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A Review of the Australian Species of Clusiidae
(*Diptera, Acalyptata*)

By
DAVID K. McALPINE

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A REVIEW OF THE AUSTRALIAN SPECIES OF CLUSIIDAE (Diptera, Acalyptrata)

By DAVID K. McALPINE, Australian Museum

(Figs. 1-36)

(Manuscript Received 9.10.59)

SYNOPSIS

Characters for recognition of both adult and larval specimens of Clusiidae are given. A larva from Australia is described, and some characters of the puparium of one species are noted.

The morphology of the male terminalia is discussed in order to determine the homologies of the parts and to provide a sounder basis for classification. It is shown that those genera which have been sufficiently investigated can be distinguished from one another by characters of the male postabdomen.

The geographical origin of the Australian forms is discussed.

Keys to the genera of Clusiidae, to all described species of *Allometopon* and to the Australian species of other genera are provided. Two genera and 19 species are described as new.

INTRODUCTION

The species of the family Clusiidae, once called Heteroneuridae, are, in Australia as in other regions, difficult to collect in numbers. This is no doubt due to rarity (small population size) of many of the species and to extreme localization of others. The known larvae live in rotting wood and the adults inhabit forest country.

The only previously recorded Australian species are the two species of *Heteromeria* described by Malloch (1926, 1930) on the basis of three specimens. The present work is based on more than 170 Australian specimens, but most of these were collected within a short distance of Sydney and in a few localities in Queensland. A few specimens from Western Australia and one from Tasmania have been examined, but no material from other States is available. The family is probably absent from the drier part of the continent.

Hennig (1958) considers that the family Clusiidae belongs to the group of families which includes the Helomyzidae and its allies. This position is tentatively accepted, though the long, divergent postverticals are a discordant character. The only other possible location seems to be in Hennig's superfamily Pallopteroidea.

The monograph on the Clusiidae by Melander and Argo (1924) may be consulted for references to earlier papers, generic synonymy and keys to and descriptions of the species then known.

RECOGNITION OF CLUSIIDAE

Adult Characters

Head with strong vibrissae; postvertical bristles divergent or absent; fronto-orbital bristles two to five; epistomal ridge between face and buccal region absent, the cuticle in this region soft and not sclerotized. Antenna porrect or almost so; second segment produced into a short, angular lobe on outer distal edge. Thorax with sternopleural, mesopleural and at least two pairs of dorsocentral bristles. Wings with subcosta, second basal cell and anal cell complete.

In distinguishing representatives of this family from other Acalyptrata, first check the venation. If it agrees with the above description check the vibrissae, antennae, face and postverticals. Only if all these characters are in agreement is the specimen a clusiid.

Larval Characters

The larvae of Clusiidae are very distinct from those of other acalyptrate families. The cephalopharyngeal armature is vestigial and unpigmented. The posterior end of the larva is not truncated, but bears two short, rigid processes on which the spiracles open. These characters, together with the fact that the only known habitats are in rotting wood and termite galleries, should make them easy to distinguish from other muscoid larvae.

The only clusiid larvae seen by the author are two specimens found in moist rotting wood in rain forest at Mount Wilson, Blue Mountains, New South Wales, on April 16, 1957. These were kept in captivity but did not survive to pupate, though one lived till September 20. The following notes and Figs. 12 and 13 have been prepared from these two specimens, which appear to be conspecific :—

Larva transparent, without pigment except on posterior stigmatic processes. General form cylindrical, slightly dorsoventrally compressed, somewhat tapered anteriorly, broader and more flattened posteriorly. No cephalopharyngeal armature visible in living larva. Striated ventral pads present on all segments except the first two, that on terminal segment small; the latter segment with numerous small sclerotized pits which, from observations on the living larvae, appear to be points of attachment of muscles to the cuticle. Anterior spiracles on small tubercles, each with about five openings. Posterior spiracles situated on the inner surface of paired, terminal, upwardly curved, undivided, yellowish-brown processes; each spiracle with three openings. No other processes or secondary annulations on larva. Length, 3.5 mm.

The only other knowledge of the immature stages of the Australian forms has been obtained from the puparia of the type series of *Heteromeringia norrisi* sp. nov. These have been mounted with the adults. As might be expected from the puparia of other flies, they are stouter than the larvae described above and not depressed. The presence of numerous transverse wrinkles is probably another character not present before pupation. The only visible taxonomic difference separating these from the larvae from Mount Wilson is in the unequally forked posterior processes (Fig. 7).

THE MALE TERMINALIA

Notes on Basic Morphology

Difficulties have been experienced in determining the homologies of the terminal organs in the males of higher Diptera. The detailed evidence supplied by Crampton (1942, 1944a) is so sound that, after due consideration, the author accepts all his conclusions concerning the identity of the sclerites in the postabdomen of Diptera. The interpretations of Hennig (many papers on Acalyprtrata; bibliography in Steyskal, 1957), Zumpt and Heinz (1949, 1950) and Steyskal (1957) differ somewhat from those here accepted.

Steyskal follows Crampton in much of his terminology but, like Hennig, he considers that the dorsal sclerite preceding the hypopygium consists largely of the eighth tergite, with sclerites of the seventh segment forming a smaller part. In the *Orthopyga* (as defined by Aczél, 1954) it is generally the eighth sternite which is greatly developed, the eighth tergite being frequently a narrow transverse strip, and Crampton has traced the evolution of the acalyprtrate terminalia from these forms by way of the *Aschiza*. He shows that the dorsal sclerite of the eighth segment in the *Schizophora* is the eighth sternite with which the seventh sternite is more or less fused.

As Hennig (1958) has recently vigorously attacked Crampton's theory, it is necessary to reconsider some points relating to circumversion and asymmetry.

In spite of the paucity of observations, it is reasonable to assume that all *Cyclorrhapha* have a hypopygium circumversum (Aczél, 1954; Hennig, 1958). Aczél has associated this character with the folding of the hypopygium forwards below the protandrium. My studies show that Aczél's assumption holds good for the *Dolichopodidae*, for in *Sciapus* the relative twisting of the hind gut and vas deferens is indicative of circumversion. His inclusion of the *Dolichopodidae* together with the *Cyclorrhapha* in the division *Campylopyga* therefore seems correct. Aczél's later conclusion (1955) that *Nothybus* has not a hypopygium circumversum on account of its symmetrical postabdomen is untenable (Hennig, 1958).

Hennig considers that the rotation of the postabdomen in the *Cyclorrhapha* has probably little to do with asymmetry. He further accuses Crampton of choosing only those forms which suit his theory and placing these unrelated forms together to form an evolutionary series. To some extent this criticism is true, for Crampton's derivation of the *Calyprtrata* from the *Helomyzidae*, *Clusiidae*, or related forms, and his derivation of the *Cordyluridae* from the *Micropezidae* cannot be accepted. Nevertheless, there are so many cases of asymmetrically developed sternites in *Cyclorrhapha* that the condition almost certainly constitutes a basic character of this complex. Crampton might well have chosen quite different families of *Schizophora* to illustrate his point. Within the higher *Cyclorrhapha* (*Syrphidae*, *Pipunculidae* and *Schizophora*) the postabdominal sternites frequently form a spiral series in the same direction as the torsion of the hypopygium. In certain *Coelopidae* the sixth to ninth tergites form a similar spiral series. There can be no other logical conclusion than that this spiral displacement is brought about through the rotation of the hypopygium as explained by Crampton.

The rather numerous forms of the Schizophora with symmetrical postabdomen are probably all evolved from asymmetrical forms. It is not surprising that there should be an evolutionary tendency to restore symmetry in bilateral animals which depend on flight for survival. Most of the symmetrical forms are, judging from other characters, comparatively specialised and show a reduction in the number of postabdominal sclerites.

Steyskal differs from Crampton in calling the dorsal sclerite of the hypopygium (epandrium the fused ninth and tenth tergites. He bases this conclusion on the fact that two pairs of surstyli are often present, presuming the second pair to belong to the tenth segment. There is no evidence however, that the surstyli are segmental appendages. In almost all male Nematocera and Orthopyga where the tenth segment is distinct, it is very small and without appendages. Various stages occur between forms with better developed tenth tergite and those with none at all, as in *Oncodes*. In these forms there is no fusion of the ninth and tenth tergites, the latter being lost by desclerotization. In the least specialised of those *Campylopyga* (*Cyclorrhapha* plus *Dolichopodidae*) which have two pairs of surstyli, i.e., certain species of *Dolichopodidae*, both processes are situated on the apex of a single marginal prominence of the epandrium. It does not, therefore, seem likely that they belong to different segments. In view of the facts just expressed, the author affirms that there is no evidence for fusion of the ninth and tenth tergites in the *Campylopyga*. It is interesting to note that Hennig (1958) now considers the epandrium to be the ninth tergite alone.

The author disagrees with Crampton in his terminology of the appendages of the ninth abdominal sternite. The term paramere is here used as defined by Snodgrass (1935) to indicate paired lateral processes of the phallobase in holometabolous insects, which may have been derived from the gonopophyses of such primitive insects as *Machilidae*. The term is applied to such structures in *Diptera* and *Coleoptera*, but its use in certain other orders may be erroneous. Crampton uses the term paramere in lower *Diptera* to designate the outer appendages consisting of gonocoxites (basimeres or basistyles of Crampton) and their styli (distimeres or dististyles). He uses the terms pregonite and postgonite for the appendages here called parameres and considers them to be, respectively, the anterior and posterior gonopophyses. However, if the parameres are derived from gonopophyses they should each be considered as a lobe of the gonopophysis of the ninth segment and not the whole organ. Crampton's use of the term paramere for structures other than those considered to be derived from gonopophyses is not acceptable.

There is no evidence that the so-called surstyli of *Campylopyga* are homologous with the styli of the gonopods; indeed, Crampton's figure of *Syrphus rectus* (1942, Fig. 14H), where both pairs of appendages are shown, seems to preclude all possibility of this being so. The surstyli are invariably associated with the tergite and not the sternite, even in the *Dolichopodidae*.

Characters of the Terminalia in Clusiidae

The most important works on the morphology of clusiid terminalia are those of Hennig (1938a), Crampton (1944a) and Séguéy (1934). Hennig, who apparently had insufficient material for a detailed report, failed to find the spiracles in most cases, thus missing important evidence as to the identity of the postabdominal sclerites. He apparently only examined his specimens from the right side, as his figures all show this aspect and there is no mention in the text of asymmetry or structures on the left side. Crampton figured and mentioned the terminalia of only one species, *Clusia lateralis* (Walker), but correctly identified the parts and explained the causes of asymmetry, thus laying a foundation for future work. Cole (1927) had previously given a helpful figure and description of the terminal segments of this species. Séguéy figured and described the terminalia of two species of *Clusiodes*. His figures show considerable detail of the hypandrium and its appendages, but omit the spiracles and certain of the postabdominal sclerites. Malloch (1933) figured the male terminalia of several species of *Alloclusia*, but his figures, which were probably prepared by Edwards, show little detail and serve mainly to show specific differences in the form of the surstyli. This also applies to the figures and descriptions of terminalia of *Heteroneura* (i.e., *Clusiodes*) given by Collin (1912).

The terminalia of male Clusiidae are so diverse that there are few characters which may be regarded as of family value. Hennig (1939) has indicated that the holarctic genus *Acartophthalmus* does not belong to the family at all for, among other anomalous characters, there is only one sclerotized segment between the preabdomen and hypopygium. All other forms which have been investigated have two free dorsal sclerites in this region.

The sixth tergite is symmetrical or almost so, and has the sixth pair of abdominal spiracles below its lateral margins. The sixth sternite is displaced on to the left side and is generally in contact with the seventh sternite which is situated still higher on the left side. The latter sclerite is adjacent or connected to the large dorsal eighth sternite. The seventh spiracles may be asymmetrically placed, the left one being upon, or just in front of, the seventh sternite, while the right one is in the extensive membranous region of the right side. In *Tetrameringia* there is a small, weakly developed sclerite above the seventh right spiracle which is perhaps the seventh tergite (Fig. 26, 17).

In *Clusiodes gladiator* the sixth to eighth sternites differ from those of other genera, as they have become fused into a complete annulus through sclerotization of primitively membranous areas (Fig. 23). A certain degree of asymmetry is retained. The sclerotized region on the right side is attenuated behind the seventh spiracle, which is situated in the membrane. On the left side the sclerotized band is not attenuated and there is a very heavily sclerotized strip on its anterior margin which appears to represent the edges of the sixth and seventh sternites. The seventh left spiracle is situated within this marginal strip. The spiracles of the sixth pair are situated in the membrane below the lateral edges of the sixth tergite. It is not clear from the published information whether the postabdominal sternites of the other species of *Clusiodes* are free or fused. *Czernyola* is intermediate between *Clusiodes gladiator* and the other genera, as the seventh sternite is completely fused with the eighth but the sixth sternite is quite distinct (Fig. 14).

In all forms the ninth segment is deflexed and symmetrical. The ninth tergite or epandrium is large and carries one or two pairs of surstyli (gonopods and cerci of Hennig). The ninth sternite or hypandrium is smaller, and has either a concave surface into which the base of the phallus may be folded or a desclerotized central region. In some species of *Heteromeriingia* only a narrow marginal sclerotized band remains. The phallus is borne on the posterior part of the ninth sternite. It is extremely variable in structure, and may be differentiated into a sclerotized phallobase and distal membranous aedeagus. The former is usually short and may have one or two pairs of parameres and a median posterior spinus ditillatorius. The aedeagus varies in length, but is often so long that it must be coiled in repose. In such cases it may be branched distally, and in *Heteromeriingia* it is supported by a pair of longitudinal skeletal strips. A long apodeme is connected to the phallobase. True cerci (para-anal lobes of Hennig) are usually present in the membranous region (proctiger) surrounding the anus, but Hennig does not show them in his figure of *Sobarocephala annulata* Melander and Argo and in *Clusiodes gladiator* they are minute.

When the terminalia of the family are more thoroughly known it may be possible to distinguish most genera on these characters alone. However, caution should be exercised in using the terminalia for generic segregation unless amply supported by other characters. The following table summarizes the characters of the male terminalia in six genera, though deviations from these may be expected to occur in some of them. Of the forms dealt with by Hennig it has been possible to include *Paraclusia* (= *Stomphastica* Hendel, not Loew), because it may be reasonably assumed that the sixth and seventh sternites are as in the closely related genus *Clusia*. There is, however, insufficient information available for the inclusion of *Sobarocephala*.

