two *Hibiscus* species, *H. heterophyllus* or *H. diversifolius*, were used to test preferences for oviposition of each population on each species. Wild caught flies (50♂♂, 70♀♀) from Bellingen (*H. heterophyllus* 30°25.155'S 152°49.425'E) were set in a population cage and maintained breeding on *H. heterophyllus* flowers for six weeks. Wild caught flies (250♂♂, 340♀♀) from Tyagarah (*H. diversifolius* 28°34.933'S 153°32.258'E) were held at 20°C in sugar-agar vials for three days, and then a population cage was set up for each population with 50 males and 50 females. One *H. heterophyllus* and one *H. diversifolius* flower were added to each cage, each day. Two days after addition to a cage, flowers were removed to sand bottles (Starmer *et al.*, 1998), and all emerging progeny scored daily until there were no further emergences. After 28 days, all remaining flies in the cages were collected and counted.

Results. Over the 28 days, the Tyagarah population derived from *H. diversifolius* produced more progeny than the Bellingen population from *H. heterophyllus* (mean progeny/day = 14.0 and 9.6 respectively, $P = 0.07$), and survived better (mean numbers at end of test period = 33♂♂, 29♀♀ and 12♂♂, 15♀♀ respectively). *Hibiscus heterophyllus* flowers were preferred by flies from both populations (mean progeny/day = 16.0 and 7.4 respectively, $P < 0.001$). The regressions of proportion of progeny from *H. heterophyllus* on day were not significant for either cage. Thus all two way interactions were tested in ANOVA against population of origin × *Hibiscus* species × day as error. None were significant.

Discussion. For two species (*H. heterophyllus* and *H. diversifolius*) which it does utilize in nature, *S. hibisci* laboratory populations from each of these species in nature produced more progeny on the former. However, as the population of origin × *Hibiscus* species interaction was not significant, there is no evidence for host plant specialization.

Both *S. hibisci* and *S. aclinata* n.sp. have been found breeding only in flowers of the *Furcaria* section of the genus *Hibiscus* in Australia. However, *S. hibisci* has been recorded breeding in flowers of okra [*Abelmoschus (= Hibiscus) esculentus*] in New Guinea (Okada & Carson, 1982), and we have bred it on okra flowers in the laboratory.

Scaptodrosophila hibisci has been collected from flowers of five *Hibiscus* species and *S. aclinata* from 11 species. Only one of these *Hibiscus* species, *H. meraukensis*, is

Table 1. Results of test crosses for hybridization, copulation latency and duration and interfertility between *Scaptodrosophila hibisci* (*h*) and *Scaptodrosophila aclinata* n.sp. (*a*); ft. = fertile.

mating type	mating ♂ × ♀	number pairs tested	number mating <1h	number mating <3h	% mated <3h	copulation latency[c] (min) mean±sd	copulation duration (min) mean±sd	number pairs tested for progeny	progeny number mean±sd	no. pairs tested to first ft. egg	mean day first ft. egg
parent	$h \times h$	18	16	nt[b]	0.89	19.3±19.1	5.6±3.9	8	66.0±33.1	12	1.83
	$a \times a$	11	7	10	0.91	37.7±35.0	4.8±1.6	6	11.7±9.5	5	5.00
F_1	$a \times h$	23	7	12	0.52	81.4±69.0	6.1±3.0	11	10.0±8.7	8	4.88
	$h \times a$	20	8	13	0.65	43.6±33.3	2.9±3.5	4	0.4±0.5	3	4.67
F_2	$(a \times h) \times (a \times h)$	11	7	9	0.82	26.8±34.3	5.6±2.7	2	0	—	—
	$(h \times a) \times (a \times h)$	2	0	0	0	—	—	—	—	—	—
backcross	$a \times (a \times h)$	7	5	5	0.71	8.5±6.6	3.3±1.0	3	35.0±16.1	3	1.00
	$h \times (a \times h)$	8	8	8	1.00	6.6±8.7	4.4±2.9	3	19.7±12.3	4	4.25
	$(a \times h) \times a$	1	0	0	0	—	—	—	—	—	—
	$(a \times h) \times h$	3	1	3	1.00	60.7±49.8	8.1±8.0	0	—	—	—

[b] not tested

[c] time to first copulation (averaged only for pairs that mated)

known to occur within each of the disjunct distributions of the two *Scaptodrosophila* species, and it is utilized by both. Thus there is no field evidence of host plant specialization for these *Scaptodrosophila* species. However, the hybridization tests (Table 1) were done using *H. diversifolius*, which is utilized by *S. hibisci* in nature, but which is not known to occur within the distribution of *S. aclinata*. In both parental and F_1 crosses, *S. aclinata* females produced fewer progeny than *S. hibisci*, indicating poorer adaptation of the former to this *Hibiscus* species, to which it is not exposed in nature, or possibly a lower intrinsic fecundity.

