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The Australian Genera of Heleomyzidae (Diptera: Schizophora) and a Reclassification of the Family into Tribes

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ABSTRACT. The 16 Australian genera of Heleomyzidae are characterised, five genera, together with their type-species, being described as new. A key to the Australasian genera is given.

The classification of the Heleomyzidae is discussed and the family is defined to include the following families recognized by some recent authors: Borboropsidae, Chiropteromyzidae, Cnemospathidae, Heteromyzidae, Notomyzidae, Rhinotoridae, Trixoscelididae. The living genera of Heleomyzidae (about 65, but additional genera recognized by some) are classified into 22 tribes of which 12 are newly described. The geographic distribution patterns of the tribes are given. A new genus and species from Chile is described. A key to the neotropical genera and a partial key to the palearctic genera are appended.

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KEYWORDS: taxonomy, Diptera, Heleomyzidae, world tribes, Australian genera, neotropical genera, zoogeography.

Contents

The first modern systematic treatment of the Heleomyzidae is that of Czerny (1924). This work was written when the south-temperate fauna was almost unknown, and it covers few genera outside the tribes Heleomyzini and Suilliini. The later review of the palearctic Heleomyzidae (Czerny, 1927a) follows Malloch in adding *Trixoscelis* to the family. Malloch (1933) covered the Heleomyzidae of temperate South America. Hennig (1969) gave further information on this fauna, and Gill (1968) listed the neotropical forms, with the exception of the higher rhinotorines, which were listed by Papavero (1972). Gill (1962) treated part of the North American Heleomyzidae. Harrison (1959) treated the New Zealand forms, and Cogan (1971) the African forms.

There has been no comprehensive review or listing of the Australian Heleomyzidae. Certain Australian genera are treated by McAlpine (1967, 1968) and McAlpine & Kent (1982).

There are about 67 Australian species of Heleomyzidae available to me in collections, of which 48 are described with publication of the present work. It is an aim of this work to characterise the 16 genera in which these species are placed.

It is, further, my aim to set forth conclusions, resulting from some years' study of heleomyzid genera of the world, in the form of a reclassification showing the apparent relationships between genera. In this connection I have examined representatives of all world genera except *Porsenus* and several of the tribe Heleomyzini. As I have made a broadly based study of neotropical heleomyzids, I append a key for their generic identification. Because the non-heleomyzine genera of the palearctic region need clarification, I also give a key to these.

The morphological terminology is that used by me previously (McAlpine, 1973). Some special terminology will be explained below.

Names of institutions housing material examined are abbreviated as follows:

AM	Australian Museum, Sydney.
ANIC	Australian National Insect Collection, Canberra.
BM	British Museum (Natural History), London.
CNC	Canadian National Collection, Agriculture Canada, Ottawa.
MNM	Hungarian National Museum, Budapest.
PM	Muséum National d'Histoire Naturelle, Paris.
SPHTM	Commonwealth Institute of Health, University of Sydney, Sydney.
USNM	National Museum of Natural History, Washington, D.C.

Key to Australasian Genera of Heleomyzidae

1. Mesopleural bristle strongly developed; 3 strong reclinate fronto-orbital bristles present. 2

——Mesopleural bristle absent or weak; 1 or 2 fronto-orbital bristles present. 5

2. Preapical dorsal tibial bristles absent; costa beyond vein 1 without spaced spines; postfrons of male narrowed. ..... *Waterhouseia*

——Each tibia with 1 preapical dorsal bristle; costa beyond vein 1 with short spaced spines among the setulae; postfrons not sexually dimorphic. 3

3. Sternopleural bristles 2; marginal cell with crossveins. ..... *Xeneura**

——Sternopleural bristle 1; marginal cell without crossveins. 4

4. Dorsocentral bristles 0+3. ..... *Fenwickia**

——Dorsocentral bristles 1+3. ..... *Aneuria**

5. Vein 7 visible as a fold in membrane beyond alula; vein 6 usually extending to wing margin, though faint apically. 6

——Vein 7 absent; vein 6 not extending to margin. 11

6. Scutellum bare, except for 2 pairs of marginal bristles. 7

——Scutellum haired or setulose. 9

7. Face uniformly sclerotized across whole width on upper part, where it is deeply excavated; subcosta and vein 1 not distinctly divergent distally. ..... *Ollix*

——Face with pair of sclerotized lateral plates separated by a desclerotized or weakly sclerotized median strip; subcosta and vein 1 strongly divergent distally. 8

8. Pteropleuron setulose; 4 pairs of dorsocentral bristles present. ..... *Pseudoleria*

——Pteropleuron bare; 3 pairs of dorsocentral bristles present. ..... *Tephrochlamys**

9. One or 2 pairs of dorsocentral bristles present; all femora with thick ventral spines; face uniformly sclerotized. ..... *Tapeigaster*

——Four or more pairs of dorsocentral bristles present; femora without such spines, though often with ventral bristles; face not uniformly sclerotized. 10

10. Lateral facial plates forming a pair of deeply concave oval pits on upper part of face, not extending to near vibrissae; 4 or more upper sternopleural bristles in a horizontal series. ..... *Amphidysis*

——Lateral facial plates not forming such pits, reaching narrowly to level of vibrissae; one strong upper sternopleural bristle present. ..... *Aecothea*

11. Mid tibia with one to 3 anterior bristles and a pair of approximated preapical dorsal bristles; costa without spaced spines. ..... *Borboroides*

——Mid tibia without anterior bristles, except for the terminal to subterminal ones. 12

12. One or 2 dorsocentral bristles; preapical dorsal tibial bristle often weak or absent; costa not spinose. 13

——Three to 5 dorsocentral bristles; preapical dorsal tibial bristles present; costa sometimes spinose. 15

13. Subcosta incomplete, not nearly reaching costa; scutellum not haired; wing without markings. ..... *Heleomicra*

——Subcosta complete; scutellum haired; wing spotted. 14

14. Vertex of head not excavated; vibrissa absent; mesopleuron not haired. ..... *Zentula*

——Vertex broadly excavated; vibrissa developed as the foremost member of series of cheek bristles; mesopleuron haired. ..... *Cairnsimyia*

15. Mid tibia with one preapical dorsal bristle and no other bristles except the terminal ones; propleural bristle long and strong; dorsocentrals 1+4. ..... *Pentachaeta*

——Mid tibia with more than one bristle; propleural short and weak, often minute; dorsocentrals 3 or 4. 16

16. Some well developed acrostichal bristles present in addition to the prescutellar pair; mid tibia with one preapical dorsal bristle and one or two posterodorsal bristles on distal third; costa not spinose. ..... *Prosopantrum*

——At most only the prescutellar acrostichals present; mid tibia with two approximated preapical dorsal bristles and no posterior bristles; costa usually with short spaced spines. 17

17. Scutellum bare (except for the 2 pairs of major bristles). 18

——Scutellum haired or setulose. 20

18. Scutellum broadly rounded; arista plumose (bipectinate as in *Drosophila*). ..... *Allophylina**

——Scutellum more elongate, ovate-triangular; arista with very short hairs only. 19

19. Dorsocentrals 0+3; mesopleuron bare; wings with small markings on cross-veins only. ..... *Leriopsis*

——Dorsocentrals 1+2; mesopleuron setulose; wings with extensive blackish markings. ..... *Trixoleria*

20. Prosternum setulose; base of radial vein with one or 2 fine posterior setulae on dorsal surface near humeral crossvein; scutellum with a few fine hairs; (dorsocentral bristles 0+3). ..... *Allophylopsis**

——Prosternum bare; base of radial vein bare; scutellum with rather coarse setulae. 21

21. Dorsocentrals 0+3; mesopleuron setulose. ..... *Austroleria*

——Dorsocentrals 1+3; mesopleuron bare. ..... *Diplogeomyza*

*Genus occurs in New Zealand but is not known from Australia, and is, therefore, not treated further in this paper.

Genus *Pseudoleria* Garrett

Pseudoleria Garrett, 1921: 128. Type-species *Blepharoptera pectinata* Loew.

This genus is native to North America, but at least two species are introduced in south-temperate countries, including Australia (McAlpine, 1984).

Genus *Aecothea* Haliday

Aecothea Haliday, 1838: 137. Type-species (monotypy) *Helomyza fenestralis* Fallén.

Neoecothea Peterson & Gill, 1982: 219. Type-species *Helomyza fenestralis* Fallén. New synonym.

This genus has long been known by the name *Aecothea*, or its variant *Oecothea*, on the basis of Haliday's publication alone. This usage has been recently disputed (Thompson & Mathis, 1980; Peterson & Gill, 1982), on somewhat confused grounds. These authors appear to agree that *Oecothea* Curtis, 1837, is unavailable, as it was introduced in synonymy, but then regard Curtis's publication as the original publication for purposes of type designation for the genus *Oecothea* (or *Aecothea*) Haliday. Further, *Oecothea* Curtis was, until 1980, a *nomen oblitum*.

Proposed alterations to the International Code may partly overcome the objections to availablility of *Oecothea* Curtis, but Thompson & Mathis designate as its type-species *Leria subterranea* Robineau-Desvoidy which is currently a *nomen dubium* (B.H. Cogan *in litt.*)

It is further possibile that an objection should be raised to the use of *Neoecothea* as an alternative name to *Aecothea*. Peterson & Gill (1982) announced their new name in the title of their work thus: "*Neoecothea*, a New Name for *Oecothea* (Diptera: Heleomyzidae)". Though the following text is at variance with the view that *Neoecothea* is a new name for *Oecothea*, the title might be considered a statement in itself. Such a conflict is resolved by Art. 67(i) of the International Code, which gives the type of the new generic name as the same as that of the name it replaces, "despite any statement to the contrary". Therefore, if the designation by Thompson & Mathis (1980) of *Leria subterranea* as type of *Oecothea* be acceptable (a doubtful point), then that is also the type of *Neoecothea*, the two names being objective synonyms.

Because a final decision on the name of the genus cannot be made at present, I continue to use the name *Aecothea* Haliday in accordance with predominant usage.

Aecothea fenestralis (Fallén) is an introduced European species, found in Tasmania and the mountains of New South Wales.

Genus *Tapeigaster* Macquart

Tapeigaster Macquart, 1847: 86–87 (in reprint). Type-species *T. annulipes* Macquart.

Sciomyzoptera Hendel, 1917: 46–47. Type-species *S. annulata* Hendel.

This is a genus of 11 known species endemic in temperate Australia. There is a recent revision by McAlpine & Kent (1982). The larvae live in fructifications of fungi and have been described by McAlpine & Kent.

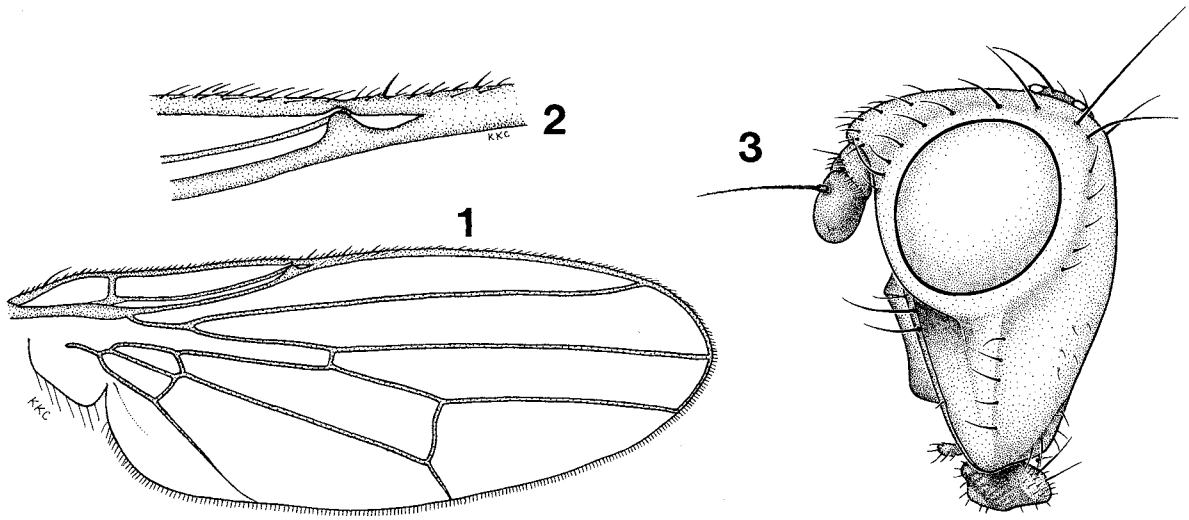
Ollix n. gen.

Type-species. *Ollix cogani* n.sp.

Description (female). Rather small flies of medium build. Male unknown.

Head obliquely triangular in profile, prolonged below; inner vertical bristles situated in front of outer verticals; postverticals convergent; 2 fairly strong upper fronto-orbital bristles directed outwards and forwards; in front of these a series of proclinate orbital setulae, sometimes intergrading with bristles, one of the foremost setulae larger than the others and incurved; central part of postfrons anteriorly with numerous proclinate setulae; face short, uniformly sclerotized, deeply excavated except for narrow lower marginal zone, with a slight linear median keel within concavity; vibrissa subtended by a strong bristle, sometimes a setula located just above vibrissa (on one side of one specimen); postgena with a vertical series of setulae; no other stong bristles on cheek region. Antenna deflexed from articulation between segments 1 and 2; segment 1 setulose above; segment 3 rounded oval, with arista inserted slightly before middle; segment 5 of arista short, strongly swollen; segment 6 minutely pubescent on its whole length, only slightly swollen basally. Prelabrum rather weakly developed, well removed from face; palpus and proboscis short.