Characters of the Male Terminalia of Clusiid Genera

1. Two pairs of surstyli; parameres absent; spinus ditillatorius present	2
One pair of surstyli; parameres present	3
2. Aedeagus branched distally	<i>Paraclusia</i>
Aedeagus not branched	<i>Clusia</i>
3. Aedeagus spirally coiled; sternites six to eight distinct from one another; two pairs of parameres; spinus ditillatorius present	4
Aedeagus not, or but slightly, coiled; sternites seven and eight fused; one pair of parameres	5
4. Aedeagus with a pair of longitudinal pigmented skeletal strips	<i>Heteromeriingia</i>
Aedeagus without pigmented skeletal strips	<i>Tetrameriingia</i>
5. Sternites six to eight not forming an annulus, sternite six distinct; spinus ditillatorius present; phallobase very short	<i>Czernyola</i>
Sternites six to eight fused into a complete annulus; spinus ditillatorius absent; phallobase elongate	<i>Clusiodes</i>

The Origin of the Australian Clusiid Fauna

The genus *Clusiodes* is widespread, occurring in the Nearctic, Palaearctic and Oriental Regions, but it has not been previously recorded from the Southern Hemisphere. Most of the species occur in the Nearctic and Palaearctic Regions; none is known from the Neotropical Region, where the allied genus *Labomyia* occurs. It seems that *Clusiodes* has entered Australia from the Oriental Region during the Tertiary.

The occurrence of the genus *Heteromeriingia* in both the Neotropical and Indo-Australian Regions was considered by Hennig (1938a) to be of special interest. However, as the genus also occurs in the Nearctic Region, Palaeartic Region (one specimen known) and Ethiopian Region (Seychelles), the distribution is almost cosmopolitan. It seems likely that the genus has entered Australia in the same way as *Clusiodes*. There are more known species of *Heteromeriingia* in the Australian Region than in any other, and it is the only genus of the family known from Tasmania and Western Australia.

Czernyola has a less extensive distribution than *Heteromeriingia*, but the differences are mainly due to its not extending so far beyond the tropics. It occurs from the Neotropical Region through Oceania to Formosa, the Philippines, Guam and eastern Australia, but does not extend as far west as *Heteromeriingia* in the Old World tropics.

Allometopon is essentially an Indo-Australian genus. The typical forms may be considered as belonging to the Papuan Subregion, though extending south almost to the border of New South Wales and Queensland. Another group consists of two Philippine species, while a third is represented by one species from the Seychelles, an outlying part of the Ethiopian Region.

Tetrameriingia, though endemic in temperate Australia, appears to be allied to the southern neotropical genera *Alloclusia* and *Apiochaeta*. The relationship between the fauna of southern South America, New Zealand and southern Australia has been much discussed. It is certain that some migration route for land animals has either enabled animals to enter all three regions from a common source or allowed migration between these regions. Hennig has associated *Alloclusia* and *Apiochaeta* with the northern temperate genera *Clusia* and *Paraclusia* [*Stomphastica*], but the author can find no important points of resemblance.

The Australian genus *Parahendelia* is endemic and most closely allied to the geographically remote *Hendelia* of Europe. These genera are probably relicts of a previously widely distributed group. It is possible that related forms will yet be found in intermediate localities, as the known forms are rare.

The main points regarding the origin of the Australian forms may be summarized as follows: the Australian clusiid fauna has entered the continent by two main paths. All the genera but one are of northern origin, though outside Australia each of these has a different distribution pattern. *Tetrameriingia* is the only genus which shows relationship with the Chilean Subregion of the Neotropical Region, and is therefore of southern or south-eastern origin.

SYSTEMATIC TREATMENT

Key to Genera of Clusiidae

(Genera known to occur in Australia are indicated with an asterisk).

- | | |
|---|--------------------------------|
| 1. Foremost pair of fronto-orbitals incurved or proclinate, the others reclinate | 2 |
| Foremost pair of fronto-orbitals reclinate, though sometimes slightly sloping inwards | 10 |
| 2. Interfrontal bristles present | 3 |
| Interfrontal bristles absent | 4 |
| 3. Postvertical and prescutellar acrostichal bristles present; Europe | <i>Paraclusia</i> Czerny |
| Postvertical and prescutellar acrostichal bristles absent; Holarctic | <i>Clusia</i> Haliday |
| 4. Postverticals absent; first vein setulose above; America, mainly tropical | <i>Chaetoclusia</i> Coquillett |
| Postverticals present; first vein not setulose | 5 |
| 5. Presutural dorsocentral and preapical tibial bristles present | 6 |
| Presutural dorsocentral bristles absent | 7 |
| 6. Presutural bristle about as long as presutural dorsocentral bristle; three or four fronto-orbitals; southern Neotropical | <i>Alloclusia</i> Hendel |
| Presutural bristle very short and fine, sometimes scarcely distinguishable; three fronto-orbitals; southern Neotropical | <i>Apiochaeta</i> Czerny |
| 7. Arista lanceolate, densely pubescent; presutural bristle present; Formosa | <i>Phylloclusia</i> Hendel |
| Arista filiform | 8 |

8. Presutural bristles and prescutellar acrostichals well developed; preapical tibial bristles minute; four fronto-orbitals; Australia **Tetrameringia* nov.
 Presutural bristles absent; prescutellar acrostichals small or absent; three, or rarely two, fronto-orbitals 9
9. Preapical tibial bristles well developed at least on middle tibiae; length of penultimate section of fourth vein about one-third that of ultimate section; America, mainly tropical *Sobarocephala* Czerny
 Preapical tibial bristles absent; length of penultimate section of fourth vein at most about one-quarter that of ultimate section; widely distributed. . **Heteromeringia* Czerny
10. Interfrontal bristles absent; preapical tibial bristles present 11
 Interfrontal bristles present 12
11. Two reclinate fronto-orbitals only; Samoa, Formosa *Isoclusia* Malloch
 Four or five fronto-orbitals, one of the middle ones incurved, the others reclinate; Neotropical Region through Oceania to Formosa and Australia .. **Czernyola* Bezzi
12. A large style-like process arising from the centre of each eye; two fronto-orbitals; interfrontals very long, widely separated, and inserted near middle of frons; Peru *Labomyia* Frey
 No such process on eye 13
13. Preapical tibial bristles absent; postverticals small or absent; interfrontals inserted near ptilinal suture; Australian and Oriental Regions, Seychelles. . **Allometopon* Kertész
 Preapical tibial bristles well developed 14
14. Interfrontals inserted well above ptilinal suture between longest pair of fronto-orbitals; frons and face not exceptionally broad; antennae normally inserted; widely distributed **Clusiodes* Coquillett
 Interfrontals inserted very close to ptilinal suture; frons and face exceptionally broad; antennae inserted very far apart and close to eyes 15
15. Second antennal segment very short; arista thickened; postverticals absent; interfrontals small and close together; Europe *Hendelia* Czerny
 Second antennal segment about as long as third or longer; arista filiform; postverticals well developed; interfrontals long and widely separated; Australia. . **Parahendelia* nov.

The last published key to the genera of Clusiidae is that of Melander and Argo (1924), on which the above key is partly based. Four additional genera are now included. The genus *Acartophthalmus* Czerny is omitted, as it probably does not belong to the Clusiidae (Hennig, 1939, 1958). The genus *Cypselosoma* Hendel (1913) has been placed in the Cypselinae (i.e., Sphaeroceridae) and in the Tylidae (Micropezidae), but more recently has been placed in the Clusiidae by Hennig (1948) in a paper not available to the author. Hennig (1952), however, returned the genus to the Tylidae, and still later (1958) set up a new family, Cypselosomatidae, to contain it.

The author agrees with Hennig (1938b) that the restoration by Hendel (1931) of the name *Stomphastica* Loew for the genus usually called *Paraclusia* Czerny is incorrect. *Stomphastica* was introduced as a substitute for *Clusia* Haliday, and is therefore an exact synonym of it.

The practice of indiscriminately designating allotypes is not here followed as, in the author's opinion, it serves no useful purpose. Unless taken in copula with a male holotype, there is no reason for accepting any one female as more authentically representative of the species than any other in the paratype series.

Genus *Tetrameringia* nov.

Head not much higher than long; ocellars and postverticals well developed; four fronto-orbitals, the foremost one more or less incurved; no interfrontals; lunule covered; antenna with subdiscoid third segment and slender, apical arista. Thorax with well developed presuturals and prescutellar acrostichals; foremost dorsocentral bristle well behind suture and very short; propleurals represented by two fine hairs (proepimeral and proepisternal); tibiae with preapicals vestigial; venation as in *Alloclusia*.

Type species : *T. ustulata* sp. nov.

This genus most closely resembles the neotropical *Alloclusia* Hendel, but all the dorsocentrals are far behind the suture, the foremost pair being very small, and the prescutellar pair of acrostichals is well developed. It differs from *Sobarocephala* Czerny in having the head not much higher than long, in having four instead of three fronto-orbitals, and in the strongly developed ocellar and presutural bristles.

The small size of the preapical tibial bristles would also appear to distinguish the genus from *Alloclusia* and *Sobarocephala*. The presence or absence of these bristles has been considered of generic importance, and is the principal distinction between *Sobarocephala* and *Heteromerangia*. The author has not seen any specimens of *Alloclusia*, but Malloch (1933) states that there is a short apical bristle on the mid tibia. Czerny (1903) states that the preapical bristles on the fore and middle legs are distinct (deutlich) while Melander and Argo merely indicate their presence on the middle tibiae. In *Sobarocephala* these bristles are also well developed. In *Tetrameringia* they are very short on the fore tibiae and may be indistinguishable on the middle ones. They are always absent on the hind tibiae.

Alloclusia is as distinct from *Tetrameringia* as it is from *Apiochaeta*, and may be regarded as intermediate between these two genera. It includes species with four fronto-orbitals, as in *Tetrameringia*, and others with three fronto-orbitals, as in *Apiochaeta*.

Key to Species of *Tetrameringia*

1. Arista with longer hairs about twice as long as its basal diameter; thorax with a blackish spot on mesopleuron, otherwise unmarked; prescutellar acrostichal over half the length of posterior dorsocentral *ustulata* nov.
- Arista with short pubescence only; thorax with black marks on mesopleuron and metapleuron and a black stripe on each side of mesonotum, interrupted at suture; prescutellar acrostichal bristle not more than half the length of posterior dorsocentral *pubescens* nov.

Tetrameringia ustulata sp. nov.

(Figs. 1, 5, 26)

♂♀. Colour light brownish-yellow, somewhat shining; antennal arista, all bristles and most hairs black; a brown spot between ocelli; a large brown-black spot on upper part of mesopleuron, the thorax otherwise unmarked; hind tibiae brown centrally, the legs otherwise unmarked. Wings hyaline, with a blackish mark extending from fifth vein to costa across end of discal cell and just beyond apex of first vein, thence along costa to fourth vein, where it becomes wider and more diffuse. Abdomen black, except at base.

Head about one and a half times as high as long; frons almost as wide as long, and about two-fifths as wide as head; cheek in middle region about one-eighth height of eye, lower margin almost straight and ascending anteriorly; postgenal region ventrally prominent and with a ventrally directed bristle; postvertical and ocellar bristles subequal, long, but shorter than the verticals; fronto-orbitals subequal, successively further apart from front to rear; a series of cheek hairs behind vibrissa; second antennal segment with a long terminal dorsal bristle; arista with longer hairs about twice as long as its basal diameter.

Thorax with the following bristles: two short, fine propleurals; one mesopleural; one sternopleural; one humeral; a long presutural; two notopleurals; supra-alar; a very long postalar; posterior intra-alar; three or four dorsocentrals, the foremost often scarcely distinguishable from the surrounding hairs; a pair of well-developed prescutellar acrostichals; four marginal and two discal scutellars, apical ones longest, others subequal. Mesoscutum and posterior part of mesopleuron with numerous hairs. Femora with a row of postero-ventral bristles, those on the middle and hind femora sometimes undeveloped; fore and middle tibiae with very small preapical dorsal bristles, sometimes indistinguishable on the latter; middle tibiae with several apical spurs; hind tibiae with two short, unequal spurs. Wings with preapical section of fourth vein about one-third as long as apical section, and subequal to apical section of fifth vein; discal cell acute at posterior apex.

Dimensions: total length, 3.2-4.5 mm.; length of thorax, 1.5-1.6 mm.; length of wing 3.4-4.2 mm.

Distribution : New South Wales—Central Coast and Tableland. Sassafras Gully Springwood, Blue Mountains, January 10, 1956 (holotype ♂, paratype ♀). Wentworth Falls, Blue Mountains, February 2, 1957 (paratypes, 1 ♂, 2 ♀), January 31, 1959 (paratype ♂). National Park, south of Sydney, December 31, 1955 (paratype ♂). Otford, Illawarra district, January 27, 1958 (paratype ♂); January 26, 1959 (paratypes, 3 ♂, 9 ♀). All collected by D. K. McAlpine.

Habitat : on banks of creeks in and near rain forest, not found above 1,400 ft.

Location of types : Australian Museum.

An abnormal male specimen from Otford measures only 3.0 mm. in total length, length of thorax being 1.3 mm. and length of wing 2.8 mm. The incurved pair of fronto-orbitals is undeveloped in this specimen, the left one being represented by a small hair, the right one absent altogether.

Tetrameringia pubescens sp. nov.

♂. Colour brownish-yellow, somewhat shining; arista, bristles, and most hairs of head and thorax, black; all bristles, spurs, and hairs on legs yellow or yellowish-brown; ocellar spot black; a large black spot on mesopleuron and another covering metapleuron; mesoscutum with a longitudinal black stripe on each side between dorsocentrals and supra-alar, interrupted at suture and not reaching humeral callus; legs unmarked; abdomen black, the first segment yellowish-brown. Wings hyaline with a greyish cloud along distal half of costal margin and a smaller separate cloud around posterior crossvein.

Head similar structurally to that of *T. ustulata*, but bristles and cheek hairs relatively shorter; second fronto-orbital not closer to first than to third, the first more distinctly reclinate than in *T. ustulata* and less strongly incurved; arista with short pubescence only.

Thoracic chaetotaxy as in *T. ustulata*, but most bristles somewhat shorter. Fore and middle femora with postero-ventral bristles; preapical tibial bristles almost indistinguishable; tibial spurs less developed than in *T. ustulata*. Preapical section of fourth vein about two-fifths as long as apical section; venation otherwise similar to that of *T. ustulata*.