Hybridization studies

Adults of *Scaptodrosophila hibisci* and *S. aclinata* n.sp. were reared from flowers of *H. heterophyllus* collected at Bellingen, N.S.W. and flowers of *H. menzeliae* collected at Nitmiluk National Park, Northern Territory. Some, where females were collected as virgins, were used in single pair matings in both parental and F_1 crosses (both reciprocals). The remainder were added to population cages (one for each species, and one for each reciprocal cross to produce F_1 progeny). For all pair matings, males were generally one day older than females, and most females were collected and used within 2 h of eclosion, using very light CO_2 anaesthetization. All flies for crosses were placed singly in vials with about 7 ml 1.5% agar, and allowed 1 h to recover from anaesthetization. The predetermined male was then gently aspirated and added to its paired female, and pairs observed for copulation for 3 h. Copulation latency and copulation duration were recorded. All observations were done between 09h00 and 14h00 at 25°C. At the end of the observation period, each mated pair was placed in a 200 ml bottle with moist sand in the base, and a small tube with water holding a single *H. diversifolius* flower. The pairs were transferred to a fresh flower each day for 10 days, with the previous days flower transferred to a bottle with sand. Four days later, 10 ml distilled water was added to each of these bottles. Progeny emerging from these flowers were collected daily, sexed and counted. From parental matings, progeny were used in backcrosses or added to the appropriate parental cage. Some of the F_1 progeny, plus F_1 flies from the cage crosses, were used in F_2 and backcross matings, with the remainder stored (sexes separate in agar vials) for use on subsequent days.

Flies in population cages were maintained by adding one or two fresh flowers to the cage each day, with the previous days flowers transferred to a bottle with sand for progeny collection.

Sufficient flowers were not available on some days to set up all pairs that copulated. Further, some pairs were not carried through for 10 days because of death or loss of one or both of the pair. Thus the number of pairs tested for progeny production is less than the number that copulated, while the number of pairs recorded for day of first fertile egg lay is greater than the number tested for progeny, except where some pairs copulated, but produced no progeny.

Discussion. The results are summarized in Table 1. These two species are partially interfertile, and clearly are closely related. The proportion of pairs mating and average progeny numbers are less for the F_1 crosses than for parentals, while no progeny were obtained from the F_2 crosses. Two of the backcrosses appear exceptional, both in proportion of pairs mating and in progeny numbers. However, this is possibly a function of the much older males used in these crosses, viz. average of 9–10 day old versus average of two day old in all other crosses.

In all crosses, the pairs were kept together for 10 days, so that further matings may have occurred during this period.

Previous study of *S. hibisci* (Polak *et al*., 1998) has shown that mature males prefer young virgins, as compared with older virgin and non-virgin females, and that a mating plug fills the entire uterus at copulation. For the *S. hibisci* parental matings here, copulation latencies for < 2 h and 2 day old females were 12.5 and 30.1 min (but not significantly different). The sexual maturation and copulation dynamics of *S. aclinata* seem to be different. Mean copulation latency was about twice as long as for *S. hibisci*, while copulation latencies for < 2 h, 1 and 4 day old females were 49.7, 39.2 and 10.9 min respectively (again not significantly different). However, male age was highly correlated with female age, and both copulation duration and progeny numbers increased with parental age. These observations, together with the later day of first fertile egg lay, suggest delayed sexual maturity in this species, as compared with *S. hibisci*. For the F_1 cross (*S. hibisci* male×*S. aclinata* female), mean copulation duration is shorter than for all other crosses. However, six of the 13 pairs mated more than once in the 3 h observation period—five twice and one three times. In all cases, the first copulation was short (< 1 min), and the overall mean copulation duration, using last copulation for multiple matings was 4.2±4.1 min, similar to the means of other crosses.

Hibiscus meraukensis is known (records of the Queensland Herbarium) from a number of localities in northwest Queensland—the region between the known distributions of these two *Scaptodrosophila* species (Fig. 13). Further field work in this region is needed to determine if either species is present there, and whether they ever occur sympatrically under natural conditions. The form of orbital setation in hybrids is also in need of further investigation so that any naturally occurring hybrids may be identified as such.

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