Thorax with the following bristles: propleural, 3 sternopleurals, humeral, prescutellar acrostichal, 1+1 notopleurals, prescutellar acrostichal, 1-2+4-5 dorsocentrals, supra-alar, postalar, intra-alar; prostigmatal and mesopleural bristles absent; propleuron and mesopleuron without hairs; intradorsocentral setulae in 4 rows anteriorly, becoming irregular posteriorly; scutellum short, broad, convex,



Figs 1–3. *Ollix cogani* n.sp. **1**, wing. **2**, stigmatal region of wing. **3**, head.

without hairs; prosternum oval, very small, deeply grooved medially, pubescent. Fore femur with series of dorsal bristles; hind femur with one or 2 anterodorsal bristles distally; femora otherwise without differentiated bristles; tibiae each with one preapical dorsal bristle, shortest on fore tibia; all tarsi slender, somewhat depressed distally. Costa with few spines, not strongly differentiated from hairs, both before and beyond termination of subcosta; subcosta strongly developed throughout, immediately before its termination in the costa touching the node-like preapical expansion of vein 1; vein 2 long, diverging from vein 3 distally; anal crossvein recurved, making the posterodistal angle of anal cell obtuse; vein 6 reaching margin, curved apicad distally; vein 7 weak and almost unpigmented but visible under suitable lighting.

Abdomen pyriform, with segments behind segment 6 slender and folding telescopically; segment 6 shorter than preceding segments; segment 7 cylindrical, with separate tergite and sternite; cerci rather slender, haired.

Discussion. *Ollix*, like *Amphidysis*, appears to be monotypic and endemic to Western Australia.

The relationships of the genus are obscure. In Malloch's (1933) key to the temperate South American heleomyzid genera, *Ollix* runs imperfectly to *Epistomyia*, to which it is probably not closely related. It differs from *Epistomyia* in the bowl-like concavity of the face, the reduced prelabrum, vein 6 reaching the margin (in *Epistomyia* vein 6 does not end as close to the margin as Malloch's description would seem to indicate), the presence of vein 7, and absence of anterior bristles on the mid femur.

There is a possibility that *Ollix* is related to *Tapeigaster*, but some points of resemblance appear to be due to symplesiomorphy. *Ollix* and *Tapeigaster* are the only Australian native genera with complete vein 6 and visible vein 7, except for *Amphidysis* which differs from both in having 2 separate facial sclerites. *Ollix* differs from *Tapeigaster* in the shape of the head, the structure of the face, the outwardly inclined fronto-orbital bristles, the presence of a propleural bristle, the more numerous sternopleural and dorsocentral bristles, the absence of hairs on the scutellum, the absence of ventral spines on the femora, the presence of costal spines, the proximity of the subcosta to vein 1 distally, and the more slender and extensile terminal abdominal segments of the female.

On the other hand there is a possibility of relationship to *Amphidysis* and thus to the Diaciini in general, if that tribe be correctly constituted. The facial region of *Ollix* differs from that of *Amphidysis* in having the sclerotized part undivided, but resembles that of *Diacia*, a neotropical genus of Diaciini, quite closely in that the sclerotized part is deeply concave with a linear median carina. The well spaced costal spines, though rather weak in *Ollix*, are unlike any form of costal armature known in the Diaciini. The structure of the distal part of vein 1 in *Ollix*, with its peculiar node meeting the subcosta, is unlike that of any other heleomyzid genus available to me.

Etymology. The generic name is from the Greek ολλιξ, drinking bowl, in reference to the structure of the face, and is feminine.

Ollix cogani n.sp.

Figs 1–3

Description (female). *Coloration*: entire insect pale fulvous, with black bristles and major setulae. Wing membrane faintly tinged with yellow, without markings. Base of abdomen darkened in paratype only (perhaps discoloured).

Dimensions: total length 2.7–3.0 mm; length of thorax 1.1–1.3 mm; length of wing 3.1–3.5 mm.

Distribution. Western Australia – south-west district, north of Perth.

HOLOTYPE ♀. Dongara, 23viii–5ix1935. R.E. Turner (BM, 1935-240).

PARATYPE. Same data, 1 ♀ (AM).

Amphidysis n.gen.

Type-species. *A. hesperia* n.sp.

Description. Slightly elongate flies of medium size, with somewhat the appearance of typical north-temperate heleomyzines, but lacking spaced costal spines.

Head: postfrons forming an acute angle with face in profile; cheek broad; occiput broadly convex; ocellar and postvertical bristles long; antennal segment 2 short, but somewhat narrowed basally as in *Tapeigaster*; segment 3 rounded oval, only slightly decumbent; arista arising from near middle of dorsal surface of segment 3, long, slender, completely bare; prelabrum very narrowly developed.

Thorax with the following bristles: 2+3 dorsocentrals, humeral, presutural, 2 notopleurals, 2 anterior intra-alars, posterior intra-alar, postalar, 2 pairs of long scutellars and several long scutellar setulae, 2 long propleurals and a few setulae between them, 5 sternopleurals together with some setulae and longer ventral hairs on sternopleuron; pleura otherwise without hairs or setulae; the following bristles absent: prescutellar acrostichal, prostigmatal, mesopleural; scutellum short, subtriangular; prosternum rather narrow, with a few long hairs. Femora stout; fore femur with dorsal and posteroventral bristles; mid femur with weak anteroventral and posteroventral series of bristles, and 2 or more preapical posterior bristles, with anterior bristles weakly differentiated; hind femur with short oblique series of anterodorsal bristles; each tibia with one preapical dorsal bristle and no other strong bristles except the terminal ones. Costa with subcostal break consisting of a constriction rather than a deep incision; subcosta well separated from vein 1 distally, but only slightly diverging from it; anal cell acute distally, with anal crossvein slightly indented; vein 6 reaching margin, its apical part slightly curved basad; vein 7 rather long but, as usual, weakly sclerotized.

Abdomen (female): terminal segments elongate, folding telescopically; cerci somewhat elongate.

Etymology. The name *Amphidysis* is derived from the Greek αμφιδυσις, a double cup, in reference to the facial structure, and is feminine.

Discussion. *Amphidysis* differs from all other heleomyzid genera except *Dichromya* in the structure of the face as indicated in the key to tribes. It differs from *Dichromya* in the bare arista, less reduced eyes, duplication of the propleural (proepisternal) bristle, absence of the prostigmatal (proepimeral) bristle and of mesopleural setulae, much longer dorsocentral and marginal scutellar bristles, narrow prosternum, differently shaped anal cell, complete vein 6, long, curved vein 7, and long, extensile terminal segments of the female abdomen. Further, it seems improbable that the female of *Amphidysis* is viviparous, as is that of *Dichromya*, judging from the meagre material of the former.

Amphidysis is monotypic, as far as is known.

Amphidysis hesperia n.sp.

Figs 4-9,42,73

Description. *Coloration*: head orange-fulvous with pale pruinescence posteriorly; upper half of occiput and ocellar triangle grey; a black, non-pruinescent spot on each side of vertex between inner vertical and postvertical bristles. Thorax and abdominal tergites black, with ground-colour entirely concealed by dense grey pruinescence tinged with yellow in parts. Coxae and femora grey; trochanters brown; tibiae fulvous, browned apically, the hind one most strongly so; tarsi fulvous, with apical segment greyish brown. Thoracic bristle and hairs predominantly black; many of the longer ventral hairs yellowish, including those on femora. Wing membrane unpigmented. Haltere pale fulvous.

Male postabdomen: sternites 6 and 7 large, obliquely placed; segment 6 with supernumerary sclerite (X in Fig. 73) on left side; spiracles of segment 6 and at least left one of segment 7 in membrane (right spiracle 7 not found in the single preparation); surstylus very obtuse, incompletely articulated with epandrium; hypandrium with one pair of bidentate gonites, anteriorly with a small gibbosity on each side bearing 3 setulae; basiphallus short, well sclerotized; distiphallus large, elongate, with basal collar and 2 short sub-basal processes, slender for much of length beyond collar with pair of longitudinal pigmented strips, distally expanded into a partly scabrous bulb; aedeagal apodeme not examined; cerci short, rounded, separate.

Dimensions: total length, ♂ 4.9-5.4 mm, ♀ 5.1-7.1 mm; length of thorax, ♂ 1.9-2.3 mm, ♀ 2.1-3.0 mm; length of wing, ♂ 4.9-5.2 mm, ♀ 5.5-7.1 mm.

Distribution. Western Australia - south-west district from vicinity of Perth southwards.

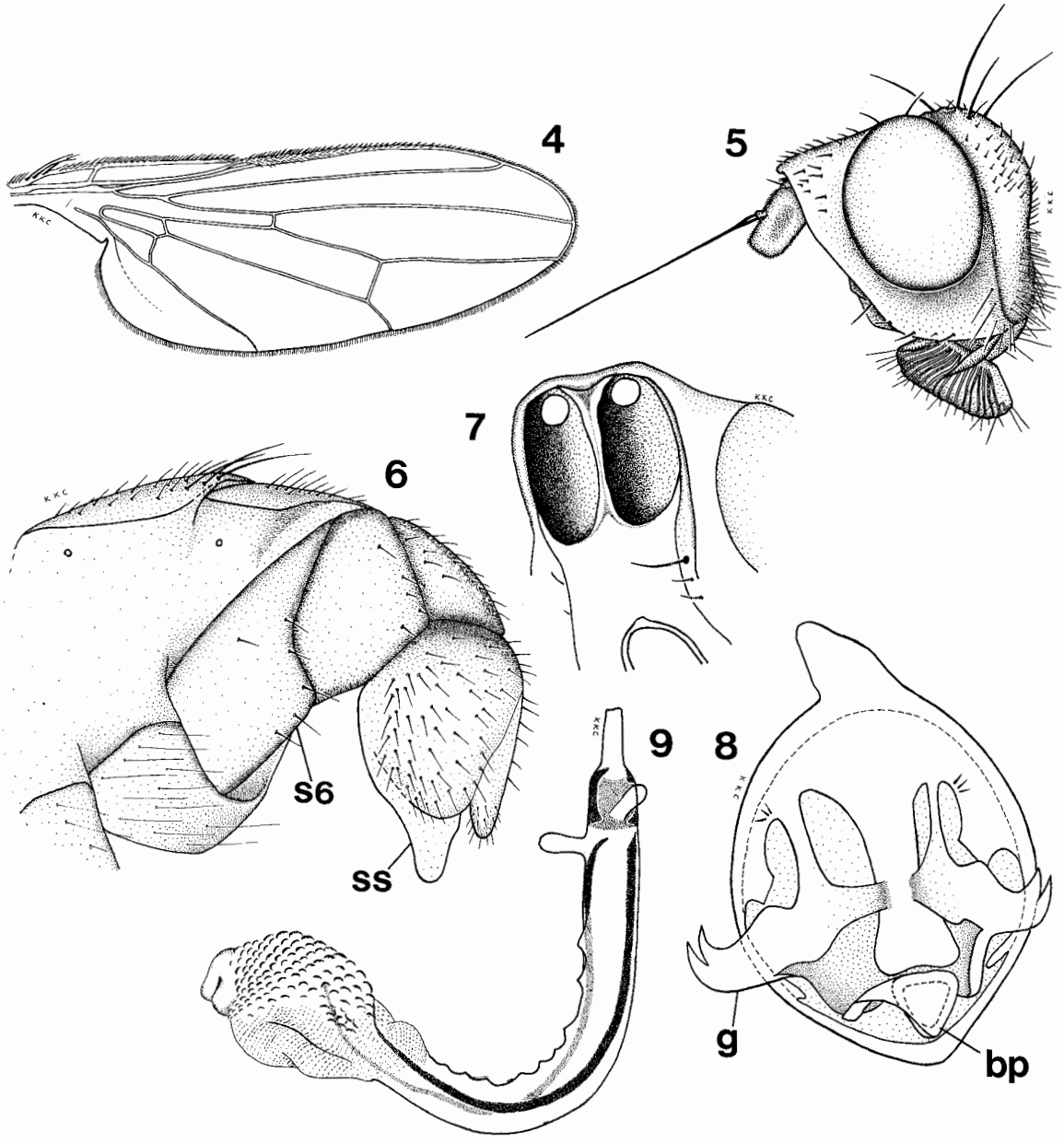
HOLOTYPE ♂. Nedlands, near Perth, light trap, 17vi1959, M.M.H. Wallace (ANIC).

PARATYPES. Quilergup, E of Busselton, vii,viii1976, S.J. Curry, 1 ♂, 2 ♀ (AM, ANIC).

Genus *Prosopantrum* Enderlein

Prosopantrum Enderlein, 1912: 135. Type-species *P. austrinum* Enderlein (= *Agromyza diademata* Bigot).
Acrostichalia Tonnoir & Malloch, 1927:86. Type-species *A. flavifrons* Tonnoir & Malloch.
Cnemospathis Enderlein, 1938: 655. Type-species *C. baeckstroemi* Enderlein (= *A. flavifrons* Tonnoir & Malloch).

This genus is indigenous to temperate South America, 12 species being listed by Gill (1968). One of these species, *P. flavifrons* (Tonnoir & Malloch, 1927), is widespread in temperate parts of the southern hemisphere, presumably through human activities. It appears that all specimens collected outside the native



Figs 4–9. *Amphidysis hesperia* n.sp. **4**, wing (alula not visible). **5**, head. **6**, male postabdomen (oblique left lateral aspect, with asymmetrically placed genital segment in direct lateral aspect). **7**, facial region (antennae omitted). **8**, hypandrium (distiphallus removed). **9**, distiphallus (to half scale of Fig. 8). **bp**, basiphallus. **g**, gonite. **ss**, surstylus. **s6**, sternite 6.

haunts of this species are females, and, as noted by Cogan (1971), these introduced populations may be entirely parthenogenetic.