Dimensions : total length, 2.4 mm.; length of thorax, 1.1 mm.; length of wing, 2.0 mm.

Distribution : New South Wales—Blue Mountains. Mount Wilson, March 2, 1957 (holotype ♂), D. K. McAlpine.

Habitat : partly cleared rain forest, circa 3,000 feet.

Location of type : Australian Museum.

Genus *Heteromeria* Czerny

The genus is easily recognized from the key. Melander and Argo state that the propleural bristles are absent, but in most Australian species they are represented by small hairs. A character of the males not previously noted is a small, round, raised plate on the mesopleuron, below and in front of the mesopleural bristle. It occurs in the males of all Australian species, with the possible exception of *H. imitans*, which the author has not seen. This structure has not been observed in other genera. Hennig (1958) refers to *Heteromeria* as being without a break in the costa or a distinctly soft central region of the face. In material the author has examined the costa is incised at the end of the subcosta, though less conspicuously so than in other genera, and the face is only sclerotized on its upper part between the antennae. In these characters *Heteromeria* agrees with all other clusiid genera seen by the author.

The species are more difficult to separate than those of other Australian genera and, though colour differences are important, some intra-specific variation is present. It is, therefore, desirable to include details of the antennae and male terminalia in all descriptions. The most important specific characters in the terminalia are the form of the surstyli and the number and structure of the appendages of the aedeagus. The latter consist of the two branches of the distal fork, to which the terms anterior and posterior are applied to indicate their positions when the aedeagus is ventrally directed and untwisted. The posterior distal branch may have a pair of terminal filaments, or there may be a short intermediate branch between those of the distal fork. In addition, up to three lobes may be present proximally to the distal fork.

Unlike the other species of the family, which I have only taken in or near rain forests along creeks, those of this genus are often found in the more open eucalypt forests.

Key to Australian Species of *Heteromerigia*

1. Lower half of pleura and a broad median area on mesonotum, pale yellowish; arista with longest hairs no shorter than its basal diameter; third antennal segment porrect; ocellars minute; wings with only the apical cloud distinct; only the front legs with dark markings. Queensland *hypoleuca* nov.
 Thorax almost entirely black 2
2. Halteres black; wings with only the apical dark cloud; coxae and femora entirely yellowish; ocellars very small. Queensland *imitans* Malloch
 Halteres with yellowish knobs; other characters not all as above 3
3. Wing with three incompletely separated transverse blackish patches; ocellars about half as long as postverticals; pubescence on arista more than half as long as basal diameter of latter; third antennal segment porrect 4
 Wing with, at most, two principal dark patches; ocellars almost or quite as long as postverticals; pubescence on arista not more than half as long as basal diameter; third antennal segment slightly decumbent 6
4. Mesonotum with a pair of narrow yellow-brown bands along dorsocentral lines behind suture; fore legs, except bases of tibiae but including coxae, entirely blackish; surstyli not distinctly curved, tapering only in distal half; aedeagus with posterior branch of distal fork longer than anterior one and expanded into a large membranous disc at apex. New South Wales *australiae* Malloch
 Mesonotum without pale bands; fore legs with at least the coxae pale yellowish; middle and hind legs almost entirely yellowish to brownish-yellow; surstyli curved; aedeagus with posterior branch of distal fork no longer than anterior branch..... 5
5. Ventral margin of cheek entirely yellow; anterior margin of frons yellow; surstyli curved near base where they are comparatively narrow, not notably tapering; aedeagus with posterior branch of distal fork broad, the apical part expanded into a bell-shaped structure. New South Wales, Tasmania *spinulosa* nov.
 Posterior part of cheek, including ventral margin, entirely black; frons entirely black, but the anterior margin sometimes deep brown; surstyli falcate, broad basally, thence gradually tapering almost to apex; aedeagus with posterior branch of distal fork short and narrow. New South Wales *pulla* nov.
6. Legs, including the coxae, predominantly deep brown, the fore legs with tarsi not darker than the tibiae; third antennal segment not wider than second; propleural hair usually absent; surstyli more than twice as long as wide, gradually tapering; aedeagus with a pair of moderately long terminal filaments. Western Australia ..
 *norrisi* nov.
 Fore coxae and other extensive regions of legs pale yellowish; propleural hair present 7
7. Third antennal segment wider than second; distal parts of fore and hind femora broadly black; fore legs with tarsi black and tibiae yellowish in male (female unknown); legs otherwise unmarked; surstyli subtriangular, not distinctly longer than broad; aedeagus without terminal filaments. New South Wales.... *laticornis* nov.
 Third antennal segment not wider than second; legs otherwise marked 8
8. Fore tibia and apex of fore femur brown-black, fore tarsus black in both sexes, legs otherwise yellowish; third antennal segment not very notably decumbent; arista with longest hairs fully half as long as its basal diameter; surstyli not distinctly longer than basal width; aedeagus without terminal filaments. New South Wales species A.
 Fore tibia yellowish, fore tarsus black in female only, apices of femora at most narrowly browned; third antennal segment distinctly decumbent; arista with longest hairs less than half as long as its basal diameter; surstyli broad basally, contracted into a narrow distal part; aedeagus with a pair of long terminal filaments. New South Wales *hardyi* nov.

Heteromeriugia hypoleuca sp. nov.

(Fig. 29)

♂♀. Head pale yellowish; only the ocellar spot and upper half of occiput blackened in male; the entire frons, a part of the postgena and a variable amount of parafacials and anterior part of cheek blackened as well in female; antennae slightly browned at apices. Thorax pale yellowish with, in the female, a broad dark-brown longitudinal band on each side of mesonotum, extending from neck region on to sides of scutellum, and a somewhat narrower band across upper parts of pleura, beginning on propleuron and expanded posteriorly to cover the metanotum and postnotum; male with the above bands extensively interrupted and much paler in part. Fore tibia with a longitudinal black stripe on each side (anterior and posterior), which is broader in female; blackish spot on distal part of fore femur in female; legs otherwise entirely yellowish. Bristles of head and thorax yellowish-brown to black. Wings hyaline, with a greyish distal cloud, and a very indistinct one in region of discal cell. Abdomen dark brown to black.

Head rather higher than long; cheek one-seventh to one-eighth height of eye; ocellars minute, not longer than the diameter of an ocellus; cheek hairs rather long, but much shorter than vibrissa, which is about one and a half times as long as antenna (excluding arista); eyes with sparse minute hairs; third antennal segment almost as wide as second, porrect; arista with the longest hairs about as long as its basal diameter.

Thorax, including mesopleuron, almost without pubescence or dust, largely shining, propleural hair present; mesopleuron with fine setulae on posterior part and one long bristle; mesopleural plate of male convex, with roughened or pubescent surface; male with a series of postero-ventral bristles on fore and middle femora; female with a few postero-ventral bristles on fore femur only. Wings normal.

Surstyli of male elongate oval, slightly narrowed at base, outer surface with fine sparse hairs; cerci of male very narrow, joined for most of their length; aedeagus withdrawn in holotype and no details visible.

Dimensions : total length, ♂ 4.2 mm., ♀ 3.6-4.2 mm.; length of thorax, ♂ 1.3 mm., ♀ 1.2-1.4 mm.; length of wing, ♂ 3.7 mm., ♀ 3.0-3.3 mm.

Distribution : Queensland. Lamington National Park, October 29, 1955 (holotype ♂, paratype ♀), F. A. Perkins. Coolum, April 20, 1938 (paratype ♀), F. A. Perkins. Kuranda, December 22, 1958 (1 ♂), D. K. McAlpine.

Location of types : holotype in Queensland Museum; paratypes in Entomology Department, University of Queensland; Kuranda specimen in Australian Museum.

Habitat : Kuranda specimen in rain forest.

The holotype male specimen differs in a number of ways, mainly in colour, from the two female specimens. These differences have been noted in the above description, but it is not possible to be sure if some of these are sexual differences or individual variation. The specimens from Lamington National Park and Kuranda differ from the one from Coolum in having the dark bands on the mesonotum broadly connected anteriorly instead of quite separate, as in the latter. The Kuranda specimen differs from the holotype male in having the frons black with an orange-brown median anterior patch. It also differs from all the specimens from southern Queensland in having the two basal segments and basal part of third segment of fore tarsus black. This may represent a northern subspecies.

Heteromeriugia imitans Malloch, 1930

The author has not seen this species, which is only known from the type specimen. The description is rather brief, but the species should be easy to recognize. No other Australian species has the halteres black, and in addition, it is the only one of the predominantly black species which has only one dark cloud on the wing in combination with very short ocellars.

Distribution : North Queensland. Cairns (holotype).

Location of type : Deutsches Entomologisches Institut, Berlin.

Heteromeriugia australiae Malloch, 1926

(Fig. 28)

No specimen other than the holotype can at present be referred to this species. Lee, Crust and Sabrosky (1956) failed to locate the allotype, but a female specimen in the same institution as the holotype bears identical data to the allotype and differs from the holotype in the same points as noted by Malloch. It is therefore probably the allotype, but is referable to *H. spinulosa* rather than to this species.

The main differences of this species from *H. pulla* and *H. spinulosa* are noted in the key, but some variation in the characters cited may be noted when more material is studied. The wing colouring as given in the original description is misleading, as the dark area extends almost to the base and is incompletely divided into three. The halteres of the holotype are now yellow-brown, but may have become darkened with age, as Malloch stated that they were yellowish.

The terminalia were examined on the intact specimen: aedeagus with posterior branch of distal fork longer than anterior branch, expanded into a flat membranous disc at apex; surstyli almost lanceolate, acute.

Some additional characters were noted. Mesopleural plate larger than in other species, appearing as a round yellow disc with raised margins and dull surface. Propleural hair well developed. Third antennal segment correct, distinctly narrower than second. Dimensions of holotype: total length 4.7 mm., length of thorax 1.8 mm., length of wing 4.8 mm.

Distribution: New South Wales—North Coast. Coramba (holotype).

Location of type: School of Public Health and Tropical Medicine, University of Sydney.

Heteromeriugia pulla sp. nov.

(Fig. 4, 6, 34, 35)

♂♀. General colour black. Face and anterior part of cheeks reddish-brown to yellowish; upper part of cheek silvery-dusted; eyes conspicuously red in life (field observation); palpi brown distally or entirely yellowish; antennae yellowish, apex of third segment usually darker; arista blackish. Fore femur yellowish to brown; fore tibia brown to almost black; fore tarsus black, except for the brownish apical segment; middle and hind legs, except the coxae, brownish-yellow; all coxae pale yellowish. Wings extensively blackish, the dark area incompletely divided into three by transverse hyaline bands. Halteres with brown stalks and whitish clubs. Abdomen entirely black.

Head about as long as high; frons about one-third as wide as head; cheek about one-seventh to one-ninth as high as eye; ocellars about half as long as postverticals; foremost pair of fronto-orbitals appearing erect in profile, strongly incurved; second pair recurved, but also curved inwards; vibrissa about as long as antenna, the cheek hairs about half as long; third antennal segment correct, as wide as second segment; arista with longer hairs about as long as its basal diameter.

Thorax with normal chaetotaxy; propleural hair present; mesopleural setulae fine; mesonotum, metanotum, sternopleuron (except upper margin) and a small posterior part of mesopleuron, finely dusted; mesopleural plate of male yellowish grey, slightly raised. Fore tarsus strongly bilaterally compressed, its maximum diameter equal to that of tibia; fore and middle femora of male with series of antero-ventral and postero-ventral bristles, the latter better developed; these bristles much less developed in female; hind femur with a few antero-ventral bristles only. Wing as in Fig. 6.

Male postabdomen with surstyli falcate, broad basally and tapering to near apex; aedeagus with additional melanized branch between those of the distal fork, posterior branch of fork narrow, without terminal filaments, a lobe with weakly serrated melanized margin before the fork, and proximal to this lobe a short, triangular, entirely melanized lobe.

Dimensions: total length, ♂ 2.7-3.3 mm., ♀ 3.5-3.9 mm.; length of thorax, ♂ 1.0-1.3 mm., ♀ 1.2 mm.; length of wing, ♂ 2.1-3.0 mm., ♀ 2.9 mm.

Distribution: New South Wales—Central Coast. National Park, south of Sydney, April 13, 1957 (holotype ♂, paratypes, 4 ♂), April 20, 1957 (paratypes, 4 ♂), January 28, 1957 (paratype ♀), D. K. McAlpine. Otford, Illawarra District, January 26, 1959 (paratype ♀), D. K. McAlpine.

Habitat: wet sclerophyll and dry sclerophyll forest.

Location of types: Australian Museum.

This species was observed on fallen limbs and bark of *Eucalyptus*, moving the wings alternately up and down in a manner suggestive of certain of the Sepsidae, Platystomatidae and Trypetidae. All the specimens captured in this situation were males, but, as one pair was seen in copula, females were also present.

***Heteromeriugia spinulosa* sp. nov.**

(Fig. 27)

♂. Colour generally as described for *H. pulla*, but the following characters are notable. Anterior margin of frons, face and entire cheeks, except upper postgena, yellowish; frontal orbits yellow-brown; palpi and antennae yellowish; arista blackish. Thorax with variable yellowish-brown patches on propleuron, pteropleuron, hypopleuron, sides of scutellum and postero-lateral corners of mesoscutum. Halteres with pale brown stalks and pale yellowish knobs.

Head deformed in holotype, in paratype similarly formed to that of *H. pulla*, but slightly higher in proportion to length, the cheek almost one-fifth as high as the eye. Chaetotaxy of head and general characters of thorax as described for *H. pulla*. Legs and wing as in *H. pulla*.

Surstyli curved near their bases, narrow throughout and only slightly tapered; aedeagus with a small melanized lobe between those of distal fork; posterior branch of fork expanded into a bell-shaped structure, without filaments; a lobe present before fork as in *H. pulla*, but more narrowly melanized and very weakly serrate on margin; in addition, two lobes basal to this, the more basal one short and rounded, the other typically very long, directed towards base of aedeagus and heavily melanized with spinose-serrate margin—in one specimen very short, as in *H. pulla*.

Dimensions : total length, ♂ 3.0 mm., ♀ 4.4-5.2 mm.; length of thorax, ♂ 1.2-1.3 mm., ♀ 1.7-1.9 mm.; length of wing, ♂ 2.9 mm., ♀ 3.8-4.3 mm.

Distribution : New South Wales—Coast and Tablelands; Tasmania—West Coast. New South Wales : below Govett's Leap, Blue Mountains, December 7, 1956 (holotype ♂) D. K. McAlpine; Otford, Illawarra district, October 12, 1957 (paratype ♂), D. K. McAlpine; Katoomba, Blue Mountains, November 2, 1957 (1 ♂), G. H. Hardy; Lawson, Blue Mountains, December 3, 1956 (1 ♀), D. K. McAlpine; Sydney (i.e., probably Sydney district), February 1925 (1 ♀, probable allotype of *H. australiae* Malloch), Health Department. Tasmania : Strahan, February, 1924 (1 ♀), G. H. Hardy.

Habitat : in rain forest on banks of creeks; specimen from Lawson on dense weed growth near a roadside gutter.

Location of material : Holotype, paratype and specimens from Katoomba and Lawson in Australian Museum; specimen from Sydney in School of Public Health and Tropical Medicine, University of Sydney; specimen from Strahan in Entomology Department, University of Queensland.

The female specimens differ from the males in their much larger size. In other species of the genus the sexual difference in size is very slight. In all other characters, except for the reduced bristling of the legs, a sexual character, they resemble the males. It is probable that these specimens are not specifically distinct from the males, but in view of the small specific differences in *Heteromeriugia* they are not designated as paratypes.

The male specimen from Katoomba differs from the other two males in its slightly darker colouring and reduction of the melanized lobe proximal to fork of aedeagus. In coloration of head, width of cheek and other characters of the terminalia it agrees with this species and not the previous one.

***Heteromeriugia norrisi* sp. nov.**

(Figs. 7, 30)

♂♀. Colour deep brown to brown-black. Antennae, anterior edge of frons, anterior part of cheek, mouthparts and a variable amount of face brownish-yellow. Legs, including coxae, deep brown; knees, bases of femora and middle of hind tarsus sometimes yellowish. Wings with a greyish cloud over apices of second and third veins, sometimes extending over fourth vein, and a fainter cloud over anterior crossvein and discal cell. Halteres pale yellowish with brown stalks.

Head slightly higher than long; vibrissae no longer than antennae; cheek hairs small; eyes with sparse minute hairs; third antennal segment somewhat decumbent, not wider than second; arista with pubescence not over one-quarter as long as its basal diameter.

Thorax with normal chaetotaxy; propleural hair absent or, in some specimens, visible on one side only; mesopleuron shining, almost undusted, with hairs on posterior part, but only one distinct bristle; mesopleural plate of male small, covered with greyish pubescence. Fore femur

with postero-dorsal, antero-ventral and postero-ventral bristles, the latter in a complete series in male; middle femur with antero-ventral and postero-ventral bristles in male only, the latter series complete; hind femur with antero-ventral bristles in male only; fore tarsus of female dilated, maximum diameter almost equal to that of tibia, that of male only slightly dilated. Wing venation normal.

Male terminalia similar to those of *H. hardyi*, but the surstyli gradually tapered to near apex and the terminal filaments of aedeagus comparatively shorter.

Dimensions : total length, ♂ 3.0-3.8 mm., ♀ 3.8-5.0 mm.; length of thorax, ♂ 1.1-1.5 mm., ♀ 1.3-1.8 mm.; length of wing, ♂ 2.5-3.0 mm., ♀ 3.0-4.0 mm.

Distribution : Western Australia—near Perth. Applecross, collected in rotting wood, June 10, 1934, except one collected July 1, emerged July 18-August 4, 1934 (holotype ♂, paratypes 4 ♂, 9 ♀). Cannington, September 2, 1934 (paratype ♀). All collected by K. R. Norris.

Habitat : specimens from Applecross bred from rotting wood; one female is labelled "In log with termites".

Location of types : holotype and 12 paratypes in Division of Entomology Museum, C.S.I.R.O., Canberra; two paratypes in Australian Museum.

***Heteromeria hardyi* sp. nov.**

(Figs. 2, 31, 36)

♂♀. Colour black. Anterior part of frons, face, anterior part of cheeks, mouth-parts and antennae brownish-yellow; apex of third antennal segment brown to black. Thorax without paler markings. Legs yellowish, the knee region of fore and hind and sometimes of middle legs dark brownish; fore tarsi black in female only; middle and hind coxae partly brown. Wings with a grey cloud over distal parts of second to fourth veins, which is darkest near second vein, and a less distinct cloud in the region of the discal cell. Halteres whitish with pale brown stalks. Abdomen black in male, brown in female.

Head slightly higher than long; frons about one-third the width of head in male, slightly less in female; cheek about one-sixth to one-fifth the height of eye; ocellars about as long as postverticals; vibrissa about as long as antenna excluding arista; cheek hairs short; eyes with sparse minute hairs; third antennal segment somewhat decumbent, as wide as second; arista with pubescence less than half as long as the basal diameter.

Thorax with normal chaetotaxy; propleural hair well developed; mesopleuron dusted on posterior half and with a few posterior hairs; mesopleural plate of male small, with short, dense, greyish pubescence. Male with antero-ventral bristles on distal part of femora, almost obsolete on the hind ones; postero-ventral bristles in almost complete series on fore and middle femora, the former with postero-dorsal bristles as well; all these bristles less developed in female; fore tarsus of female compressed and vertically dilated, tapering apically, maximum diameter greater than that of tibia; fore tarsus of male only slightly thicker than other tarsi. Wing venation normal.

Surstyli broad basally, then contracted into a narrow, elongate distal part with about five short spines at apex on inner surface; anterior paramere with a large anterior and small posterior bristle; aedeagus with a pair of very long terminal filaments; anterior branch of apical fork short; no well developed additional lobes.

Dimensions : total length, ♂ 3.1-3.5 mm., ♀ 3.0-4.5 mm.; length of thorax, ♂ 1.4-1.5 mm., ♀ 1.2-1.7 mm.; length of wing, ♂ 3.0-3.2 mm., ♀ 2.5-4.0 mm.

Distribution : New South Wales—Blue Mountains. Katoomba, December 19, 1956 (holotype ♂, paratypes, 2 ♀), November 23, 1956 (paratype ♀), December 17, 1956 (paratype ♀), December 18, 1956 (paratype ♀), December 29, 1956 (paratype ♂), November 16, 1957 (paratype ♀), November 23, 1957 (paratype ♀), December 6, 1958 (paratype ♂), G. H. Hardy.

Location of types : Australian Museum.

Heteromeriugia laticornis sp. nov.

(Figs. 3, 3A, 32)

♂. General colour black. Face, anterior margin of frons, anterior part of cheeks, proboscis, palpi and antennae yellowish; arista dark brown. Thorax without pale markings. Legs yellowish; fore tarsus and distal parts of fore and hind femora black. Wings hyaline; a greyish cloud on anterior apical margin only.

Head distinctly higher than long; frons about two-fifths as wide as head; cheek about one-seventh to one-fifth as high as eye; ocellars slightly shorter than postverticals; vibrissae shorter than antennae; cheek hairs short; third antennal segment decumbent, wider than long and wider than second segment; arista with minute pubescence which is not half as long as the basal diameter.

Thorax, including mesopleuron, extensively finely dusted; chaetotaxy normal; a small propleural hair present; mesopleural hairs very short and fine; mesopleural plate small, dull greyish, convex. Fore tarsus compressed, the maximum diameter less than that of tibia; fore and middle femora with series of postero-ventral bristles and a few antero-ventral bristles. Wing venation normal.

Surstyli subtriangular, about as long as basal width, with convex anterior margin and a compact group of short, stout spines at apex; aedeagus with both branches of distal fork slender and simple, without terminal filaments; two broad lobes before the distal fork.

Dimensions : total length, 2.4-2.5 mm.; length of thorax, 1.0-1.1 mm.; length of wing, 2.3-2.4 mm.

Distribution : New South Wales—Central Coast. National Park, south of Sydney, March 19, 1957 (holotype ♂). Otford, Illawarra District, October 12, 1957 (paratype ♂). Collected by D. K. McAlpine.

Habitat : wet sclerophyll forest and rain forest.

Location of types : Australian Museum.

Heteromeriugia sp. A

(Fig. 33)

Very similar to *H. laticornis*, differing in coloration of legs, form of third antennal segment, and the slightly longer arista hairs, as indicated in the key. Male terminalia as in that species, the form of surstylus very similar, but only one lobe visible before fork of aedeagus.

Dimensions : total length, ♂ 2.1 mm., ♀ 3.0 mm.; length of thorax, ♂ and ♀ 1.0 mm.; length of wing, ♂ 1.9 mm., ♀ 2.4 mm.

Distribution : New South Wales—Central Coast. Bronte, near Sydney, March 31, 1958 (1 ♂). Otford, Illawarra District, January 26, 1959 (1 ♀). Collected by D. K. McAlpine.

This form may be a variation of *H. laticornis*, but the characters of antennal structure and leg colour are constant in both specimens and therefore suggest that it may be distinct. A longer series of specimens will be necessary to decide the status of the two forms.

Genus Czernyola Bezzi, 1907

Synonyms : *Craspedochaeta* Czerny, 1903, not Macquart, 1851. *Tonnoiria* Malloch, 1929 (as full genus), synonymized Malloch, 1942.

Fronto-orbitals four or five, the second or (when five are present) the third from front directed inwards and forwards, the remainder reclinate; interfrontals absent; postverticals and ocellars present; antennae normal. One to three dorsocentrals, situated behind suture; presutural bristle absent. Preapical tibial bristles well developed. Abdominal characters : see section on male terminalia and description of *C. delta* below. Wing venation similar to that of *Clusiodes*.

Type species : *Craspedochaeta transversa* Czerny (Melander and Argo, 1924).

The incurved bristles near the centre of the frontal orbits in *Czernyola* have been frequently referred to as cruciate bristles situated in the orbits. The author follows Malloch (1929, 1933, 1942) and Hennig (1938a) in regarding these bristles as true fronto-orbitals. Cruciate or interfrontal bristles are, by definition, situated on the interfrontalia and not on the frontal orbits. Because of this interpretation it is necessary to re-evaluate the numbers of fronto-orbitals given in early descriptions.

Melander and Argo (1924) gave a key to the species then known, but it was not until Hennig (1938a) dealt with the genus that a more satisfactory scheme of grouping the species was put forward. Hennig did not, however, definitely recognize *Tonnoiria* as congeneric, though he suggested that *C. biseta* Hendel might be better placed in that genus.

The species are divisible into three groups which may be of subgeneric value. However, the author does not consider that the present knowledge of the group is adequate to establish subgenera, especially as the groups are differentiated only by single bristle characters.

Key to Species Groups of Czernyola

1. Four strong reclinate fronto-orbitals in addition to the incurved one; neotropical *transversa* group
Three reclinate fronto-orbitals 2
2. One strong pair of dorsocentrals; neotropical *atra* group
Two strong pairs of dorsocentrals; Indo-Australian *biseta* group

As only the *biseta* group enters the Australian Region, it is the only group dealt with here. If it is considered to be a subgenus the name *Tonnoiria* Malloch is available for it. The species may be divided into two subgroups, according to the development of the fronto-orbital bristles. The following are the known species of the *biseta* group :—

Subgroup *a* (three strong, subequal reclinate fronto-orbitals).

- C. australis* sp. nov. New South Wales.
- C. bisignata* sp. nov. North Queensland.

Subgroup *b* (three reclinate fronto-orbitals, the posterior one short and weak).

- C. biseta* Hendel, 1913. Formosa.
- C. puncticornis* Frey, 1928. Philippines. Possible synonym of *biseta* Hendel.
- C. palliseta palliseta* (Malloch), 1929. Society Islands, Marquesas.
- C. palliseta pleuralis* Curran, 1936. Solomons, New Hebrides, North Queensland.
- C. delta* sp. nov. North Queensland.
- C. atrifrons* Malloch, 1942. Guam.

Study of much more material is necessary to establish specific limits in this group. In the species of subgroup *b* specific differences may be quite small, though conspicuous sexual dimorphism occurs. Variations in the proportional lengths of the sections of the fourth vein do not seem to have taxonomic value.

Key to Australian Species of Czernyola

1. The three reclinate fronto-orbitals subequal 2
Third (posterior) reclinate fronto-orbital much shorter and finer than others 3
2. Third antennal segment more tumid and prominent ventrally than on dorsal edge, thus obliquely oval in outline; wing with only a distal blackish patch and a very faint suffusion over posterior crossvein; incurved fronto-orbitals inserted distinctly mesad of line of reclinate orbitals *australis* nov.
Third antennal segment almost orbicular, not prominent ventrally; wing with dark distal patch and a broad basal patch extending from apex of first vein across discal cell almost to posterior margin; incurved fronto-orbitals inserted in line with reclinate ones *bisignata* nov.
3. Pleura pale yellowish on lower half in male, entirely black in female; femora and tibiae extensively blackened in female, almost entirely pale in male; surstyli of male nearly trapezoid, with very convex posterior margin *palliseta* Malloch
Pleura dark brown to black in both sexes; legs yellowish in both sexes with, at most, the apices of middle and hind femora brownish; surstyli subtriangular, the posterior margin almost straight *delta* nov.

Czernyola australis sp. nov.

(Fig. 19)

♂♀. Colour black, including the bristles. Frons with broad yellow anterior margin; face yellowish above, brown to black below; cheeks dark grey with white dusting on upper half; palpi and proboscis pale yellowish; antenna brownish-yellow, apex dark brown; arista brown. Thorax without pale markings. Legs light yellow-brown, fore coxa paler, hind femur somewhat darker brown; middle coxa dark brown on outer side. Wing greyish hyaline, with a dark grey patch on slightly less than the distal third, a much fainter cloud round distal part of discal cell and a small one in basal part of marginal cell. Halteres white with light brown stalks. Apex of abdomen and cerci pale yellowish in female.

General structure much as in *C. palliseta* and *C. delta*. Head much higher than long; cheek about one-seventh height of eye; fronto-orbitals four, all strong and subequal, the incurved second one set in a little from the line of the others; ocellars nearly as long as fronto-orbitals, postverticals a little shorter; antenna with third segment oval, the ventral part of the distal edge somewhat prominent; arista as in *C. delta*, but the hairs more uniform.

Thoracic chaetotaxy as in *C. delta*; scutellum entirely black-dusted. Wing with ultimate section of fourth vein three times as long as penultimate section or a little longer, the latter equal to ultimate section of fifth vein; fifth vein stopping well before wing margin.