The only Australian specimens of *P. flavifrons* that I have seen are from Tasmania (AM, ANIC).

Cogan (1971) records that label data indicate an association with faecal matter and carrion.

Genus *Leriopsis* McAlpine

Leriopsis McAlpine, 1967: 76. Type-species *L. montana* McAlpine.

This is an apparently monotypic genus, inhabiting highlands of Tasmania and Victoria, and the Snowy Mountains of New South Wales. It is common at higher altitudes in Tasmania in summer, particularly in forests of deciduous beech (*Nothofagus gunnii*), but has been seldom collected in other states.

Genus *Trixoleria* McAlpine

Austroleria McAlpine, 1967: 80. Type-species *A. extensa* McAlpine.

This apparently monotypic genus is widely distributed in southern Australia. *Trixoleria maculata* is here recorded from Western Australia for the first time

(Crowea State Forest, ANIC).

Genus *Austroleria* McAlpine

Austroleria McAlpine, 1967: 80. Type-species *A. extensa* McAlpine.

Austroleria includes 2 known species, widely distributed in southern Australia but possibly absent from Western Australia. The presence of *A. extensa* on Kangaroo Island, South Australia (AM), extends the recorded distribution of the genus to that state.

Genus *Diplogeomyza* Hendel

Diplogeomyza Hendel, 1917: 38. Type-species *D. diaphora* Hendel.

A genus of about 18 species, 15 already described, found in temperate Australia and extending into tropical Queensland on the highlands. I have previously revised the genus (McAlpine 1967).

Genus *Borboroides* Malloch

Borboroides Malloch 1925: 85. Type-species *B. atra* Malloch.

This genus was originally placed in the Borboridae (Sphaeroceridae), but has not the diagnostic characters which separate that family from the Heleomyzidae, and the larger species lack the superficial resemblance to sphaerocerids present in the minute type-species.

I interpret the genus broadly to include about 9 species in available collections. These show such a range of variation that I formerly inclined to place the species in 3 genera. In view of the intermediate characters of some species, I now recognize one polytypic genus. More material will be required, particularly from Victoria and Tasmania, to make a satisfactory revision possible.

Borboroides atra, the only species of the genus yet described, is smaller than most species, and has dorsocentral bristles reduced to one or 2 pairs (commonly 3 pairs in other species), the discal cell compact and bounded posteriorly by a strongly curved section of vein 5, the fronto-orbital bristles in two subequal pairs strongly flexed outwards, the mesopleuron setulose, and the protandrium symmetrical (Fig. 81) (asymmetrical in other species examined: Fig. 80). The species lies near the extreme of a range of variation rather than in an isolated position within the genus.

With the exception of the widespread *B. atra* (southern Queensland to Tasmania and possibly south-western Australia), the species of *Borboroides* are found mainly in cool, mountain *Eucalyptus* forest (but not temperate rainforest as is favoured by *Diplogeomyza* species), and adults are found mainly in spring and autumn.

Heleomicra n.gen.

Type-species. *Heleomicra collessi* sp. nov.

Description. Minute blackish flies superficially resembling the smaller species of *Borboroides* (e.g. *B. atra* Malloch), having the general characters given below for the tribe Borboroidini.

Head: higher than long; postfrons with few minute hairs only; the 2 fronto-orbitals strong, subequal, directed outwards, posterior one sloped backwards, anterior one sloped forwards; face sclerotized, slightly concave, with rounded transverse ridge along lower margin; cheek with 2 series of bristles or setulae behind vibrissa. Antenna somewhat decumbent; segment 1 vestigial; segment 2 rather short and not overlapping segment 3 dorsally.

Thorax: mesopleuron without setulae; one sternopleural present; humeral and presutural bristles weak but distinct; one dorsocentral situated in front of line of postalar bristles; acrostichals absent; intra-alar bristle reduced; mesoscutum with rather numerous setulae centrally, some of which are longitudinally aligned with dorsocentral bristles. Fore femur with long posterodorsal and shorter posteroventral bristles; mid femur with an anterior bristle near middle and a smaller one near apex; hind femur without strong bristles; tibiae without bristles, except for one anterior and one ventral terminal spur on mid tibia. Costa not visibly weakened just beyond humeral crossvein, with inconspicuous subcostal break; without spines among the hairs; subcosta distally obsolete, not merging with vein 1, though the distal dilation of the latter may give the impression of a double vein from some angles; veins 2 and 3 subparallel distally, forking distinctly before level of discal cell; anal cell obtusely angular posterodistally, wider than first basal cell at level of fork of veins 2 and 3; vein 6 short, not much curved.

Male postabdomen (Fig. 82): tergite 6 reduced in size but sclerotized; sternites 6 and 7 much reduced, located on left side and connected to the large dorsal sternite 8; left spiracle 7 situated within compound sternite (spiracles of right side not seen); genital segment short and broad, not constricted anteriorly as in *Borboroides*; surstylus basally articulated; aedeagus with large, elongate, scoop-like basiphallus; distiphallus with complex sclerotization, folding into groove on anterior face of basiphallus; cerci separate.

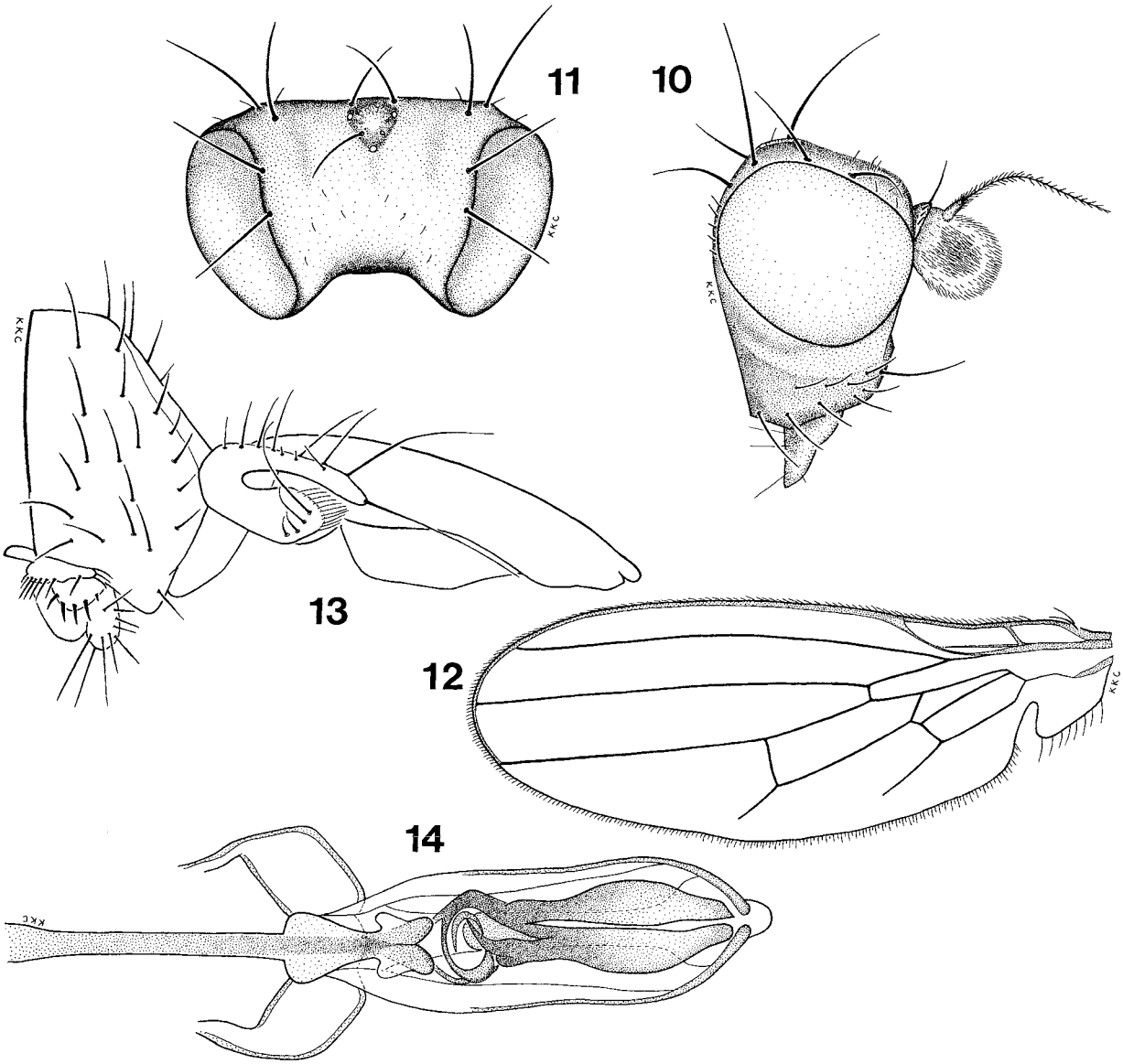
Female postabdomen folding telescopically, with segments behind segment 5 progressively reduced in size; segment 7 with separate tergite and sternite; cerci elongate, separate.

Discussion. This is a genus of at least 2 species. They are known from New South Wales, Victoria, Tasmania, and South Australia, but have been seldom collected. One specimen was collected together with numerous specimens of the superficially similar *Borboroides atra* on a skinned, drying kangaroo carcase in dry sclerophyll forest.

Heleomicra collessi n.sp.

Figs 10–14

Description. *Coloration*: head brown-black; anterior part of postfrons broadly orange-tawny; face,



Figs 10–14. *Heleomicra collessi* n.sp. **10**, head. **11**, frontal region of head. **12**, wing. **13**, genital segment (left lateral aspect, aedeagus extended posteriorly). **14**, aedeagus (ventral aspect).

cheek, and palpus fulvous; antenna fulvous, with segment 3 partly suffused with brown. Thorax dark brown. Legs brown, with coxae and bases of femora fulvous. Wing membrane indistinctly uniformly smoky. Haltere pale yellowish. Abdomen black.

Wing: distal section of vein 6 about three quarters as long as anal cell in male, slightly longer in female, sclerotized and pigmented for more than halfway from anal crossvein to margin, then abruptly discontinued.

Male postabdomen: surstylus complex, setulose; cercus large, very deeply bifid, the lower lobe broader and a little shorter than upper one.

Other characters as given for genus.

Dimensions: total length, ♂ 1.3–1.4mm, ♀ 1.8mm.; length of thorax, ♂ 0.53–0.58 mm, ♀ 0.74 mm; length of wing, ♂ 1.6–1.8 mm., ♀ 2.1 mm.

Distribution. New South Wales - Western Slopes district.

HOLOTYPE ♂: Goonoo State forest, 8 km south of Mendooran, 1–3 v 1970 (AM), G.A.Holloway and D.K.M.

PARATYPES: Wombat, near Young, vi 1966 (1 ♂ ANIC), Z.R. Liepa; Camp Wambelong, Warrumbungle National Park, near Coonabarabran, vi 1982 (1 ♀ AM), K.C.Khoo.

Discussion. More material is needed to decide the number of species in *Heleomicra* and their distinguishing characters. There is at least one other species from Victoria and Tasmania which appears to be distinguishable from *H. collessi* in having the distal section of vein 6 more reduced and the male cerci undivided.

Genus *Cairnsimyia* Malloch

Cairnsimyia Malloch, 1931: 294. Type-species *C.cavifrons* Malloch.

In my revision (McAlpine, 1968) I recorded 9 species, 6 from Australia and 3 from New Guinea. Since then, one of the New Guinea species, *C. aroana* McAlpine, has been collected in Australia (Claudie River, North Queensland, AM) and 3 undescribed Australian species have been collected (AM, ANIC).

Cairnsimyia is the only heleomyzid genus recorded for New Guinea where it occurs on the highlands and near sea level.

Zentula n.gen.

Type-species. *Z.vittata* n.sp.

Description. Rather robust flies resembling the smaller species of *Cairnsimyia* in appearance, and having the general characters of the tribe Rhinotorini given below. Cuticle pruinescent and scarcely shining.

Head not distinctly excavated at vertex; check broad; hypofacial not, or very narrowly, developed below cheek; fronto-orbital bristles 2, short, reclinate; convergent postvertical bristles present; cheek bristles and vibrissa absent; antenna as in *Cairnsimyia*; prelabrum small; palpus prominent, elongate, cylindrical-clavate, not compressed; labella of proboscis vestigial.

Thorax pale, with extensive brown markings; mesoscutum and dorsal surface of scutellum setulose; mesopleuron bare; the following bristles present: humeral, notopleurals, supra-alar, postalar, posteria intra-alar, prescutellar acrostichal, 2 closely placed posterior dorsocentrals, 2 pairs of scutellars, one or 2 propleurals, usually 4 sternopleurals progressively longer posteriorly, presutural bristle absent or vestigial. Fore femur with irregular dorsal bristles and variably developed posteroventral comb distally; other femora with bristles absent or little developed. Wing resembling that of *Cairnsimyia*, with numerous brownish spots; veins 2 and 3 slightly divergent apically; veins 2 and 4 slightly convergent apically; discal crossvein transverse or almost so.

Abdomen resembling that of *Cairnsimyia*.