Dimensions : total length, ♂ 3.2 mm., ♀ 2.9 mm.; length of thorax, ♂ 1.2 mm., ♀ 1.1 mm.; length of wing, ♂ 2.8 mm., ♀ 2.7 mm.

Distribution : New South Wales—Central Coast and Tableland. Deep Creek, Narra-been, near Sydney, November 25, 1956 (holotype ♂), W. W. Wirth. Katoomba, Blue Mountains, October 30, 1958 (paratype ♀), G. H. Hardy.

Katoomba, where the paratype was collected, is at an elevation of over 3,000 feet and has a cool climate with some winter snow. This is interesting, as the other species of *Czernyola* are only recorded from the tropics.

Location of types : holotype in United States National Museum, paratype in Australian Museum.

Czernyola bisignata, sp. nov.

♂♀. Colour black; bristles yellowish brown in male, black in female. Head in female coloured as in *C. australis*, except that the frons is dark brown, not yellow, on anterior margin; in male, frons broadly yellow on anterior margin, face and cheeks whitish, third antennal segment pale yellowish, with brown mark at base of arista. Legs yellowish, apices of femora somewhat darker. Wing with a dark grey patch occupying distal third, and another quite broad one from apex of first vein across discal cell almost to posterior margin.

General structure very similar to other Australian species. Head not much higher than long; cheek one-seventh to one-ninth as high as eye; three subequal reclinate fronto-orbitals, the incurved fronto-orbital almost in line with them; third antennal segment almost orbicular.

Thoracic chaetotaxy as in *C. delta*, except that anterior dorsocentral in male is very weak and not half as long as posterior one, and in female but slightly shorter than posterior one. Wing with ultimate section of fourth vein nearly five times as long as penultimate section, the latter half, or slightly more than half, as long as ultimate section of fifth vein.

Dimensions : total length, ♂ 2.5 mm., ♀ 3.1 mm.; length of thorax, ♂ 1.0 mm., ♀ 1.1 mm.; length of wing, ♂ 2.2 mm., ♀ 2.5 mm.

Distribution : North Queensland. Kuranda, December 26, 1958 (holotype ♂), December 28, 1958 (paratype ♀), D. K. McAlpine.

Habitat : rain forest.

Location of types : Australian Museum.

Czernyola delta sp. nov.

(Fig. 14)

♂♀. Colour black, somewhat shining; bristles yellowish to brown in male, darker brown in female. Frons without pale anterior margin, extensively dusted anteriorly, shining on orbits and on posterior third or less; face and cheeks pale yellowish to mid-grey, dusted, upper part of cheek silver-dusted; antennae of male pale yellow, the first and second segments usually slightly darker than third (brown in one specimen), third segment without dark mark near arista; antenna of female with first and second segments deep brown, third segment dull yellowish with a brownish spot surrounding base of arista; proboscis and palpi pale yellowish. Thorax of male with yellowish area confined to a median ventral band on sternopleura extending forwards from insertion of middle coxae; thorax of female with only the extreme postero-ventral angles of sternopleura between bases of middle coxae slightly yellowish. Legs yellowish, apices of middle and hind femora sometimes slightly darker. Wings hyaline with a greyish tinge and a more distinct greyish cloud on distal half, which is obsolete towards posterior margin. Halteres pale yellowish. Abdomen black.

Head structurally as figured for *C. palliseta pleuralis*, with four fronto-orbitals, the anterior three long and strong, the second incurved, the posterior one short and weak; third antennal segment subdiscoid; arista with short hairs not more than twice as long as its basal diameter.

Thorax with two pairs of strong subequal dorsocentrals, the anterior one well behind suture, and with a variably developed short bristle in front of it up to half its length; mesopleuron with numerous hairs posteriorly; scutellum flattened on top, with a pair of long apical bristles and two pairs of very short lateral bristles. Fore femur of male with numerous postero-ventral bristles and some shorter antero-ventral bristles near apex; middle femur of male with numerous antero-ventral and postero-ventral bristles; female without well developed femoral bristles, except for some postero-ventral ones on distal part of fore femur. Second and third veins somewhat diverging apically; third and fourth veins almost parallel apically; ultimate section of fourth vein four to six times as long as penultimate section.

Male postabdomen with sixth tergite normal; sixth sternite ventral, joined to the seventh on the left side by a narrow sclerotized strip; sixth spiracles in membrane below edges of sixth tergite; seventh sternite broadly fused with eighth on left side, extending narrowly around ventral surface; seventh left spiracle situated in edge of seventh sternite near its junction with sixth sternite. Surstyli triangular, acute, posterior margin straight to slightly concave, the inner surface with a broad blade occupying most of its length and toothed near apex. Ninth sternite consisting of distinct left and right pieces, joined posteriorly by a weakly sclerotized band. Phallobase sclerotized, with a pair of well developed parameres, produced into a short thorn-like spinus ditillatorius posteriorly and into a slightly projecting angle on each side ventrally. Aedeagus moderately elongate, largely membranous, not coiled, but the apex asymmetrically folded; basal part with a pair of broad, weakly pigmented skeletal strips, distal to these another strip which connects to the sclerotized apical part. Cerci about as long as surstyli, rather broad, setulose.

Dimensions : total length, ♂ 2.1-2.2 mm., ♀ 2.7-3.5 mm.; length of thorax, ♂ 0.8-1.1 mm., ♀ 1.0-1.1 mm.; length of wing, ♂ 1.8-2.4 mm., ♀ 2.4-2.8 mm.

Distribution : North Queensland—Cairns District. Lake Placid (or Barron Waters), May 26, 1958 (holotype ♂, paratypes, 2 ♂, 1 ♀), May 24, 1958 (paratype ♀). Kuranda, May 17, 1958 (paratype ♂). Collected by D. K. McAlpine.

Habitat : on shrubs at edge of rain forest. This species was taken, together with *C. palliseta pleuralis*, at Lake Placid. Both species invariably settled on the undersides of the leaves.

Location of types : Australian Museum.

Differs from *C. atrifrons* in its entirely dark thorax, from *C. palliseta* in the pale-coloured legs of female and in the entirely dark pleura of male, and from *C. biseta* in the absence of a brown ring on the hind tibiae of male and in the pale legs of the female.

Czernyola palliseta (Malloch) comb. nov.

Tonnoiria palliseta Malloch, 1929, 1932.

This species has a wide range through the tropics of the southern Pacific Ocean. Two races are distinguished at present which may represent distinct species, though it is difficult to find clear-cut differences in the males. The eastern race occurs in the Marquesas and Society Islands and the western one in the New Hebrides, Solomon Islands and North Queensland.

Czernyola palliseta palliseta (Malloch)

This form needs further study to establish its status. Only one male and one female from Tahiti are available to the author. These were examined by Malloch, and the male bears his identification label. Malloch (1932) recorded, but did not describe, the female.

♂. Very like the next race, but average size greater. Surstyli of very similar form to those of *C. p. pleuralis*. Anterior margin of frons very broadly yellow. Fronto-orbitals as in the next race.

♀. Differs from the next race in the following points: Frons with very broad yellowish brown anterior margin; antennae uniformly black. Fore coxae partly brownish. Size larger.

Dimensions: total length, ♂ 2.7 mm. (3.25 mm. in holotype), ♀ 3.8 mm.; length of thorax ♂ 1.1 mm., ♀ 1.5 mm.; length of wing, ♂ 2.7 mm., ♀ 3.4 mm.

Distribution: Society Islands and Marquesas.

Location of material: holotype and material examined by author in United States National Museum.

Malloch overlooked the small posterior fronto-orbital bristle, but on my request Dr. C. W. Sabrosky has confirmed its presence in the type and states that it is also present in *C. atrifrons* Malloch.

Czernyola palliseta pleuralis Curran, status nov.

(Figs. 17, 18, 24, 25)

Czernyola pleuralis Curran, 1936.

Very similar to *C. delta* in colour and structure, but the following characters are noteworthy:—

♂. Anterior margin of frons more or less yellowish, at least in centre; a brown mark on third antennal segment at base of arista; first and second segments not darker than third; palpi pale yellowish. Thorax black, with sternopleuron, hypopleuron and lower margins of mesopleuron and pteropleuron pale yellowish; legs yellowish with at most the knees brownish.

Postabdomen structurally similar to that of *C. delta*; the surstyli, when viewed directly from side, with strongly convex posterior margin, and thus almost trapezoid in outline.

♀. Frons often without yellowish anterior margin; face greyish; cheeks brown to black, silvery dusted above; distal margin of third antennal segment blackened, basal segments not darkened; palpi dark brown to black. Thorax almost entirely dark brown to black, only postero-medial angles of sternopleura between middle coxae yellowish; legs with all coxae and tarsi pale yellowish, femora and tibiae black except at bases and apices.

Dimensions: total length, ♂ 2.0-2.7 mm., ♀ 2.7-3.2 mm.; length of thorax, ♂ 0.9-1.1 mm., ♀ 1.1-1.2 mm.; length of wing, ♂ 1.8-2.4 mm., ♀ 2.4-2.8 mm.

Distribution: Solomon Islands, New Hebrides and North Queensland. Santa Catalina Island, Solomon Group (holotype ♂). Guadalcanal, Solomon Group, 1944 (♂), C. O. Berg. Little Florida Island, Solomon Group, March, 1945 (♂, ♀), G. E. Bohart. Second Channel, Espiritu Santo, New Hebrides, July, 1944 (♂), Jean Laffoon. Lake Placid, near Cairns, May 24 and 26, 1958 (32 ♂, 9 ♀), D. K. McAlpine.

Habitat: on shrubs at edge of rain forest.

Location of material: holotype in Museum of California Academy of Sciences, Australian specimens in Australian Museum, other material in United States National Museum.

The male may be distinguished from other species of the *biseta* group by the pale lower parts of the pleura. One of the males from Lake Placid has dark pleura, as in the female. The female differs from other species of this group in having the tibiae and femora, but not the coxae, black.

Genus *Clusiodes* Coquillett

This genus is easily recognized from the characters given in the key. Though widely distributed, it is not previously recorded from Australia.

The three species here described are closely related to one another, but do not seem to have close allies among species from other regions. For this reason, the first species is described in some detail and the others are more briefly compared with it.

Melander and Argo follow Malloch in recognizing three subgenera of *Clusiodes*: *Clusiaria* Malloch, which has no presutural dorsocentral and but two postsutural dorsocentrals; and two subgenera which have three pairs of long dorsocentrals, one of them in front of the suture. Of the two latter, *Columbiella* Malloch differs from *Clusiodes* sensu stricto in the absence of post-vertical bristles. Czerny (1928) has used *Clusiaria* as a full genus, but has not been followed by most authors. The Australian species have three pairs of long dorsocentrals, the foremost varying from slightly in front of to slightly behind the suture, and are thus intermediate between the subgenera *Clusiaria* and *Clusiodes*. The peculiar development of the vibrissae and associated melanization of the face in the male of *C. gladiator* would seem to ally this species to the Nearctic *C. melanostoma* (Loew), but in the former the vibrissae of both sexes are longer. Moreover, *C. melanostoma* has dorsocentral bristles typical of the subgenus *Clusiaria*. The only species of the genus previously recorded from the Indo-Australian Region are *C. aberrans* Frey (1928), from the Philippines, and *C. formosana* Hennig (1938a), from Formosa. These species differ from all others in having long, dense hairs on the arista, which give it a thickened appearance. The Australian species have much longer aristal hairs than the Holarctic ones, but the hairs are not crowded or appressed, so that the arista does not appear thickened. They also differ from *C. aberrans* in having six, instead of four, scutellar bristles and three, instead of two, dorsocentrals. Unfortunately, the thoracic chaetotaxy of *C. formosana* was not described.

The terminalia of an Australian species are shown in Fig. 17, and their structure is discussed in the section on terminalia. They agree with those of the two European species of *Clusiodes* described by Séguy (1934) and Hennig (1938a) in having one pair of parameres, an elongate phallobase and a membranous aedeagus which is not spirally coiled. Further information is required concerning the disposition of the sixth to eighth sternites in the European forms.

Key to Australian Species of *Clusiodes*

1. General colour black; sternopleuron, hypopleuron, antennae and most of legs pale yellowish; fore tibiae and tarsi black; wings unmarked..... *clara* nov.
 Head and thorax predominantly yellowish with few dark markings; wings with dark costal mark 2
2. Mesonotum with a black patch on each side that extends from the dorsocentrals to the wing base; a blackish spot present on each side of occiput; legs, except the fore tarsi, entirely yellowish; face in both sexes with a small black median mark only *megaspilos* nov.
 Mesonotum with a comparatively narrow longitudinal stripe between dorsocentrals and wing base; no dark occipital marks; at least the hind femora blackened distally; face blackened in male, at least near bases of vibrissae, but not at all blackened in female 3
3. Anterior dorsocentral scarcely shorter than others, at or very slightly in front of suture; black mesonotal stripe approximated to dorsocentrals, well removed from supra-alar; dark costal mark not reaching basally to first vein; only the hind femora with dark markings; third antennal segment with dark spot at apex .. *gladiator* nov.
 Anterior dorsocentral not more than three-quarters as long as second, slightly behind suture; black mesonotal stripe well removed from dorsocentrals, enclosing the supra-alar; dark costal mark reaching almost to base; all femora with dark markings; third antennal segment without dark spot *arguta* nov.

Clusiodes gladiator sp. nov.

(Figs. 8, 9, 23)

♂♀. Colour light brownish-yellow, somewhat shining; bristles and most hairs black. Ocellar spot black; face and anterior part of cheek dark brown to black in male only; arista and apex of third antennal segment black. Mesonotum with a blackish longitudinal band on either side between dorsocentral and supra-alar bristles, much closer to the former, beginning shortly behind suture and extending on to lateral metanotal sclerite posteriorly; pleura with a brown

band beginning on humeral callus and almost reaching haltere. Apices of hind femora, and often also the bases and apices of hind or all tibiae, brown; legs otherwise entirely yellowish. Wings hyaline with a dark costal band on apical half, extending around apex of wing to just beyond fourth vein. Abdomen brown, the distal parts of second to fifth tergites usually darker.

Head slightly higher than long; frons wider than long and about half as wide as head; lunule covered; cheek about one-sixth as high as eye; eyes large and rounded; ocellars and postverticals well developed, the former longer; three fronto-orbitals, the middle one long and strong, the others weak and not more than half as long; interfrontals moderately long, convergent or crossed; vibrissae of male sometimes exceptionally developed, up to one-and-a-half times as long as head, sigmoidally curved or merely incurved; vibrissae of female strong, incurved, about as long as head; a series of cheek hairs behind vibrissa; third antennal segment almost orbicular; arista with numerous but not dense hairs, the longest ones nearly half as long as width of third antennal segment.