Discussion. *Zentula* is closely related to *Cairnsimyia*, but the latter has the vertex excavated; the hypofacial well developed below the cheek; the vibrissa developed as the foremost, and usually strongest, member of a series of check bristles; the prelabrum large and prominent; the palpus shorter, not clavate, and usually more or less compressed; the mesopleuron haired; only one pair of dorsocentral bristles; and the discal crossvein generally more oblique.

In addition to the type-species here described, a second species of *Zentula* occurs in the Cooktown district of North Queensland (ANIC).

Etymology. The generic name commemorates the collector, Miss Zenta R. Liepa, of C.S.I.R.O. Division of Entomology, Canberra.

Zentula vittata n.sp.

Figs 15–17

Description (female). *Coloration*: head pale buff; postfrons with large fulvous orange zone occupying anterior part and extending on each side of blackish ocellar zone posteriorly; antenna and palpus fulvous. Thorax pale buff; mesoscutum with lateral brown stripe anteriorly on lower part of humeral callus and notopleuron, a sublateral brown stripe from just above humeral callus to postalar callus, and a pair of complete submedian brown stripes which are joined for a short distance just in front of suture; scutellum with pair of brown zones dorsally; pleura with horizontal brown stripe on upper margins of propleuron and mesopleuron, a brown mark below middle of propleuron, a brown stripe across middle of mesopleuron and pteropleuron; sternopleuron suffused with brown. Femora brown with variable irregular yellowish suffusions; fore and mid tibiae yellowish with basal, premedial, and apical brown bands; hind tibia yellowish with basal and sub-basal brown bands; tarsi yellowish. Wing with extensive pattern of mostly simple brown spots as in Fig 17; haltere pale yellowish, with slight brownish suffusion on capitellum. Abdomen tawny, paler distally, with brown suffusion on parts of segments 1–3.

Head in dorsal view with frontal lunule narrowly visible in front of ptilinal suture; posterior fronto-orbital bristle larger than anterior one.

Thorax: mesoscutum without supernumerary bristles just in front of scutellar suture; propleuron with one fairly strong and one much weaker bristle.

Dimensions: total length 3.1–3.5 mm; length of thorax 1.7–1.9 mm; length of wing 3.4–3.6 mm.

Distribution. Southern New South Wales; Australian Capital Territory.

HOLOTYPE ♀. Black Mountain Reserve, Canberra, A.C.T., 16 x 1977 (ANIC), Z.R. Liepa.

PARATYPE. Congo, 8 km ESE of Moruya, N.S.W., iv 1981 (1 ♀, AM), M.S. Upton.

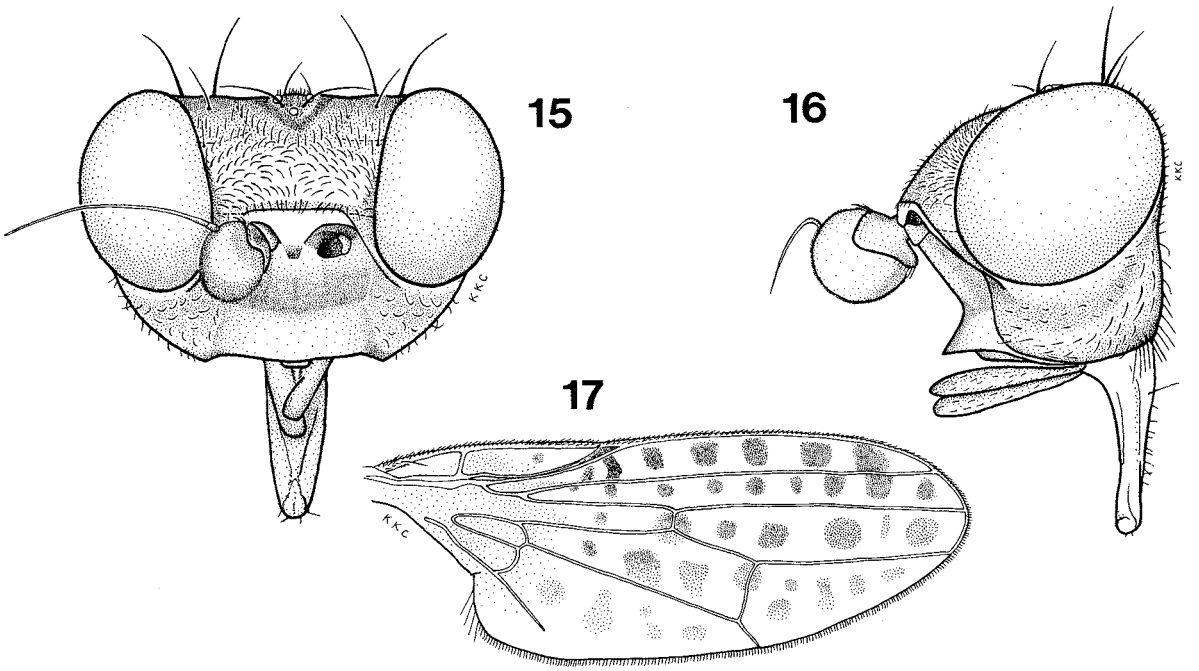
Pentachaeta n.gen.

Type-species. *P. physopus* n.sp.

Description. Rather robust flies of moderately small size, having the characters given for the tribe Pentachaetini.

Coloration: general coloration generic; head and thorax fulvous-orange, finely, densely pruinescent; humeral callus and a stripe covering suture between notopleuron and mesopleuron dark brown; legs fulvous, variously marked with brown; wing clear, with broad dark brown band along entire costal margin, becoming broader and more diffuse apically, terminating just behind vein 4, and with separate brown spot on discal crossvein, none on anterior crossvein; abdomen light brown.

Head: postfrons with several anterior marginal bristles overhanging ptilinal suture; cheek with a series



Figs 15–17. *Zentula vittata* n.sp. **15**, **16**, head. **17**, wing.

of strong setulae on lower margin; lower occiput with pair of bristles directed towards fore coxae.

Thorax: propleural bristle long; upper part of sternopleuron with one long bristle and a series of hairs; anterior notopleural bristle longer than posterior one; dorsocentral bristles 5, subequal; scutellum without hairs. Tibiae of males variously swollen in certain species, those of females not so modified. Second basal and anal cells moderately short, their lengths more than 0.2 that of discal cell.

Male postabdomen (Fig. 93) with tergite 6 sclerotized, free, not setulose; sternite 6 reduced, displaced to left side and joined to sternite 8 to form a synsternite; sternite 7 doubtfully identifiable as part of this synsternite; epandrium with one pair of articulated surstyli; hypandrium with 2 pairs of posterior gonites, sometimes small; aedeagus not very elongate with complex distal sclerotization, without distinctly sclerotized basiphallus; aedeagal apodeme large, with elbow-like joint, the anterior part bent downwards from the articulation and, from a little behind its anterior end, with a process which passes posteriorly and is joined to hypandrium; ejaculatory sclerite rather small; cerci variable, often large.

Female postabdomen with no elongate segments; segment 7 with tergite and sternite fused into a ring enclosing seventh pair of spiracles; cerci short, well separated.

Discussion. *Pentachaeta* is a genus of at least 7 species (all but the type-species remaining undescribed) distributed from the Atherton Tableland, in tropical Queenland, to Tasmania and South Australia. The greatest concentration of species is in eastern New South Wales, where at least 5 species occur. They live in wetter forests and are frequently taken in traps baited with mammalian faeces, particularly in summer.

The species are very uniform in appearance and chaetotaxy and may be distinguished from other Australian heleomyzids by the presence of 5 pairs of dorsocentral bristles in combination with the characteristic wing markings (Fig. 18). The differences between species consist mainly of details of coloration of the antenna, palpus, sternopleuron and legs, of the extent of thickening of the male tibiae, and of the structure of the male genitalia.

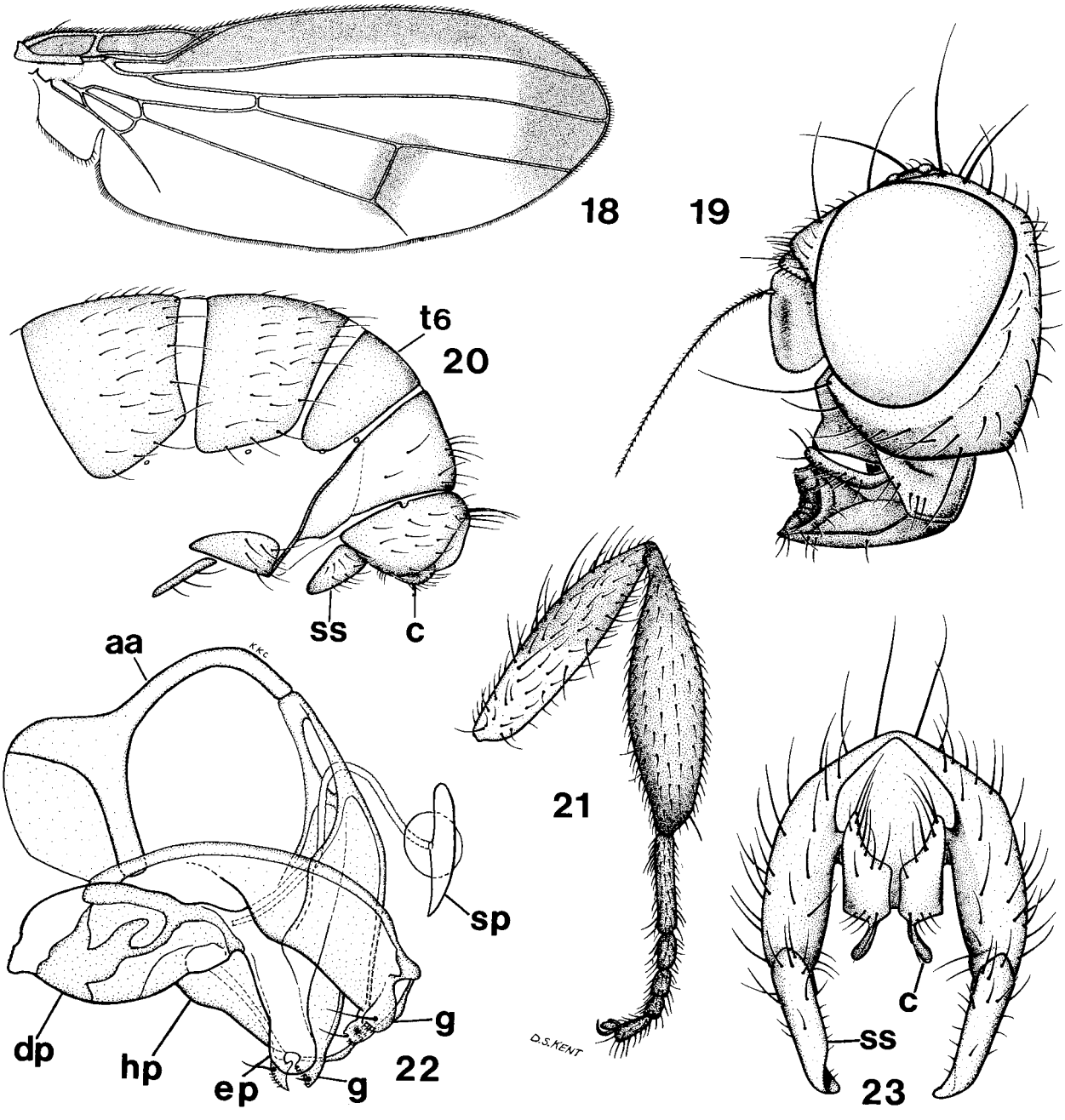
Pentachaeta physopus n.sp.

Figs 18–23

Description. *Coloration*: antenna entirely orange-fulvous, except for the brownish arista; palpus pale fulvous. Sternopleuron without dark mark. Coxae and trochanters fulvous; fore femur dark brown with well defined fulvous basal zone; fore tibia and tarsus entirely dark brown; mid leg entirely fulvous; hind leg fulvous with apex of femur often narrowly browned, in male much of tibia and base of tarsus often also browned.

Legs: all tibiae of male strongly, but somewhat variably, swollen, the fore and hind ones sometimes thicker than femora; tibiae of female relatively slender.

Male postabdomen: epandrium short, reduced to a narrow arch dorsally, with 2 pairs of dorsal bristles, the anterior pair longer; surstylus narrowly ovate, with several strong black setulae; each lateral hypandrial ridge with 2 small gonites at its posterior end, each gonite with one long setula and several minute ones; distiphallus stoutly clubbed, with complex, symmetrical sclerotization; a large transparent epiphallus (spinus) arising from posterior surface of aedeagus; cerci large,



Figs 18–23. *Pentachaeta physopus* n.sp. **18**, wing. **19**, head. **20**, male postabdomen from segment 4. **21**, fore leg of male (femur to tarsus only). **22**, hypandrium with aedeagus (left lateroventral aspect). **23**, epandrium (posterior aspect). **aa**, aedeagal apodeme. **c**, cercus. **dp**, distiphallus. **ep**, epiphallus. **g**, gonites. **hp**, hypandrial plate. **sp**, sperm pump. **ss**, surstylus. **t6**, tergite 6.

complex, separately sclertoized, each with broad setulose dorsal plate and slender ventral process.

Dimensions: total length, ♂ 2.5–3.0 mm, ♀ 2.2–3.5 mm; length of thorax, ♂ 1.2–1.4 mm, ♀ 1.2–1.6 mm; length of wing, ♂ 3.0–3.5 mm, ♀ 3.0–3.8 mm.

Distribution. New South Wales – coast districts and adjacent ranges.

HOLOTYPE ♂. Mooney Mooney Creek, near Gosford, 20 xi 1975 (AM), D.K.M.