Thorax with the following bristles: sternopleural; mesopleural; humeral; two notopleurals; supra-alar; postalar; a smaller posterior intra-alar; three strong, subequal dorsocentrals, the anterior one situated at the suture; no acrostichals; six marginal and no discal scutellars, the apical pair longest, other two pairs subequal; two short, fine propleural hairs. Fore and middle femora with postero-ventral series of bristles and sometimes all femora with weaker antero-ventral bristles; fore femora with postero-dorsal bristles also; all tibiae with paired preapical dorsal bristles, shortest on fore tibiae. Penultimate section of fourth vein about one-quarter the length of ultimate section and nearly as long as ultimate section of fifth vein.

Dimensions: total length, ♂ 3.0-3.7 mm., ♀ 3.1-4.2 mm.; length of thorax, ♂ 1.2-1.7 mm., ♀ 1.2-1.9 mm.; length of wing, ♂ 2.9-3.8 mm., ♀ 3.0-3.9 mm.

Distribution: New South Wales—Coast and Tablelands; Queensland—Tablelands in north and south. N.S.W.: National Park, south of Sydney, December 31, 1955 (holotype ♂), April 28, 1956 (paratype ♀); Otford, Illawarra District, January 26, 1959 (paratypes, 2 ♂), March 7, 1959 (paratypes, 2 ♂, 1 ♀); Wentworth Falls, Blue Mountains, February 28, 1957 (paratype ♀), April 22, 1957 (paratypes, 3 ♂), November 20, 1958 (paratypes, 1 ♂, 1 ♀), November 29, 1958 (paratype ♀); below Govett's Leap, Blue Mountains, December 7, 1956 (paratypes, 2 ♂), September 14, 1957 (paratypes, 2 ♂); Mount Wilson, Blue Mountains, March 2, 1957 (paratype ♀), March 29, 1958 (paratypes, 2 ♂), February 7, 1959 (paratype ♂); all the above collected by D. K. McAlpine; Salisbury, near Barrington Tops, November 1-5, 1957 (paratype ♀), F. A. Perkins. Queensland: Lamington National Park, October 21, 1934 (paratype ♂), F. A. Perkins; October 26, 1957 (paratypes, 3 ♂), I. C. Yeo; Barron River, near the Crater, Atherton Tableland, January 3, 1959 (paratype ♂), D. K. McAlpine.

Habitat: in and near rain forest on banks of creeks.

Location of types: holotype and 19 paratypes in Australian Museum, five paratypes (Lamington National Park and Salisbury) in Entomology Department, University of Queensland

Clusiodes arguta sp. nov.

♂♀. Colour similar to that of *C. gladiator*; third antennal segment without dark apex; black mesonotal bands removed from dorsocentrals, enclosing the supra-alar bristle; pleura band paler than in *C. gladiator*; apices of all femora and tibiae black to brown; fore tarsi brown in female only; wings with dark costal band extending almost to base.

Head structurally as described for *C. gladiator*, except that the vibrissae are not as long as the head in either sex.

Thoracic chaetotaxy as in *C. gladiator*, except that the anterior dorsocentral is not more than three-quarters as long as the second and is situated slightly behind the suture; scutellum with a pair of small setulae between apical bristles in female. Chaetotaxy of legs and wing venation also as in *C. gladiator*.

Dimension: total length, ♂ 3.4 mm., ♀ 3.8-4.1 mm.; length of thorax, ♂ 1.5 mm., ♀ 1.5-1.7 mm.; length of wing, ♂ 3.3 mm., ♀ 3.3-3.8 mm.

Distribution: New South Wales—Blue Mountains. Wentworth Falls, February 28, 1957 (holotype ♂), February 2, 1957 (paratypes, 3 ♀), November 29, 1958 (paratype ♀), D. K. McAlpine.

Habitat: in and near rain forest on banks of creeks.

Location of types: Australian Museum.

Clusiodes megaspilos sp. nov.

♂♀. Colour similar to that of *C. gladiator*. Face with a small black median mark in both sexes; occiput with a large blackish spot on each side extending from the dorsocentrals to the wing base; upper margin of mesopleuron brown in male, upper half blackish in female; pteropleuron only darkened posteriorly; metapleuron with a dark brown spot. Fore tarsi blackish, the legs otherwise unmarked. Wings marked as in *C. gladiator*, but the costal mark not as dark and less extensive.

Head structurally as in *C. gladiator*, but the vibrissae not as long as head.

Thoracic chaetotaxy as in *C. gladiator*, the first pair of dorsocentrals slightly in front of suture. Both preapical bristles on fore tibia and the posterior one on hind tibia very small. Venation as in *C. gladiator*.

Dimensions : total length, ♂ 2.4-2.8 mm., ♀ 2.7-3.5 mm.; length of thorax, ♂ 1.0-1.2 mm., ♀ 1.2-1.3 mm.; length of wing, ♂ 2.3-2.9 mm., ♀ 2.5-3.0 mm.

Distribution : New South Wales and Southern Queensland—Tablelands. New South Wales : Wentworth Falls, Blue Mountains, February 2, 1957 (holotype ♂, paratypes, 1 ♂, 3 ♀), February 28, 1957 (paratypes, 2 ♂, 1 ♀), November 5, 1957 (paratype ♂), D. K. McAlpine; Mount Wilson, Blue Mountains, February 7, 1959 (paratype ♂), D. K. McAlpine. Queensland : Lamington National Park, October 26, 1957 (paratype ♂), I. C. Yeo.

Habitat : in and near rain forest on banks of creeks.

Location of types : specimens from Wentworth Falls and Mount Wilson in Australian Museum; specimen from Lamington National Park in Entomology Department, University of Queensland.

Clusiodes clara sp. nov.

♀. Colour black, somewhat shining; bristles yellowish to black. Labella of proboscis and antennae brownish-yellow. Thorax with sternopleuron, hypopleuron and lower margin of mesopleuron pale yellowish; a black dot on sternopleuron just above middle coxa. Legs pale yellowish; fore tibiae and tarsi black; middle and hind tibiae and apices of all femora pale brown. Wings hyaline, without dark markings; veins brown. Halteres whitish, with pale brown stalks. Abdomen without pale markings.

Structure and chaetotaxy very similar to that of *C. gladiator*. Head collapsed in type, so that proportions cannot be stated; foremost fronto-orbital shorter than in *C. gladiator*; vibrissae long, incurved; arista with longest hairs distinctly less than half as long as width of third antennal segment, that is, slightly shorter than in the other Australian species.

Thorax with three pairs of dorsocentrals, the first slightly shorter than second and situated very slightly in front of suture; scutellum with basal pair of bristles minute, about one-third as long as intermediate pair, which is half as long as the apical pair; disc of scutellum with weak longitudinal wrinkles; apical hairs absent. Fore femur with weak postero-ventral and postero-dorsal bristles. Penultimate section of fourth vein less than one-quarter as long as ultimate section of fourth and about two-thirds as long as ultimate section of fifth vein.

Dimensions : total length, 2.3 mm.; length of thorax, 1.0 mm.; length of wing, 2.5 mm.

Distribution : Queensland—north-east. Silkwood, near Innisfail, May 25, 1958 (holotype ♀), D. K. McAlpine.

Habitat : rain forest on bank of creek.

Location of type : Australian Museum.

Genus Parahendelia nov.

Frons and face very broad; lunule covered; ocellars and postverticals well developed; three fronto-orbitals, all reclinate; interfrontals well developed, widely spaced, inserted near ptilinal suture; antennae widely separated and approximated to the eyes, especially in male, second segment subcylindrical, very elongate in male, as long as third segment in female, arista filiform.

Thorax with two pairs of dorsocentrals, both behind suture; two (rarely three) pairs of short lateral scutellars and a pair of long apical ones; acrostichal and presutural bristles absent. All tibiae with paired preapical dorsal bristles; tarsi slender, cylindrical. Wings as in *Clusiodes*.

Type species, *P. latifrons* sp. nov.

This genus is most closely related to *Clusiodes* and *Hendelia*. The latter genus contains only one known species, *H. beckeri* Czerny (synonym *H. nigripalpis* Czerny) from the Palearctic Region. The new genus differs from *Clusiodes* and resembles *Hendelia* in the broad head, widely separated antennae and insertion of interfrontals near ptilinal suture. It differs from *Hendelia* in the slender tarsi, filiform arista, larger, widely spaced interfrontals, and in other characters of chaetotaxy such as the presence of postverticals and the numbers of fronto-orbitals, dorsocentrals and scutellars. The outstanding difference between *Parahendelia* and all other genera of Clusiidae lies in the elongate second antennal segment.

Key to Species of *Parahendelia*

1. Head yellowish; male with second antennal segment about as long as head, slender, subcylindrical *latifrons* nov.
- Head predominantly black; male with second antennal segment shorter than head, conical *nigriceps* nov.

Parahendelia latifrons sp. nov.

(Figs. 10, 11, 15)

♂. General colour light yellow-brown, shining; bristles black. Head with ocellar spot, arista and dorsal margin of third antennal segment black; lower margin of palpi brown to black. Thorax with prosternum and pleura (except propleuron, lower part of hypopleuron and often a patch on sternopleuron in front of coxa) black; mesonotum with a postsutural black streak on each side between dorsocentral and supra-alar bristles, closer to the former. Fore tibia brown to black, except at base; fore tarsus brown to black on basal part of metatarsus and on the two distal segments; legs otherwise unmarked. Wings hyaline, with a blackish costal band on distal half, extending to just beyond fourth vein and sometimes extending indistinctly to fork of second and third veins.

Head about twice as wide as high, and nearly one and a half times as high as long; frons about three-fifths as wide as head; cheek tumid, about one-third as high as eye; vibrissal angle absent; face sclerotized only on upper margin; middle fronto-orbital long, posterior one about half as long, anterior one even shorter; ocellars as long as middle fronto-orbital; postverticals slightly shorter; interfrontals widely spaced, situated just above ptilinal suture and level with the anterior fronto-orbitals, slightly longer than posterior fronto-orbitals; in the type specimen an additional longer interfrontal bristle present on left side only, just below level of posterior fronto-orbital; vibrissae strong, about one and a half times as long as head, incurved, asymmetrical; cheek hairs few and fine; palpi short and broad; antennae porrect, about twice as long as head; first segment short and rounded; second segment as long as head or slightly longer; third segment shorter, elongate oval, densely pubescent at apex; arista slightly longer than third segment, with rather dense short hairs, the longest ones slightly longer than basal diameter.

Thorax rather broad; mesoscutum with short, fine, rather dense hairs anteriorly and sparser hairs posteriorly, the black markings almost devoid of hairs; scutellum devoid of hairs, slightly rugose; two small propleural setulae present; mesopleuron with some short hairs on posterior half in addition to the long bristle. Fore and middle femora with series of strong postero-ventral and shorter antero-ventral bristles. Wing with ultimate section of fourth vein about four to five times as long as penultimate section and about twice as long as ultimate section of fifth vein.

Cerci not prominent.

♀. Differs from male in the following characters:—

Palpi, prosternum, sternopleuron (except extreme ventral part) and most of hypopleuron, light yellow-brown. Fore tibia, except extreme base, and fore tarsus black; apex of fore femur brown. Wing with blackish costal band darker and extending basally to fork of second and third veins.

Head less broad than in male and antennae less widely separated; cheek slightly less than one-quarter as high as eye; vibrissae shorter than head, incurved; antennae shorter than head, with second and third segments subequal and both much shorter than in male.

Femoral bristles undeveloped, except some short postero-ventral ones on fore legs.

Dimensions : total length, ♂ 2.6-3.0 mm., ♀ 3.8 mm.; length of thorax, ♂ 1.3-1.4 mm., ♀ 1.5 mm.; length of wing, ♂ 3.1-3.2 mm., ♀ 3.6 mm.

Distribution : New South Wales—Blue Mountains. Wentworth Falls, November 5, 1957 (holotype ♂), November 20, 1958 (paratype ♀), D. K. McAlpine. Mount Wilson, December 11, 1959 (paratypes, 3 ♂), D. K. McAlpine.

Habitat : on ferns in rain forest.

Location of types : Australian Museum.

The male is easily recognizable in the field by means of the length and position of the antennae, which may be vibrated in a similar manner to those of many Hymenoptera.

***Parahendelia nigriceps* sp. nov.**

(Fig. 16)

♂. General colour shining black. Head with postgena, some markings on upper occiput, and mouth-parts, yellowish-brown; antenna dull fulvous, upper margin and apex of third segment and arista black. Thorax with mesonotum and postnotum brownish-yellow, the former with postsutural black marks as in *P. latifrons*; humeral calli brown-black. Legs brownish-yellow; fore tibia except base, and first, fourth and fifth segments of fore tarsus blackish; legs otherwise unmarked. Wings marked as in *Clusiodes gladiator*, the dark costal mark very distinct on distal half of wing only, but extending basally as an ill-defined greyish cloud. Abdomen brownish basally.

General structure similar to that of *P. latifrons*; chaetotaxy as described for that species. Head about twice as wide as high and about 1.2 times as high as long; cheek at middle nearly one-fifth as high as eye; vibrissae about as long as antennae (excluding arista), asymmetrical as in male of *P. latifrons*. Antennae about one and a quarter times as long as head; second segment stout, conical; third segment broad basally, tapering apically, fully as long as second segment; arista nearly three-quarters as long as rest of antenna, inserted at middle of upper margin of third segment, its longest hairs nearly twice as long as its basal diameter.

Thorax and appendages structurally as described for *P. latifrons*.

Dimensions : total length, 2.5 mm.; length of thorax, 1.2 mm.; length of wing, 2.6 mm.

Distribution : New South Wales—Blue Mountains. Mount Wilson, February 7, 1959 (holotype ♂), D. K. McAlpine.

Habitat : rain forest, elevation 3,000 feet.

Location of type : Australian Museum.

The smaller size, black head, narrower cheek and shorter, stouter antennae distinguish this from the male of the type species. The first two characters, at least, should also be available for separating the females.

Genus *Allometopon* Kertész, 1906

Fronto-orbitals all reclinate; a pair of interfrontals situated low down near ptilinal suture; ocellars present; postverticals absent or small; palpi slender; third antennal segment wider than long; preapical tibial bristles absent.