PARATYPES. Mooney Mooney Creek, i xi xii 1975–1978 (15 ♂, 16 ♀, AM, ANIC, BM), B.J. Day and D.K.M.; Upper Allyn, near Eccleston, xi 1965 (1 ♂, 1 ♀, AM), D.K.M.; Bowen's Creek, Blue Mountains, xii 1956 (1 ♂, AM), D.K.M.; Wentworth Falls, Blue Mountains, ii xi xii 1957–1958 (12 ♂, 8 ♀, AM, CNC, USNM), D.K.M.; Springwood, i 1956 (1 ♀, AM), D.K.M.; (Royal) National Park, i ii iii x xi xii 1955–1978 (10 ♂, 3 ♀, AM, MNM), G. Daniels, D.K.M.; Otford, Illawarra District, i ii 1964 (1 ♂, 1 ♀, AM), D.K.M.

Discussion. *Pentachaeta physopus* is distinguished from other, undescribed species of the genus by the

entirely dark brown fore tibia and tarsus in combination with the entirely pale colouring of the antenna, palpus, and sternopleuron. The shape of the surstylus and other details of the male genitalia are distinctive. The swollen tibiae of all legs in the male, particularly the fore and hind ones, serve to distinguish this from some of the species.

Genus *Waterhouseia* Malloch.

Waterhouseia Malloch, 1936: 260–261. Type-species *W. cyclops* Malloch.

The only known species lives in the Central and Southern Tableland districts of New South Wales. It is uncommon, but small numbers of adults have been obtained by sweeping xeromorphic shrubs in dry sclerophyll forest near the tops of sandstone ridges, principally in autumn. Morphological features are given below under the tribe Waterhouseiini.

List of Australian Species.

Pseudoleria placata (Hutton, 1901) (*Leria*)
(= *Pseudoleria crassata* Garrett, 1925)
Pseudoleria pectinata (Loew, 1872) (*Blepharoptera*)
(= *Pseudoleria pectinerata* Garrett, 1921)
Aecothea fenestralis (Fallén, 1820) (*Helomyza*)
Tapeigaster nigricornis (Macquart, 1851) (*Sciomyza*)
(= *Tapeigaster marginifrons* Bezzi, 1923)
Tapeigaster cinctipes (Walker, 1853) (*Heteromyza*)
(= *Tapeigaster bella* Paramonov, 1955)
Tapeigaster argyrospila Bezzi, 1923
Tapeigaster brunneifrons Malloch, 1927
(= *Tapeigaster vernalis* Paramonov, 1955)
Tapeigaster luteipennis Bezzi, 1923
(= *Tapeigaster taylori* Malloch, 1935)
Tapeigaster annulipes Macquart, 1847
(= *Dryomyza cingulipes* Walker, 1858)
Tapeigaster paramonovi McAlpine & Kent, 1982
Tapeigaster digitata McAlpine & Kent, 1982
Tapeigaster annulata (Hendel, 1917) (*Sciomyzoptera*)
(= *Tapeigaster fulva* Malloch, 1926b)
Tapeigaster pulverea McAlpine & Kent, 1982
Tapeigaster subglabra McAlpine & Kent, 1982
Ollix cogani n.sp.
Amphidysis hesperia n.sp.
Prosopantrum flavifrons (Tonnoir & Malloch, 1927) (*Acrostichalia*)
(= *Cnemospathis baeckstroemi* Enderlein, 1938,
= *Cnemospathis schoenemanni* Enderlein, 1938)
Leriopsis montana McAlpine, 1967
Trixoleria maculata McAlpine, 1967
Austroleria extensa McAlpine, 1967
Austroleria truncata McAlpine, 1967
Diplogeomyza incisa McAlpine, 1967
Diplogeomyza wirthi McAlpine, 1967
Diplogeomyza conformis McAlpine, 1967
Diplogeomyza immaculata McAlpine, 1967
Diplogeomyza hardyi McAlpine, 1967
D. hardyi hardyi McAlpine, 1967
D. hardyi tasmanica McAlpine, 1967
Diplogeomyza flavipalpis McAlpine, 1967
Diplogeomyza diaphora Hendel, 1917
Diplogeomyza tridens McAlpine, 1967
Diplogeomyza victoriae McAlpine, 1967
Diplogeomyza annularis McAlpine, 1967
Diplogeomyza spinosa McAlpine, 1967
Diplogeomyza signata McAlpine, 1967
Diplogeomyza media McAlpine, 1967
Diplogeomyza maculipennis (Malloch, 1926b) (*Huttonina*)
Diplogeomyza pectinervis McAlpine, 1967
Borboroides atra Malloch, 1925
Heleomicra collessi n.sp.
Cairnsimyia robusta (Walker, 1853) (*Heteromyza*)
Cairnsimyia excavata McAlpine, 1968
Cairnsimyia sydneiensis McAlpine, 1968
Cairnsimyia verticalis McAlpine, 1968
Cairnsimyia uniseta McAlpine, 1968
Cairnsimyia cavifrons Malloch, 1931
Cairnsimyia aroana McAlpine, 1968
Zentula vittata n.sp.
Pentachaeta physopus n.sp.
Waterhouseia cyclops Malloch, 1936

Australian Species Erroneously Referred to Heleomyzid Genera.

Helomyza marginalis Walker, 1858. The given type-locality is New South Wales. The description of *Helomyza robusta* Walker, 1858, which immediately precedes that of *H. marginalis*, refers to an insect from 'Valley of the Amazon.' In the BM collection there are two much damaged specimens on the one pin, both headless, with an apparent original Walker label '*robusta*', which should indicate type-material. The pin has also an unclear label in doubtful language mentioning '*Helomyza marginalis* Walk.' I found no other possible type-material of either nominal species. These specimens belong to the Australian lauxaniid species *Meiosimyza lineata* (Walker, 1853) (*Sciomyza*) n.comb. (= *Sapromyza bicoloripes* Malloch, 1926a, n.syn., on the basis of examination of types in BM and SPHTM respectively). They therefore disagree with Walker's locality data for *H. robusta* and appear also to agree better with the description given for *H. marginalis*. It is possible, therefore, that they are types of *H. marginalis* instead of *H. robusta*. *Helomyza marginalis* is perhaps best dismissed as a *nomen dubium*, but there is no evidence that it refers to a species of Heleomyzidae.

Helomyza pallida Walker, 1853. This was described from 'Van Diemen's Land' (now Tasmania). From examination of type-material (BM), I find it to be a lauxaniid and a synonym of *Sapromyza rufifrons* (Walker, 1853) (see below). It is a primary junior homonym of *Helomyza pallida* Fallén, 1820, a palearctic species now referred to the heleomyzid genus *Suillia* (see Czerny, 1924).

Helomyza rufifrons Walker, 1853. Examination of the type shows this to be the same as *H. pallida* Walker,

which has the same type-locality. *Sapromyza rufifrons* (Walker) is a new combination, as the species is referable to the lauxaniid genus *Sapromyza* Fallén in the broad sense in which this genus has been used in the southern hemisphere. *Sapromyza griseadorsalis* Malloch, 1926a is very closely related, perhaps even conspecific.

Helomyza vittata Macquart, 1851. I saw the type-material of this species in PM some years ago, and noted that it appeared close to the genus *Helcomyza* (family Helcomyzidae). The stated type-locality is Tasmania, but no such fly is known to have been collected in Tasmania or elsewhere in Australia in recent times.

Classification

Very diverse views have been expressed on classification of the flies I group in the family Heleomyzidae (e.g. Czerny, 1927a; Hennig, 1958, 1973; Griffiths, 1972). My concept of the Heleomyzidae is somewhat similar to that of Czerny (1927a), Malloch (1933), Harrison (1959) and Cogan (1971), though I have had to consider numerous genera not mentioned in these works, each of which is restricted to the fauna of one geographic area.

Hennig (1973) lists numerous genera under the three families Heleomyzidae, Rhinotoridae, and Trixoscelididae, but a glance at the included genera shows that this arrangement cannot be maintained. For example, the genera *Cephodapedon*, *Gephyromyza*, and *Paraneossos*, which he distributes among the families Heleomyzidae and Trixoscelididae, are, in fact, very closely related to one another. *Anastomyza* and *Apophoneura*, placed in the Heleomyzidae by Hennig, are phylogenetically close to the genera he places in the Rhinotoridae (D. McAlpine, 1968; Griffiths, 1972). *Listriomastax* and *Apetaenus*, placed in Heleomyzidae, have been removed to the Tethinidae by Griffiths (1972). *Chiropteromyza* and *Ornitholeria*, placed in the Heleomyzidae, are synonyms of *Neossos*, which is placed in the Trixoscelididae. The series of genera which Hennig places in the subfamily Heleomyzinae of the Heleomyzidae includes many groups just as distant from *Heleomyza* and its allies as are the genera placed in Rhinotoridae and Trixoscelididae.

I conclude that Hennig's grouping of genera was simply intended to show that given in recent literature, and not intended as a critical appraisal.

It is usual in taxonomic works reviewing a major group either to give a short description of the group which is intended to apply, more or less in toto, to all its members, or, following Hennig (1958), to list the apomorphic characters of the groundplan of the group. Either method gives considerable difficulty for the Heleomyzidae. Harrison (1959) was able to give a description of the family which is useful for identification of the New Zealand species, but, on a world basis, there are some departures from at least 50% of the given characters, including most of those often reckoned as most distinctive for the family. Hennig (1958) attempted to give some characters of the groundplan of the Heleomyzidae. He was not, however, familiar with the family on more than a regional basis and admitted great uncertainty as to the family limits.

It is still not possible to demonstrate by standard cladistic method the monophyly of the Heleomyzidae. Reasons for this difficulty include (1) an apparent very early (early Tertiary) radiation into a variety of niches; (2) the present impossibility of determining the sister-group of the Heleomyzidae (if one exists) and thus the difficulty of making out-group comparisons; (3) inherent difficulties in the cladistic method, e.g. the problem of reversibility of character states and possible convergent evolution of some characters in possibly related out-groups (homoplasy).

Despite these problems, there remains, in my view, a probability that the forms I place in the Heleomyzidae (or most of them) are more closely related to one another than to other Diptera. In general these forms depart only to a limited extent from a suite of basic or typical characters of the family (not necessarily groundplan characters), which I set out below. Perhaps *Mayomyia* is the genus that departs most from these characters, while *Notomyza* and *Waterhouseia* have unusual protandrial characters without being otherwise very different from certain more typical genera. There is a lack of admissible evidence that any of the less typical genera are more closely related to forms excluded from the family than to those I include, and I do not think that separating off some genera into a number of very small families would add any scientific significance to the classification.

The Chyromyidae and Sphaeroceridae are excluded from the Heleomyzidae, not because I am convinced that they are phylogenetically separate, but because their relationships are not yet understood, and diverse views of their taxonomic positions have been expressed. The large amount of literature on the Sphaeroceridae makes it undesirable to change the status of the group until stability can be assured.

I have previously initiated a system of tribes within the Heleomyzidae (McAlpine, 1967, 1968; McAlpine & Kent, 1982), a system which I here extend to cover more genera. These tribes are narrowly defined groups of genera which are probably all monophyletic groups. Some of these are necessarily restricted to a single genus (e.g. Borboropsini, Notomyzini) at the present stage of understanding of relationships.

The grouping of these tribes into larger groups (subfamilies) is a difficult problem which I have had under consideration for a long time, but, at present, I am unable to offer a satisfactory solution. Occasionally, evidence is available which suggests close relationship between certain tribes (e.g. in the structure of the pleurotergite in Allophylopsini and Cnemospathini), but in general it has not been possible to find combinations of clearly apomorphic characters which can be relied upon for grouping the tribes into higher monophyletic taxa. Like Gill (1962), I do not accept a close relationship between the Heleomyzini and Suilliini; the few resemblances are due mainly to symplesiomorphy.

It is customary with some authors to use input from geographic distribution in setting up classifications, and indeed it is often difficult to ignore data of this kind. On the other hand, it often happens that classifications, whose basis includes biogeographic evidence, are subsequently used in analyses of faunal relationships. The result is, of course, circular reasoning. I have therefore attempted to minimize geographic input in this classification; otherwise I may have been tempted to lay more stress on those morphological characters which could be used to divide the neotropical from the Australian forms in such tribes as Diaciini, Rhinotorini, and Pentachaetini.

List of Characters Typical of Heleomyzidae

Head. Sclerotized part of face not extending on to ventral surface of head capsule, but in some forms extending laterally below cheeks as the hypofacials; postvertical bristles convergent or rarely absent; fronto-orbital bristles 1 to 3, variably directed but not strongly incurved; interfrontal bristles, when present, not in longitudinal series set on a pair of differentiated plates; vibrissa usually distinct. Antenna with segment 2 not dorsally slit, nor forming a hood- or cup-like structure over base of segment 3; segment 3 without basal process fitting into segment 2.

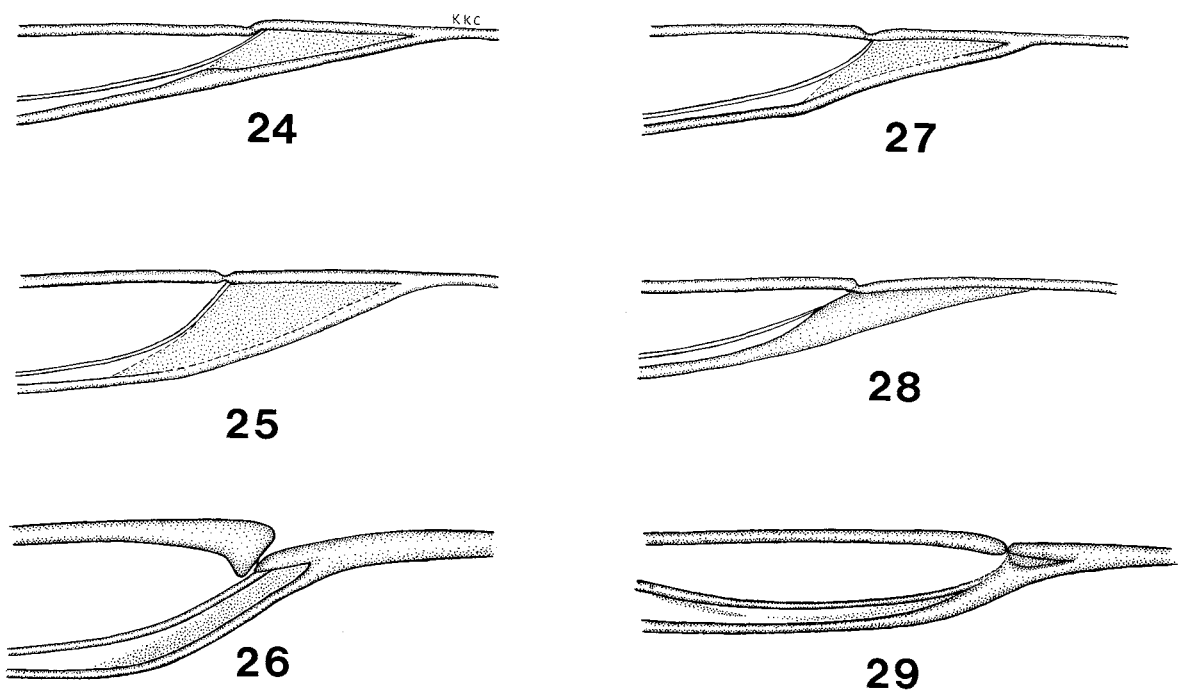
Thorax. Dorsocentral bristles usually 3 or more; presutural bristle usually present; scutellum usually with 2 pairs of subequal marginal bristles; 1 or more sternopleural bristle present; prosternum usually without well sclerotized precoxal bridges. Mid femur often with anterior bristles, which may be uniseriate; fore femur usually with posteroventral bristles, often with dorsal bristles; tibiae usually with preapical dorsal bristles, often solitary, particularly on fore tibia; hind basitarsus not exceptionally short and compact, but mid basitarsus often more elongate than other basitarsi.

Wing usually not remarkably narrowed basally; costa often with spaced spines on anterior or anteroventral surface, with a break or visible weak point at end of subcosta; vein 1 without series of dorsal setulae, on distal part often merging into a pterostigma-like thickened area of the subcostal cell (Figs 24–29); second basal cell closed; anal cell closed; section of vein 6 beyond anal cell well developed and aligned with section bordering that cell (contrast Drosophilidae); alula well developed.

Abdomen. Protandrium usually asymmetrical, with sternites 6 and 7 usually lateral, sometimes reduced; sternite 8 dorsal, usually well developed. Cerci of female usually separate.

Some Structures of Taxonomic Importance

Face. The face, mesofacial or prefrons of the Heleomyzidae is most frequently a uniformly sclerotized area between the antennal bases and the ventral membranous subcranial region. There is generally an abrupt discontinuity of the sclerotization at the lower margin. The face varies from concave in *Diacia* and *Ollix* to somewhat convex in *Cinderella* and most species of *Suillia*. In certain heleomyzids an area of variable



Figs 24–29. Distal part of costal and subcostal cells of heleomyzid flies (costal armature omitted). **24**, *Scoliocentra helvola* Loew. **25**, *Leriopsis montana* McAlpine. **26**, *Anastomyza* sp. **27**, *Trixoscelis ornata* (Johnson). **28**, *Stuckenbergiella littoralis* Cogan. **29**, *Mayomyia diversipennis* Malloch.

width on the median part of the face is desclerotized or very lightly sclerotized, the fully sclerotized part being thus divided into two lateral plates. The desclerotization has proceeded farthest in *Mayomyia* in which the face is predominantly soft and without a visible line demarking it from the subcranial region (as in the Clusiidae). In the forms I place in the tribe Heleomyzini, the face has a differentiated median panel which is less sclerotized than the lateral parts, but the lower margin of the face is usually defined. This condition is similar to that of the Opomyzidae. In *Dichromya* and *Amphidysis* the sclerotized part of the face is restricted to a pair of deeply concave plates on the upper part into which the antennae fit in repose.

I use the term clitelliform to decribe the saddle-like contour of the face in many of the Rhinotorini. The surface in such insects forms a broadly rounded longitudinal ridge, which is lower in the middle and thus appears concave in profile.

In a few heleomyzid groups only (e.g. *Cinderella* and most species of Rhinotorini) the face is extended lateroventrally below the cheek on each side to form an almost vertical plate, the hypofacial. I have seen no heleomyzids in which the lower marginal part of the face is inflexed so that part of its surface faces ventrally, as in most forms referred to the superfamily Asteioidea (McAlpine, 1978).

Postgenal fold. Variation in the heleomyzid head capsule includes the development of a slight vertical ridge on the postgenal region, subtended anteriorly by a usually shallow groove. This modification, which I term the postgenal fold, is distinct in *Stuckenbergiella*, *Ollix* and the genera of Diaciini, while in the Heleomyzini it is often, but not always, distinguishable. In *Nephellum* the groove associated with the postgenal fold is very deeply incised. The postgenal fold most frequently occurs in forms with particularly deep cheek, but is absent in the Rhinotorini despite the depth of the cheek in various members.

Prosternum. The prosternum of the acalyptrate Diptera has been studied by Speight (1969) and its shape recorded for a number of heleomyzid genera. A difficulty in describing the shape of the prosternal plate (basisternum) derives from the fact that the margins of this sclerite often gradually give place to the surrounding membranous cuticle so that, in part, it may not be sharply outlined. Differences of interpretation are therefore sometimes possible.

In the heleomyzid prosternum, a shape found with high frequency through a wide range of genera approximates to that designated "B" by Speight (l.c.). This type is elongate, variably expanded anteriorly, and without precoxal bridges. It is possibly the groundplan type for Heleomyzidae, though direct evidence of this is not available. From the non-phylogenetic viewpoint it may be regarded as near the centre of diversity for the family.

In the tribe Heleomyzini, as defined below, the prosternum is often large and triangular, approximating to Speight's type V. Strongly sclerotized precoxal bridges (as in such families as Tanypezidae and Chloropidae) are not present in the forms I have examined, but often the cuticle at the anterolateral angle of the prosternum forms a ridge-like fold lying against the posterior cervical sclerite, which is in contact with the propleuron (Figs 40, 41). In many of this tribe, the anterior part of the prosternal plate is weakly sclerotized and there are reduction stages apparently resulting from desclerotization of this part.

Sclerotized precoxal bridges, connecting the prosternum to the propleuron of each side, occur in *Blaesochaetophora* and *Cinderella* (Figs 45, 46). In the latter there is a deeply impressed suture crossing the precoxal bridge.

Modifications of the pleurotergite. The pleurotergite is that part of the thoracic pleura lying behind the pteropleuron and above the metathoracic spiracle. The pleurotergite is sometimes considered to consist of a lower katatergite and an upper anatergite but these divisions are generally not well defined in acalyptrate flies.

Typically, the lower, anterior part of the pleurotergite forms a broadly convex raised ridge or callus running from the wing base to the metathoracic spiracle. Posteriorly, this ridge drops away to the level of the much less prominent, but sometimes convex, posterior part. This condition of the pleurotergite (Fig. 48) is seen in the majority of heleomyzid genera and in most other acalyptrate families. It is probably, therefore, the groundplan condition for the Heleomyzidae. For current purposes I term this the 'rhinotorine type of pleurotergite'.

In the tribes Allophylopsini and Cnemospathini, as here defined, there is a notable and fairly uniform modification of the pleurotergite (Fig. 49). The area corresponding to the convex ridge, in the above forms, is not more prominent than the posterior section and, on its lower part near the haltere, is not sharply distinguished from that section. On the upper part, towards the wing base, the two sections are separated by a deeply impressed suture, behind the upper end of which the posterior section forms a rounded gibbosity. These are the characteristics of what I designate as the 'allophylopsine type of pleurotergite'.

Though I have not found the allophylopsine type of pleurotergite in other heleomyzids, *Borboroides*, *Blaesochaetophora*, *Notomyza*, and *Epistomyia* show varying degrees of deviation from the rhinotorine condition, which could indicate that they are not far removed structurally from ancestral forms which gave rise to the Allophylopsini and Cnemospathini.

Costal armature. The presence of strong anterior to anteroventral spines at intervals among the smaller macrotrotrichia on the costa beyond the end of vein 1 has often been given as a diagnostic character of the family Heleomyzidae. This condition is particularly marked in many of the north-temperate genera of Heleomyzini, but Malloch (1933) and Hennig (1958) have rejected it as an essential criterion for inclusion in the family.

Variation in costal armature provides some characters which can be used in the internal classification of the family and I therefore illustrate the costa of a range of genera (Figs 50–65). The costal armature of *Zachaetomyia* is particularly characteristic in having an anterior series of stout, closely placed spines (Fig. 54), but the condition in *Diacia* (Fig. 53), which has the spines of the anterior series much more irregular in size, provides an intermediate state between that of *Zachaetomyia* and that of the Heleomyzini.

In *Prosopantrum* the post-tegular section of the costa terminates in 2 strong bristles, the humeral section has usually 2 series of long setulae, and the section bordering the second costal cell has at least 3 series of distinctly shorter setulae. *Notomyza* shows this pattern also. The allophylopsine genera (e.g. *Allophylopsis, Leriopsis* and *Austroleria* differ in having only one strong bristle terminating the post-tegular section and no differentiation in armature between the 2 succeeding sections, which usually have 3 series of short setulae. In *Epistomyia* the basal costal armature is markedly different again, despite resemblance in some other characters to *Prosopantrum* and *Notomyza.*

Taxonomic characters of the postabdomen. From published information and from my own studies it is apparent that there is great variation in male postabdominal structure in the Heleomyzidae. This may be somewhat greater than in most other acalyptrate families, though in several others the variation is also considerable. As this variation has been used as evidence for separating off several groups into separate families, we should ask the questions: Is the variation continuous or does it result in widely disjunct morphological types? Is the variation well correlated with variation in other organs, enabling a classification based on postabdominal characters to receive support from general characters?

Tergite 6 of the male abdomen is usually much reduced in size (sometimes absent) and without macrotrichia. In *Diacia*, *Dichromya*, *Amphidysis*, *Tephrochlamys*, *Heteromyza*, *Waterhouseia*, and *Notomyza* tergite 6 is well developed and often macrotrichose, though, except in *Notomyza*, it is considerably shorter than tergite 5. *Zachaetomyia*, *Orbellia* and *Pentachaeta* (Figs 74, 93) provide an intermediate condition in the development of tergite 6.

Sternite 6 of the male abdomen is usually somewhat reduced and located in a lateroventral position to the left of the median line. In *Notomyza* sternite 6 is absent, but in *Pentachaeta* it is reduced to an inconspicuous sclerotized strip on the left side. In *Tephrochlamys*, *Heteromyza*, and *Waterhouseia*, sternite 6 is ventral, symmetrical or almost so, and macrotrichose, but is considerably shorter than sternite 5. This might appear to be a character of great importance, but in *Orbellia* (see Griffiths, 1972: Fig 101) sternite 6 is rather large, macrotrichose, and located largely on the ventral surface, though it is asymmetrical and somewhat displaced to the left side. Thus *Orbellia* appears to link *Heteromyza* and *Tephrochlamys* to the rest of the Heleomyzini, to which they belong on the evidence of most characters including facial structure and shape of the prosternum. *Tephrochlamys rufiventris* (Meigen) also resembles certain typical heleomyzines in its synanthropy and wide distribution through human transportation. *Waterhouseia* resembles *Heteromyza* and *Tephrochlamys* in the sclerites of segment 6 of the male abdomen, and shares with *Heteromyza*, but not *Tephrochlamys*, the sexual dimorphism in size of the eye and postfrons. In other significant characters *Waterhouseia* differs entirely from the heleomyzine genera, and its relationship to them is remote.

I interpret the variation in disposition of the protandrial sclerites in Heleomyzidae as indicating that the primitive arrangement was very asymmetrical, but that there has been a trend towards symmetry in several lineages. Crampton (1942) has explained the asymmetry of protandrial sclerites in terms of the torsion of this region, which takes place during the circumversion process. Though this explanation has not gained universal acceptance, it appears to be the simplest theory to fit the facts, and no convincing alternative explanation has come to my attention.

In illustrating the arrangement of the sclerites and spiracles of the protandrium I utilize the protandrogram (Figs 66–98), a system of diagrammatic illustration devised by Steyskal (1957 and elsewhere). Segments 5 to 8 are shown as if split along the median ventral line and spread flat. In interpreting these diagrams it should be realised that some distortion is involved in representing a three-dimensional subject in one plane, and that the limits of some sclerites may not be sharply defined.