Type species, *A. fumipenne* Kertész (New Guinea).

Lamb (1914) described *Allometopon flavum* from the Seychelles, and Frcy (1928) described two species from the Philippines which he doubtfully referred to this genus. These three species show important differences from the type which might be considered generic by some. The Australian species described below are more closely related to the type species, although the first of them is the only one in which the crossveins of the wing are very close together.

The genus is in the unsatisfactory state of having each of its six species known from a single specimen. The specific limits are, therefore, a matter of conjecture, but the characters used herein are comparable with those employed in other genera. As no previous attempt has been made to tabulate the specific characters, I give below a key to the described species based on the published descriptions.

Key to Species of *Allometopon*

1. Four fronto-orbitals; interfrontals as long as foremost fronto-orbital; small postverticals present; Seychelles *flavum* Lamb
Two or three fronto-orbitals; interfrontals very short; postverticals usually absent .. 2
2. Three fronto-orbitals 3
Two fronto-orbitals 5
3. Ultimate section of fourth vein five times as long as penultimate section; postverticals and acrostichals absent; Australia *perkinsi* nov.
Ultimate section of fourth vein three times as long as penultimate section 4
4. Prescutellar acrostichals and small postverticals present; pale median area of mesoscutum containing two dark stripes posteriorly; Australia *striatum* nov.
Acrostichals and postverticals absent; mesoscutum without dark stripes in pale median area; New Guinea *fumipenne* Kertész
5. Thorax with dark median stripe only, otherwise yellowish; (arista missing in type); Philippines *palpale* Frey
Thorax with black median stripe and a black lateral mark connected with the black mesopleuron; pteropleuron, postnotum and scutellum also black; arista thickened, with long dense hairs; Philippines *hirsutisetum* Frey

Allometopon perkinsi sp. nov.

(Figs. 20-22)

♂. Head pale yellowish; upper part of occiput black; posterior part of frons greyish; ocellar spot black; third antennal segment brown on dorsal extremity. Thorax and legs very pale yellow, the latter unmarked; mesonotum brownish, broadly margined anteriorly, laterally and around scutellum with brown-black, the dark colour extending on to metanotum (metapleura or pleurotergite of some writers) and postnotum; pleura proper without markings. Bristles and hairs of head and thorax mostly yellowish-brown. Wings hyaline, with a greyish cloud on the anterior apical part. Abdomen black, with a yellowish-brown median dorsal stripe anteriorly; hairs black.

Head nearly as long as high; frons nearly two-fifths as wide as head; cheek in middle about one-fifth as high as eye, narrower anteriorly; postverticals absent; ocellars well developed; three fronto-orbitals, the first slightly shorter than, and the second slightly longer than, the third; interfrontals very short; vibrissae slightly longer than antennae (excluding arista); cheek hairs rather long, spreading horizontally; arista with longest hairs about as long as its basal diameter.

Thorax mostly shining and undusted, the scutellum finely pubescent on disc and sides; two strong dorsocentrals far behind suture, the posterior one longer; no acrostichals; a long supra-alar and postalar; a short weak posterior intra-alar; three pairs of scutellars, the apical pair much the longest; presuturals absent; one minute propleural setula; mesopleuron with fine pale setulae in addition to the strong bristle. Fore and middle femora with well developed series of postero-ventral bristles. Wings with ultimate section of fourth vein approximately five times as long as penultimate section.

Abdomen with surstyli broad, truncate, setulose on the distal posterior angle.

Dimensions : total length, 3.0 mm.; length of thorax, 1.3 mm.; length of wing, 3.0 mm.

Distribution : Queensland—south-east. Lamington National Park, October 29, 1955, F. A. Perkins (holotype ♂).

Location of type : Queensland Museum.

Allometopon striatum sp. nov.

♀. General colouring as described for *A. perkinsi*; bristles and some hairs black. Frons without greyish area posteriorly; occiput with a dark brown patch on each side of upper part, the two patches joined by a pale brownish area just above the occipital foramen; third antennal segment black on dorsal third. Scutellum dark brown; mesoscutum with a pair of dark brown bands posteriorly between the dorsocentrals and acrostichals. Wings with greyish cloud, as in *A. perkinsi*. Abdomen with second to fifth tergites dark brown, the fourth and fifth paler laterally; the more distal tergites, cerci and sternites pale yellowish.

Head structurally similar to that of *A. perkinsi*, but frons one-third the width of head, cheek near middle about one-seventh height of eye, and the prelabrum much more prominent (perhaps retracted in type of *perkinsi*); postverticals represented by fine hairs about half as long as ocellars; three fronto-orbitals, the first shorter than the other two, which are subequal, the second not much closer to the first than to the third; interfrontals very short and close together; arista as long as head, the longest hairs slightly longer than its basal diameter.

Thoracic chaetotaxy as described for *A. perkinsi*, but a pair of prescutellar acrostichals present, nearly half as long as posterior dorsocentrals. Fore femur with weak postero-ventral bristles on distal part. Wings with penultimate section of fourth vein approximately one-third as long as ultimate section of fourth and equal to ultimate section of fifth vein; sixth vein extending distinctly to three-quarters of the distance from anal cell to wing margin.

Abdomen with terminal segments short, largely retractile; cerci short, slender, haired.

Dimensions : total length, 3.0 mm.; length of thorax, 1.1 mm.; length of wing, 3.0 mm.

Distribution : Queensland—north-east. Kuranda, May 19, 1958 (holotype ♀), D. K. McAlpine.

Habitat : rain forest.

Location of type : Australian Museum.

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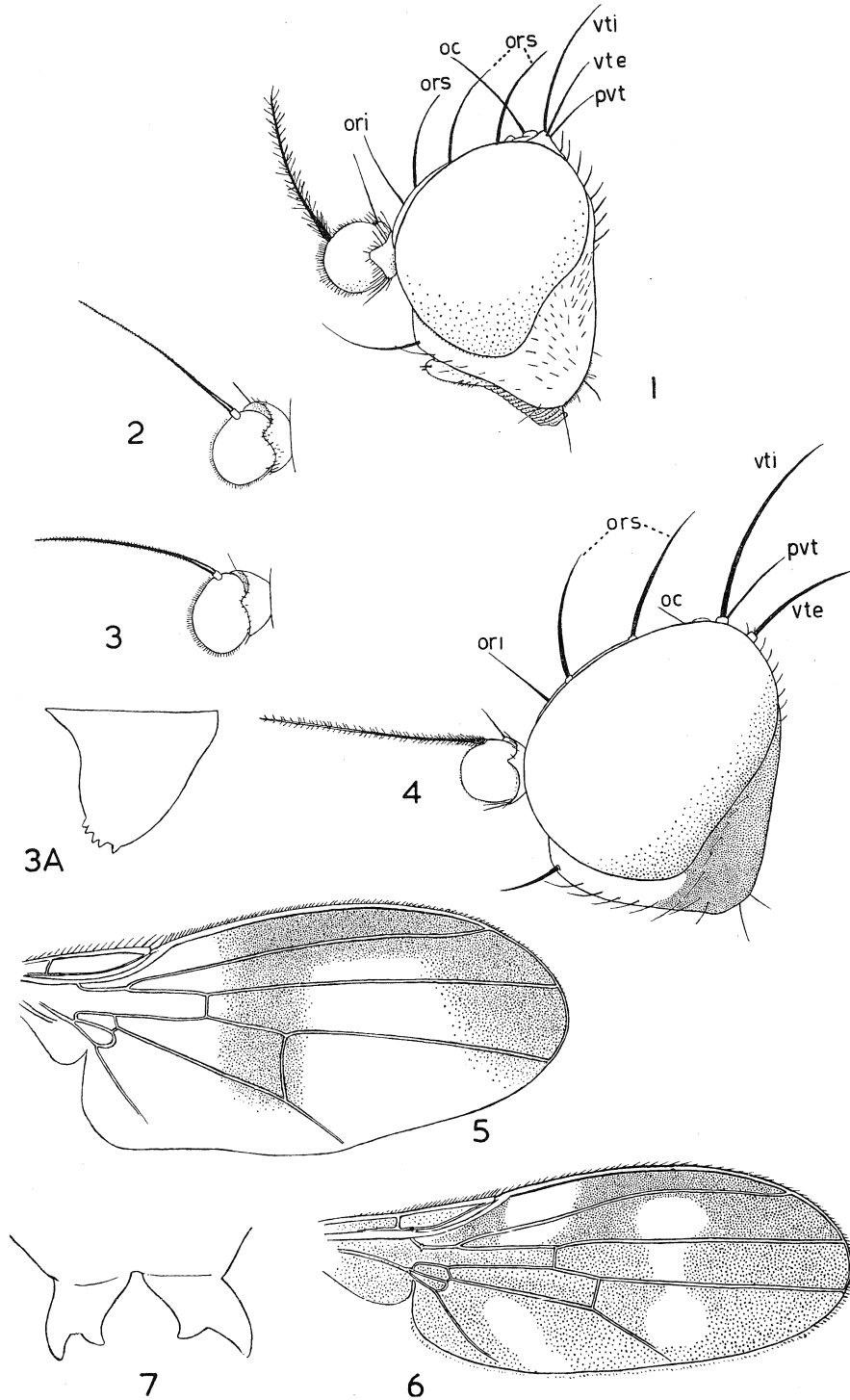
EXPLANATION OF FIGURES

1. *Tetrameringia ustulata* sp. nov. Lateral aspect of head of holotype.
2. *Heteromeria hardyi* sp. nov. Lateral aspect of antenna of paratype.
3. *H. laticornis* sp. nov. Lateral aspect of antenna of holotype.
- 3A. *H. laticornis*. Outer aspect of right surstylus of holotype.
4. *H. pulla* sp. nov. Lateral aspect of head of holotype.
5. *Tetrameringia ustulata* sp. nov. Wing of paratype.
6. *Heteromeria pulla* sp. nov. Wing of holotype.
7. *H. norrisi* sp. nov. Dorsal aspect of posterior respiratory horns, puparium of holotype.
8. *Clusiodes gladiator* sp. nov. Wing of holotype.
9. *C. gladiator*. Lateral aspect of head of holotype male.
10. *Parahendelia latifrons* sp. nov. Lateral aspect of head of holotype male.
11. *P. latifrons*. Anterior aspect of head of holotype.
12. Larva of undetermined clusiid from Mount Wilson, dorsal aspect.
13. Dorsal aspect of posterior respiratory horns of above.
14. *Czernyola delta* sp. nov. Left lateral aspect of postabdomen of holotype male.
15. *Parahendelia latifrons* sp. nov. Lateral aspect of left antenna of paratype female.

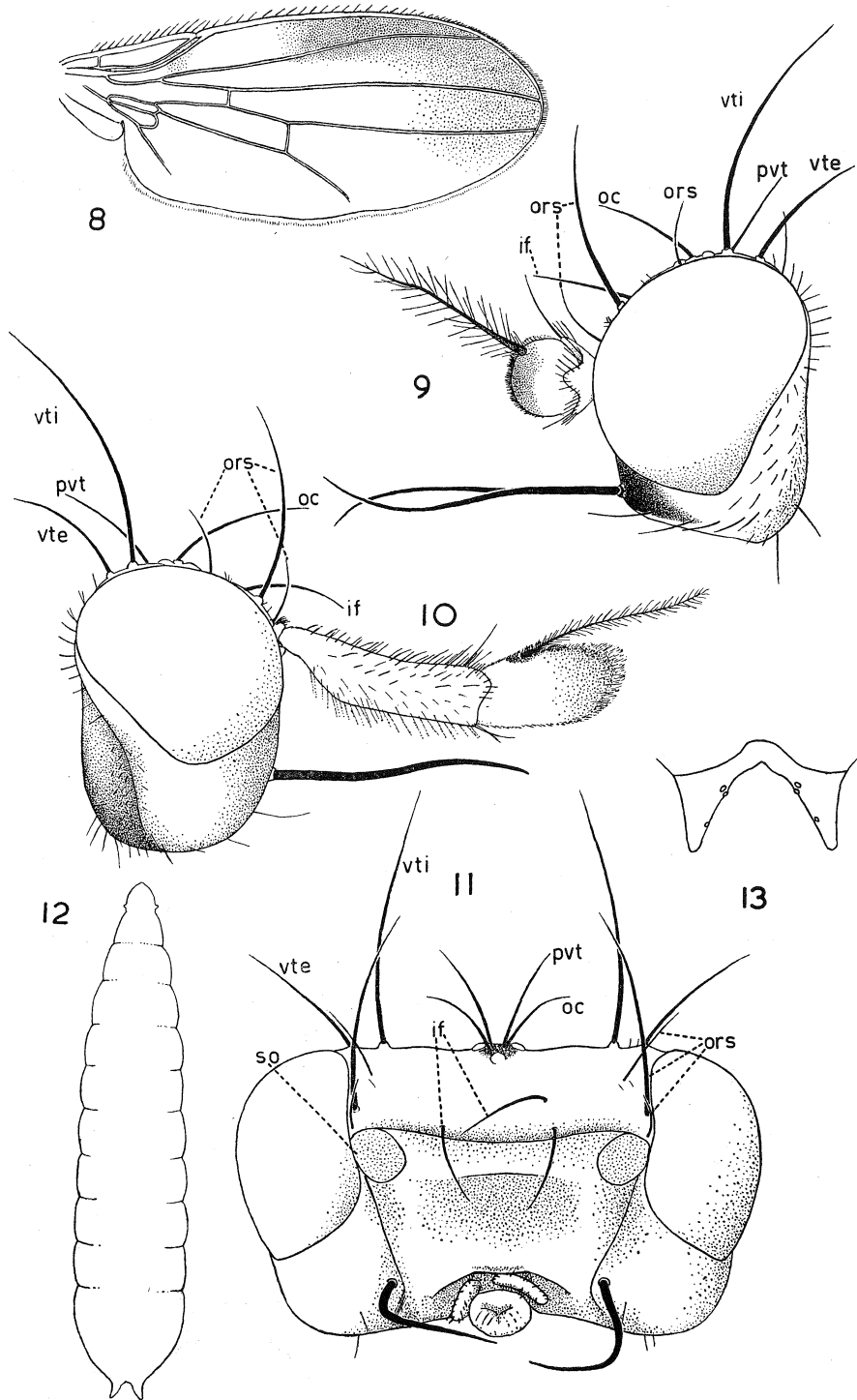
16. *P. nigriceps* sp. nov. Lateral aspect of head of holotype male.
17. *Czernyola palliseta pleuralis* Curran. Lateral aspect of head of male specimen from Lake Placid.
18. *C. palliseta pleuralis*. Anterior aspect of head of same specimen.
19. *C. australis* sp. nov. Lateral aspect of antenna of paratype.
20. *Allometopon perkinsi* sp. nov. Lateral aspect of head of holotype.
21. *A. perkinsi*. Anterior aspect of head of holotype.
22. *A. perkinsi*. Wing of holotype.
23. *Clusiodes gladiator* sp. nov. Left lateral aspect of postabdomen of male paratype. Setulae on sixth and ninth tergites omitted.
24. *Czernyola palliseta pleuralis* Curran. Outer aspect of left surstylus of specimen from Lake Placid, same aspect as in Fig. 14.
25. *C. palliseta pleuralis*. Posterior aspect of right surstylus of same specimen.
26. *Tetrameringia ustulata* sp. nov. Right lateral aspect of postabdomen of male paratype. Internal apodeme and structures on left side indicated by broken lines. Setulae on tergites and fifth and eighth sternites omitted.
27. *Heteromeringia spinulosa* sp. nov. Left lateral aspect of postabdomen of male paratype. Setulae on tergites and fifth and ninth sternites omitted.
28. *H. australiae* Malloch. Outer aspect of left surstylus of holotype.
29. *H. hypoleuca* sp. nov. Outer aspect of right surstylus of holotype.
30. *H. norrisi* sp. nov. Inner aspect of left surstylus of paratype.
31. *H. hardyi* sp. nov. Inner aspect of left surstylus of paratype.
32. *H. laticornis* sp. nov. Aedeagus of holotype.
33. *H. species A.* Inner aspect of right surstylus.
34. *H. pulla* sp. nov. Aedeagus of paratype.
35. *H. pulla*. Inner aspect of right surstylus of paratype.
36. *H. hardyi* sp. nov. Right lateral aspect of hypandrium.