The form of the aedeagus is a further highly variable character in the Heleomyzidae. Sometimes it is long and strap-shaped as in *Scoliocentra villosa* (Meigen), *Neossos marylandicus* Malloch, *Diplogeomyza hardyi* McAlpine (1967) and most examined species of *Prosopantrum* (Edwards in Malloch 1933). In other examples the aedeagus is remarkably short, e.g. *Suillia ustulata* (Meigen), *Waterhouseia cyclops* Malloch, *Trixoleria maculata* McAlpine, and *Diplogeomyza immaculata* McAlpine. My comparative study of the genitalia of *Diplogeomyza* (McAlpine 1967) illustrates the fact that the aedeagus and the periphallic parts are often extraordinarily unstable above the species level, apparently because of selection pressures which operate in closely related sympatric species.

The structure of the female postabdomen has also been used by Griffiths (1972) as evidence for separating *Neossos* (= *Chiropteromyza*) and *Prosopantrum* widely from the Heleomyzidae, and placing them in the "Prefamily Tephritoinea". The groundplan conditions of the female postabdomen include: "7th and 8th segments (♀) elongate, forming slender retractile ovipositor: 8th sternum divided into paired longitudinal sclerites".

These conditions of the female postabdomen are present in four species of the genus *Diplogeomyza* (my group 2, McAlpine 1967), but here they clearly represent

a development within part of the genus. The species of the other three species-groups of *Diplogeomyza* do not have segments 7 and 8 elongate, and sternite 8 is entire or partly divided. Hennig (1969) also records great variation in the female postabdomen between species of the genus *Cephodapedon*. Turning to *Prosopantrum flavifrons* Tonnoir & Malloch, I find segments 7 and 8 to be quite short, not at all in conformity with the theoretical ground plan of Tephritoinea. The same segments in *Neossos marylandica* Malloch are little more elongate than in *P. flavifrons*, and in neither species are they as elongate as in *Diplogeomyza diaphora* Hendel. In his discussion of these characters, Griffiths admits that the 'Chiropteromyzidae and Cnemospathidae' do not fully possess the female postabdominal characters of the Tephritoinea. I point out that in these characters, they are not differentiated from the Heleomyzidae. Their position in the Tephritoinea must then depend on the structure of the aedeagus. But the elongate distal part of the aedeagus in *Neossos* is essentially similar to that of *Scoliocentra*, a typical member of the Heleomyzidae, which is classified in the prefamily Anthomyzoinea by Griffiths.

I conclude, from examination of numerous genera and species, that diversification of the male and female postabdominal structures has occurred at various stages of evolutionary radiation in the Heleomyzidae, that the characters of these structures are often highly unstable, that some kinds of modification can be duplicated in different lineages, and that these characters should not be used in higher classification without support from other kinds of characters.

Tribes and Genera of Heleomyzidae

Tribe Heleomyzini Westwood, 1840 (as Helomyzides) (= Heteromyzides Fallén, 1820; Blepharopterina Loew, 1862; Leriinae Czerny, 1904). *Acantholeria* Garrett, 1921. *Aecothea* Haliday, 1838 (= *Neoecothea* Peterson and Gill, 1982). *Anorostoma* Loew, 1862. *Anymphochaeta* Czerny, 1924. *Anypotacta* Czerny, 1924. *Desertoleria* Gorodkov, 1962. *Eccoptomera* Loew, 1862. *Heleomyza* Fallén, 1810 (= *Helomyza* Fallén, 1820 (emend.); *Leria* Robineau-Desvoidy, 1830; *Blephariptera* Macquart, 1835). *Heteromyza* Fallén, 1820 (= *Thelida* Robineau-Desvoidy, 1830). *Kiboleria* Lindner, 1956. *Lutomyia* Aldrich, 1922. *Morpholeria* Garrett, 1921 (= *Spanoparea* Czerny, 1924). *Neoleria* Malloch, 1919. *Oldenbergiella* Czerny, 1924. *Orbellia* Robineau-Desvoidy, 1830. *Pseudoleria* Garrett, 1921. *Schroederella* Enderlein, 1921. *Scoliocentra* Loew, 1862 (= *Amoebaleria* Garrett, 1921; *Chaetomus* Czerny, 1924; *Gymnomus* Loew, 1863; *Trichochlamys* Czerny, 1924). *Tephrochlaena* Czerny, 1924. *Tephrochlamys* Loew, 1862.

Tribe Tapeigastrini Séguy, 1952 (as Tapigasterinae). *Tapeigaster* Macquart, 1847. ? *Ollix* n.gen.

Tribe Suilliini Wahlgren, 1917 (as Suilliinae). *Suillia* Robineau-Desvoidy, 1830 (= *Allophyla* Loew, 1862). *Porsenus* Darlington, 1908.

Tribe Diaciini n.tr. (= Thyreophorellinae Czerny, 1927b, invalid name). *Diacia* Wiedemann, 1830 (= *Thyreophorella* Hendel, 1910). *Dichromya* Robineau-Desvoidy, 1830. *Amphidysis* n.gen.

Tribe Zachaetomyiini n.tr. *Zachaetomyia* Malloch, 1933.

Tribe Blaesochaetophorini n.tr. *Blaesochaetophora* Czerny, 1904 (= *Dihoplopyga* Malloch, 1933).

Tribe Borboropsini Griffiths, 1972 (as Borboropsidae). *Borboropsis* Czerny, 1902.

Tribe Chiropteromyzini Frey, 1952 (as Chiropteromyzidae). *Neossos* Malloch, 1927 (= *Chiropteromyza* Frey, 1952; *Ornitholeria* Frey, 1930).

Tribe Cinderellini n.tr. *Cinderella* Steyskal, 1959.

Tribe Epistomyiini n.tr. *Epistomyia* Malloch, 1933.

Tribe Cnemospathini Enderlein, 1938 (as Cnemospathidae). *Prosopantrum* Enderlein, 1912 (= *Acrostichalia* Tonnoir & Malloch, 1927; *Cnemospathis* Enderlein, 1938).

Tribe Allophylopsini McAlpine, 1967. *Allophylopsis* Lamb, 1909 (= *Huttonomyia* Malloch, 1922). *Allophylina* Tonnoir & Malloch, 1927. *Leriopsis* McAlpine, 1967. *Trixoleria* McAlpine, 1967. *Austroleria* McAlpine, 1967. *Diplogeomyza* Hendel, 1917.

Tribe Borboroidini n.tr. *Borboroides* Malloch, 1925. *Heleomicra* n.gen.

Tribe Notomyzini Griffiths, 1972 (as Notomyzidae). *Notomyza* Malloch, 1933.

Tribe Gephyromyzini n.tr. *Gephyromyza* Malloch, 1933. *Paraneossos* Wheeler, 1955. *Cephodapedon* Malloch, 1933.

Tribe Nephellini n.tr. *Nephellum* n.n. for *Nephoneura* Malloch, 1933 (not M'Lachlan, 1871).

Tribe Rhinotorini Williston, 1896 (as Rhinotorinae). *Anastomyza* Malloch, 1933. *Apophoneura* Malloch, 1933. *Rhinotoroides* Lopes, 1934. *Rhinotora* Schiner, 1868. *Neorhinotora* Lopes, 1934. *Zentula* n. gen. *Cairnsimyia* Malloch, 1931.

Tribe Pentachaetini n.tr. *Pentachaeta* n.gen. *Dioche* n.gen.

Tribe Trixoscelidini Hendel, 1916 (as Trixoscelidae). *Trixoscelis* Rondani, 1856 (= *Trichoscelis* auct. not Amyot & Serville, 1843, Hemiptera; *Diastata*, *sensu* Malloch, 1931, not Meigen,1830; *Spilochroa* Williston, 1907; *Zagonia* Coquillett, 1904). *Paratrixoscelis* Soós, 1977. *Stuckenbergiella* Cogan, 1971. *Psiloplagia* Czerny, 1928.

Tribe Fenwickiini n.tr. *Fenwickia* Malloch, 1930. *Xeneura* Malloch, 1930. *Aneuria* Malloch, 1930.

Tribe Waterhouseini n.tr. *Waterhouseia* Malloch, 1936.

Tribe Mayomyiini n.tr. *Mayomyia* Malloch, 1934.

Removed from family Heleomyzidae. *Heloclusia* Malloch, 1933 (to Pseudopomyzidae: McAlpine, 1966; Hennig, 1969). *Apetaenus* Eaton, 1875 and *Listriomastax* Enderlein, 1909 (to Tethinidae: Griffiths, 1972). *Tethinosoma* Malloch, 1930 (to Tethinidae: McAlpine, 1967).

Nomenclatural Notes.

Because of general usage, the name Helomyzides Westwood, 1840, is treated as having priority over Heteromyzides Fallén, 1820, though an application to the International Commission on Zoological Nomenclature is necessary to formalise the position. A ruling requiring that Helomyzides be treated as if published in 1820, just prior to Fallén's work of that date, would seem advantageous. This would also preserve the superfamily name Heleomyzoidea over Sphaeroceroidea (based on Sphaeroceridae Macquart, 1835), and, in the event of the families Heleomyzidae and Sphaeroceridae being combined, preserve the family name which has a much greater period of continuous usage, and which covers a greater range of divergent types (though probably fewer species).

The application of Article 40 of the International Code of Zoological Nomenclature has here been attempted for family group names. Thus, the name Thyreophorellinae Czerny (1927b) is rejected as a name not in general usage based on a generic name synonymized before 1961. On the other hand, the name Cnemospathidae Enderlein (1938), also based on a generic name rejected as a synonym before 1961, is considered available in view of its usage in two influential works (Brues, Melander & Carpenter, 1954, and Griffiths, 1972), and of the absence of an alternative name. The name Chiropteromyzidae Frey, 1952, is available, as the synonymy of its type-genus was not recognized till well after 1960 and there is no available alternative.

In accordance with Article 29(d) of the Code, the incorrectly formed stem cnemospath- is incorporated into the tribal name Cnemospathini, rather than the otherwise correct cnemospathid-.

I do not give complete generic synonymy in the above list, but give those synonyms most likely to be encountered in literature of this century. Further synonymy is given by Czerny (1924) and Gill (1965).

Nephellum is a new replacement name for *Nephoneura* Malloch, 1933, preoccupied by *Nephoneura* M'Lachlan, 1871 (Neuroptera, Ascalaphidae). It has the same type-species as Malloch's genus, viz. *Nephellum dendrophilum* (Malloch), n.comb.

Key to Tribes of Heleomyzidae

1. Face with pair of well sclerotized lateral plates separated by a lightly sclerotized or desclerotized median strip of variable width.....2

——Face uniformly sclerotized (in some minute forms weakly so) across whole width, at least on upper part.....4

2. Mesopleural bristle long; 3 fronto-orbital bristles present; vein 4 curved forwards to meet vein 3 at apex... temperate S. America.....Mayomyiini

——Mesopleural bristle absent or quite short; fewer than 3 fronto-orbital bristles present; vein 4 not thus curved.....3

3. Facial plates forming pair of deep, rounded oval pits, not approaching vibrissae; ptilinal suture laterally passing behind and below insertion of vibrissa; cheek and parafacial with fingerprint sculpture; a horizontal series of more than 2 bristles present on upper part of sternopleuron... W. Australia and S. America.....Diaciini (part)

——Facial plates only slightly concave, following contour of parafacial to near level of vibrissa; ptilinal suture discontinued far above vibrissa; cheek and parafacial without fingerprint sculpture; 1 or 2 upper sternopleural bristles only... Holarctic and Afrotropical Regions, introduced elsewhere. ..... Heleomyzini.

4. Mesopleural bristle well developed.....5

——Mesopleural bristle absent, though mesopleuron sometimes haired or setulose. 8

5. Fronto-orbital bristles 2, not reclinate but strongly flexed outwards; vein 6 attaining wing margin... Holarctic Region.....Borboropsini

——Fronto-orbital bristles otherwise disposed; vein 6 not attaining margin.....6

6. 2 fronto-orbital bristles present, and at least the posterior one reclinate, or these bristles absent; costa with pair of strong spines terminating section basad of costal break... widespread, not in Australia or New Zealand. .....Trixoscelidini (part)

——3 fronto-orbital bristles present, all reclinate; costa with one spine (sometimes weak) terminating section basad of costal break... Australia and New Zealand.....7

7. 1 preapical dorsal bristle on each tibia; costa beyond vein 1 with short, spaced spines among the anteroventral series of setulae; postfrons not sexually dimorphic... New Zealand.....Fenwickiini

——Preapical dorsal tibial bristles absent; costa beyond vein 1 without spaced spines; postfrons of male narrowed... Australia.....Waterhouseiini

8. Prosternum connected to propleuron on each side by a sclerotized precoxal bridge (in *Cinderella* the bridge is often not visible without decapitation but the very broad prosternum, filling space between coxae, is often apparent).....9

——Prosternum relatively narrow, without precoxal bridges.....10

9. Vein 6 curved forwards distally so that its unpigmented distal part is subparallel with vein 5; fronto-orbital bristles directed outwards; ptilinal suture transverse, concealing lunule; cerci of female consisting of pair of basal plates, from each of which arises a curved, shining process ending in a large spine... temperate S. America.....Blaesochaetophorini

——Vein 6 only slightly curved, not becoming subparallel with vein 5; fronto-orbital bristles reclinate and slightly sloped outwards; ptilinal suture arched above level of antennal sockets, exposing lunule; cerci of female simple... Americas.....Cinderellini

10. Fronto-orbital bristles 3, reclinate... Americas (principally temperate South America).....Gephyromyzini

——Fronto-orbital bristles 1 or 2.....11

11. Arista inserted no closer to base than to apex of segment 3 (viewed from above); antenna porrect; not more than 3 pairs of dorsocentral bristles present; postgenal fold absent; either central cheek bristle strongly developed or wing extensively spotted... Australia, New Guinea, Americas.....Rhinotorini