ABBREVIATIONS USED IN FIGURES

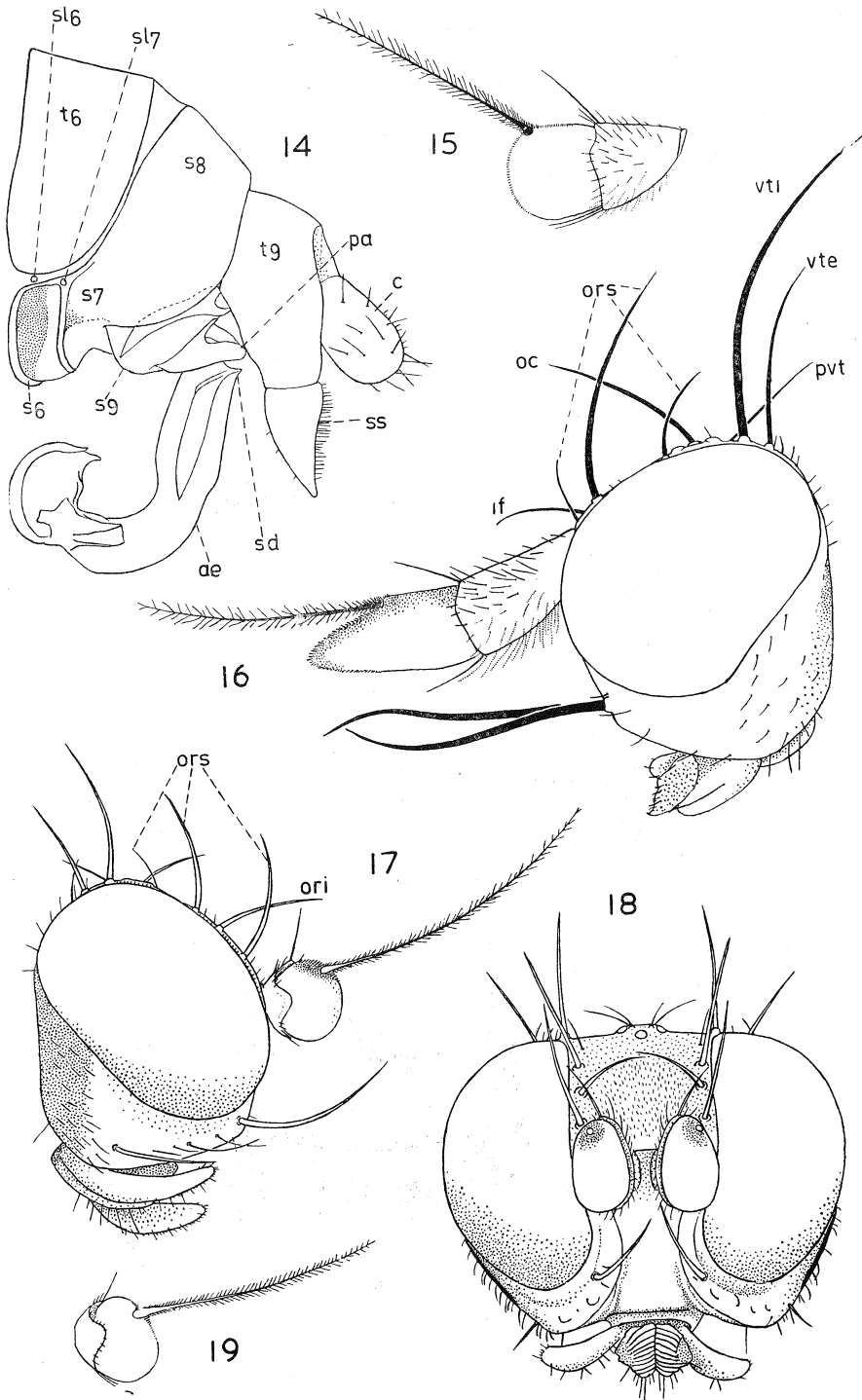
ae, aedeagus. ap, apodeme of aedeagus. b, blade of surstylus. ba, anterior branch of distal fork of aedeagus. bp, posterior branch of above. c, cerci. if, interfrontal bristles. lo, lobes of aedeagus. oc, ocellar bristles. ori, incurved fronto-orbital bristles. ors, reclinate fronto-orbital bristles. pa, parameres. pb, phallobase. pg, proctiger. pvt, postvertical bristles. s, sternite (numbered to correspond with abdominal segmentation). sd, spinus ditillatorius. sl, spiracle of left side (numbered as sternites). so, socket of antenna. sr, spiracle of right side (numbered as sternites). ss, surstyli. t, tergite (numbered as sternites). tf, terminal filaments of aedeagus. vte, outer vertical bristles. vti, inner vertical bristles.



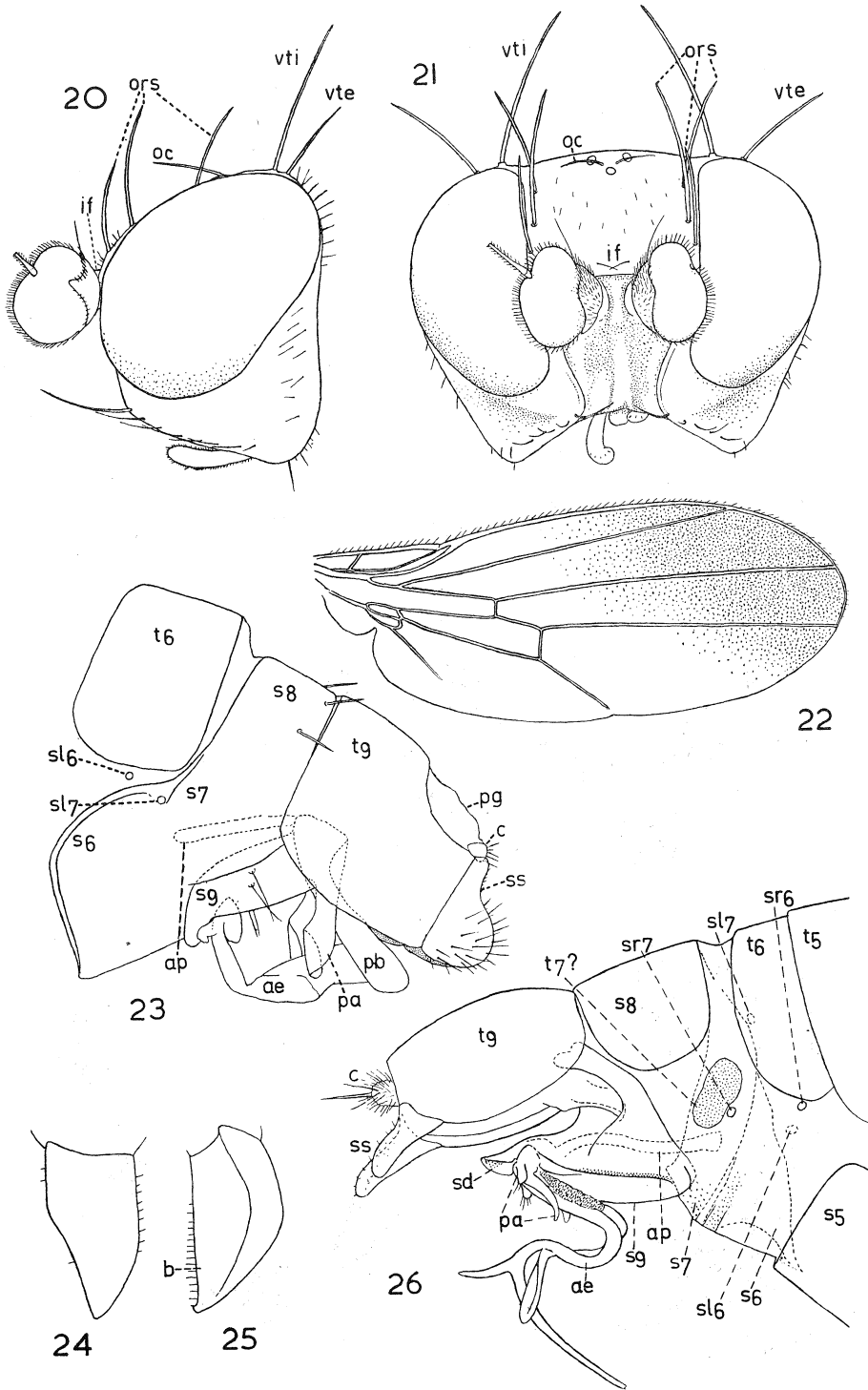
Figs. 1-7.



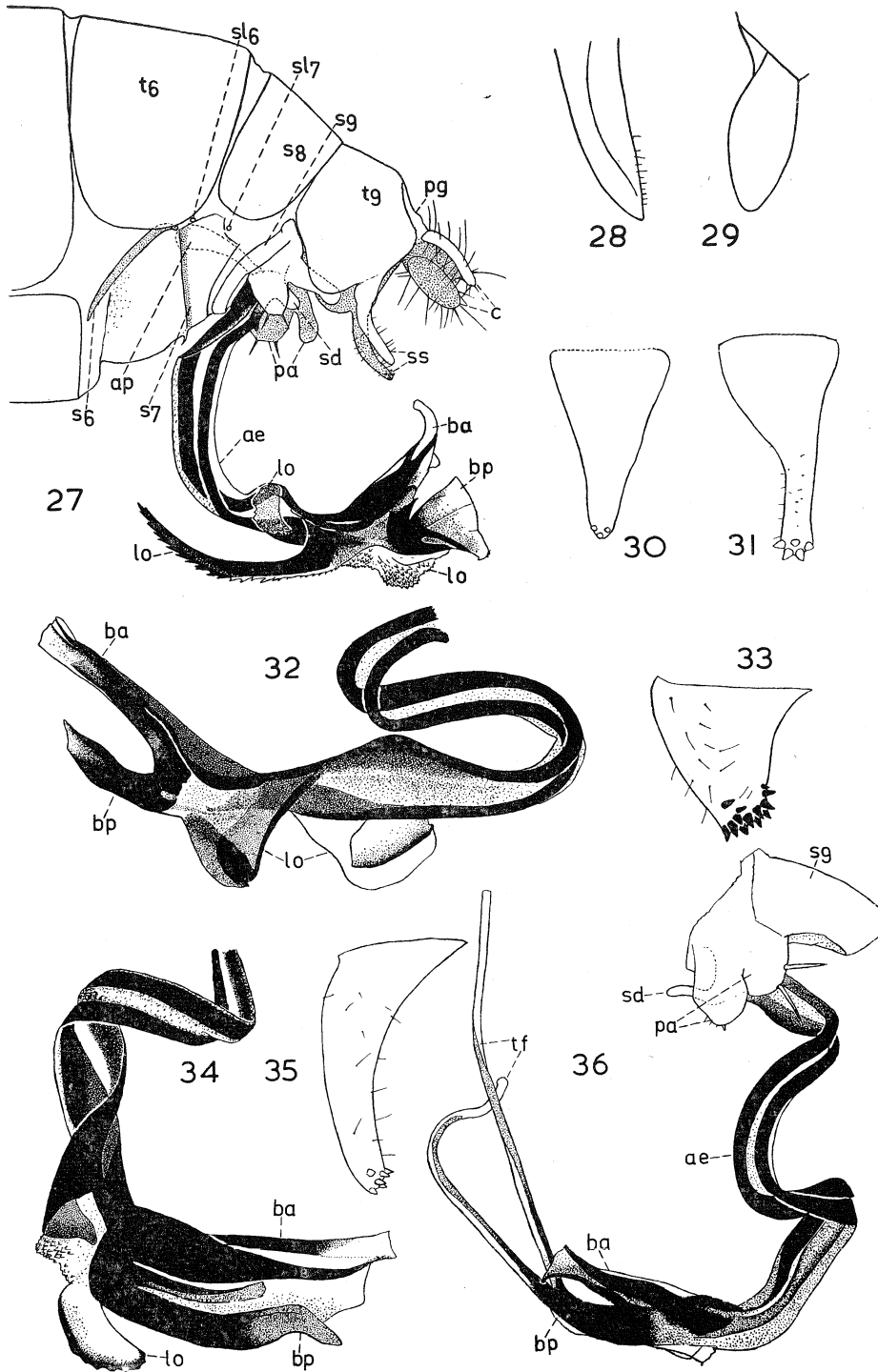
Figs. 8-13.



Figs. 14-19.



Figs. 20-26.



Figs. 27-36.