——Insertion of arista closer to base than to apex of segment 3; antenna more or less decumbent (except in Nephellini with 5 pairs of dorsocentrals); other characters variable.....12

12. Fronto-orbital plate short, sloping mesad away from eye margin, and bearing one strong bristle only; costa with strong, spaced spines; subcosta complete, distally diverging from vein 1... widespread, absent from southern Neotropical and Australian Regions.....Suilliini

——Fronto-orbital plate parallel with eye margin, or bearing more than one bristle; other characters variable.....13

13. Scutellum haired dorsally; vein 7 relatively well developed, curved; femora with thickened ventral spines... Australia.....Tapeigastrini

——Scutellum usually not haired; vein 7 short or absent; femora not strongly spined ventrally.....14

14. Mid and hind tibiae with numerous dorsal bristles, some on basal half; costa near middle usually with numerous, rather crowded, short, thick spines among the hairs; size large, wing over 6 mm long... South America.....15

——Mid and hind tibiae without dorsal bristles on basal half; costal spines, if differentiated, more widely spaced; size variable.....16

15. Sclerotized part of face deeply excavated; prosternum broader than long. .....Diaciini (part)

——Face not deeply excavated; prosternum much longer than broad. ..... Zachaetomyiini

16. 5 pairs of dorsocentral bristles present.....17

——Less than 5 pairs of dorsocentral bristles present.....20

17. Mesopleuron coarsely setulose; propleural bristle rather short; veins 2 and 3 apically divergent... Palearctic Region.....Trixoscelidini (part)

——Mesopleuron bare; propleural bristle long, reaching as far as humeral callus; veins 2 and 3 apically convergent or parallel... south temperate regions.....18

18. Costa with spaced spines; vein 6 reaching almost to margin; several pairs of acrostichal bristles present; central cheek bristle absent... temperate S. America.....Epistomyiini

——Costa without spaced spines; distal section of vein 6 discontinued at about 3/4 of its extent to margin; acrostichal bristles absent; central or central-marginal cheek bristle present.....19

19. Postgenal fold forming a deeply incised groove; palpus very short; preapical dorsal tibial bristles absent.....Nephellini

——Postgenal fold absent; palpus normal; each tibia with one preapical dorsal bristle.....Pentachaetini (part)

20. Pleurotergite of the allophylopsine type; mid femur with one strong apical to subapical posterior bristle.....21

——Pleurotergite of the rhinotorine type; apical to subapical posterior bristle on mid femur usually rather weak, absent, or one of a series.....22

21. Mid tibia with pair of strong, approximated dorsal bristles somewhat beyond middle, and no other bristles but the terminal ones; at most, only the prescutellar pair of acrostichals present... Australia and New Zealand. .....Allophylopsini

——Mid tibia with one dorsal bristle at one quarter to one third length of tibia from apex, and one or 2 subdorsal bristles between this and apex; several pairs of acrostichal bristles more or less distinguished from adjacent hairs... temperate South America, introduced elsewhere.....Cnemospathini

22. Propleural bristle well developed; vein 7 visible as a short crease in membrane beyond alula... Holarctic Region.....Chiropteromyzini

——Propleural bristle vestigial or absent; vein 7 absent... south temperate regions. 23

23. Cheek with at least one long bristle near centre; second basal and anal cells very small, about 0.1 of length of discal cell; distal section of vein 6 running much closer to postero-basal margin of anal region of wing than to vein 5... temperate South America.....Pentachaetini (part)

——Central cheek bristles absent; second basal and anal cells normal; distal section of vein 6 in normal position.....24

24. Mid tibia with only one strong preapical dorsal bristle in addition to terminal bristles; ♂ postabdomen with well developed setose tergite 6 and no sternite 8... temperate South America.....Notomyzini

——Mid tibia with two preapical dorsal and at least one anterior bristle, or with only the terminal bristles; ♂ postabdomen: tergite 6 much reduced or absent; sternite 8 large... Australia.....Borboroidini

Tribe Heleomyzini

Face with differentiated sclerotized lateral plates extending to near, or below, level of vibrissa; ptilinal suture laterally discontinued far above vibrissa; a vertical or oblique postgenal fold separating setulose postgenal region from central part of cheek; fronto-orbital bristles 1 or 2, more or less reclinate, on rather short fronto-orbital plates; prelabrum narrow; proboscis rather short, with broad or moderately developed labella, antenna porrect or decumbent, with segment 3

rounded; propleural bristle long, solitary; mesopleural bristle absent; 1 or 2 strong sternopleural bristles present; dorsocentral bristles usually 3 or more; prosternum usually broadly triangular with precoxal bridges at most only weakly indicated; mid femur usually with one or more anterior bristles; tibiae with distinct preapical bristles; costa incised only at end of subcosta, usually with strong spaced spines; subcosta complete and distally diverging from vein 1; vein 6 complete; vein 7 distinguishable; anal crossvein strongly convexly curved; male postabdomen diverse (see below); female with separately sclerotized, often elongate cerci.

The taxonomic position of *Heteromyza* and allied genera has been a matter of disagreement. Czerny included these in the subfamily Heleomyzinae, without special segregation, and has been followed by most taxonomists. Gorodkov (1971) stated, in connection with his study of postabdominal morphology: "Heteromyzidae Fallén is a taxon at least of the subfamily range." Griffiths (1972) separated *Heteromyza* and *Tephrochlamys* in the family Heteromyzidae, placing this and the Tanypezidae (s.l.) as the only families of his prefamily Tanypezoinea. Hackman (1977) also gave Heteromyzidae separate family rank from Heleomyzidae.

In males of *Heteromyza* and *Tephrochlamys* the symmetrical segment 6, with relatively large tergite and sternite, has been considered a remarkable departure from the condition in other heleomyzine genera. However, I find sternite 6 of *Heteromyza rotundicornis* (Zetterstedt) to be only approximately symmetrical (Fig. 68), a condition which could be explained by selection for functional symmetry acting upon a primarily asymmetrical complex.

In males of many typical Heleomyzini tergite 6 is reduced to a narrow transverse strip or absent, sternites 6 and 7 are asymmetrically placed, at least the latter is joined to sternite 8, and the seventh right spiracle is located ventrally, most often to the left of the median ventral line [*Scoliocentra* (Fig. 67), *Heleomyza* (Gorodkov, 1962b, as *Leria*), *Pseudoleria* (my observations), *Neoleria* (Crampton, 1942, Gorodkov, 1959), *Anorostoma* (Crampton, 1942), *Aecothea* (Gorodkov, 1959)]. Gorodkov (1971) discusses variation in this series. *Orbellia* (Hennig, 1958: Fig. 234; Czerny, 1927a: Fig 26, whole insect; my observations), and *Desertoleria* (Gorodkov, 1962a) have a rather large quadrate, setulose tergite 6 and a large but asymmetrical and somewhat laterally displaced sternite 6. They could be considered to be intermediate between the *Heteromyza* configuration and that of the more typical heleomyzines. *Oldenbergiella* is another genus with well developed tergite 6 and asymmetrical protandrial sternites (Czerny, 1924; Gorodkov, 1971). I conclude that the Heleomyzini, however defined, is a group showing considerable variation in the protandrial sclerites.

It might be inferred from Griffiths' characterisation of the prefamily Tanypezoinea that the *Heteromyza* complex shares with the Tanypezidae the modifications of the 'ovipositor' segments found in that family. This, however, is not so. The female postabdominal segments of *Heteromyza* and *Tephrochlamys* are not very unlike those of *Scoliocentra* and *Heleomyza*, though some other heleomyzines, e.g. *Aecothea*, differ considerably. The cerci of female *Heteromyza* and *Tephrochlamys* are separate, articulated structures as in other heleomyzines examined. In female Tanypezidae there are no distinguishable cerci.

The absence of the seventh pair of abdominal spiracles is a significant condition shared by Tanypezidae and 'Heteromyzidae', according to Griffiths. I find it to occur in both sexes of the heleomyzid genus *Diplogeomyza* in all species groups (McAlpine, 1967), and in both sexes of at least some species of *Trixoscelis* (Hennig, 1958). The seventh pair of spiracles is absent in males of *Prosopantrum*, *Notomyza*, *Austroleria*, and in a part only of the genus *Borboroides*. In the male of *Zachaetomyia* the spiracles of segment 7 are reduced in size. The fact that the condition of the seventh pair of spiracles is not recorded for females of these and other heleomyzid genera seems mainly due to lack of investigation. Undoubtedly the loss of these spiracles is a very simply achieved evolutionary step which has taken place in numerous lineages.

The costal spination of the *Heteromyza* complex is rather variable and differs from that of most heleomyzines only in degree of reduction of major spines. In *Orbellia*, the position of which in the Heleomyzini is accepted, they are also much reduced. The pattern of costal spination in *Heteromyza rotundicornis* (Fig. 32) lies well within the range of variation for typical heleomyzines.

Sexual dimorphism in the width of the postfrons occurs within this complex only in certain species of *Heteromyza*. It is found elsewhere in the Heleomyzidae in *Waterhouseia*, which appears to have quite different affinities despite its *Heteromyza*-like male abdominal segment 6. In the Tanypezidae, sexual dimorphism of the head occurs in only some species of one of the two subfamilies (viz. Tanypezinae and Strongylophthalmyiinae) and may well not be a groundplan character for the family. It is possible that the correlation of sexual dimorphism of the head and approximate symmetry of segment 6 is brought about by a common behavioural trait in its bearers, perhaps aerial mating (see Downes, 1969, for discussion of ocular dimorphism in this connection).

In *Tephrochlamys* and *Heteromyza*, the facial structure is identical to that of *Heleomyza* and allied genera, though the Tanypezidae also have the face desclerotized medially. *Tephrochlamys rufiventris* (Meigen) and *Heteromyza rotundicornis* (Zetterstedt) have a typical heleomyzine prosternum of broadly triangular shape, with only weak indications of precoxal bridges. The prosternum of *Tephrochlamys* resembles in remarkable detail that of such typical heleomyzines

as *Pseudoleria* (compare Figs 41 and 40). Particularly notable is the presence of a lightly sclerotized lateral supernumerary sclerite, and, in both examples, the anterior part of the plate is little sclerotized with rather indefinite limits.

Griffiths (1972) notes the characteristic structure of the spermathecae in *Tephrochlamys rufiventris* (Meigen). I have not made a study of the spermathecae in the Heleomyzini, but among other heleomyzids there are similarities in spermathecal structure (M.A. Schneider's unpublished studies). These are noted for *Borboroides* (one undescribed species investigated) and for a number of species of *Diplogeomyza*, which have two of the three spermathecal vesicles arising directly from the swollen apex of the one common duct, the sclerotized lining of the vesicle continuing into the apical part of the duct to a varying extent. The closest approach to that of *T. rufiventris* is probably found in *Diplogeomyza hardyi* McAlpine. All these forms have 3 spermathecal vesicles according to Schneider's studies. Hennig (1958) records *Tephrochlamys rufiventris* as having 2 spermathecae, but the one specimen I examined has 3, as given by Griffiths, though the form of the single spermatheca agrees with Hennig's Fig. 27.

I conclude that, in view of the detailed morphological agreement, the *Heteromyza* complex is best retained in the tribe Heleomyzini, and that its removal from the family Heleomyzidae can only be justified by placing an undue emphasis on the male postabdominal characters.

Tribe Tapeigastrini

Fronto-orbital plate short and parallel with eye-margin, with one or two somewhat reclinate, often weak bristles; prelabrum reduced; antenna decumbent; arista with very short hairs only, inserted sub-basally on segment 3; propleural and mesopleural bristles absent; 1 sternopleural bristle present; 1 or 2 dorsocentral bristles present; scutellum with 2 pairs of bristles, the anterior pair a little in front of middle of length, and numerous short hairs; all femora with strong ventral spines; preapical dorsal tibial bristle usually rather weak or absent; costa not weakened just beyond humeral crossvein; subcosta complete, distally diverging from vein 1; anal crossvein with sigmoid curvature, almost transverse; vein 6 generally long, reaching margin in some species; vein 7 present; male postabdomen (McAlpine & Kent, 1982) with tergite 6 reduced, sternites 6 and 7 laterally placed.

I provisionally refer here the new genus *Ollix* which, while resembling *Tapeigaster* in several characters, also bears some resemblance to *Amphidysis* of the tribe Diaciini. *Ollix* and *Tapeigaster* share the following notable characters: face concave; segment 6 of arista gradually thickened basally (in contrast to Diaciini) and segment 5 short (in contrast to Zachaetomyiini); anal cell angular posterodistally (*Tapeigaster subglabra* has the anal cell very similarly formed to that of *Ollix cupella*); vein 6 reaching approximately to margin (some exceptions in *Tapeigaster*); vein 7 visible; prosternum narrow; costal break at end of subcosta consisting of weakening of vein for a short distance rather than a definite incision; preapical tibial bristles weaker than usual in the family, and located closer to apex of tibia. *Ollix* differs from *Tapeigaster* in the more numerous dorsocentral and sternopleural bristles, absence of hairs on the scutellum, different structure of the subcostal cell, and indication of some irregularly enlarged costal bristles.

The placement of *Tapeigaster* in the Scatophagidae (correctly Scathophagidae) by Bezzi (1923) and Séguy (1934, 1952) is without any sound basis. The genus is clearly acalyptrate and was first referred to the heleomyzid alliance by Hennig (1958).

Schneider (1982) provides information on the male and female reproductive systems of *Tapeigaster* species.

Tribe Suilliini

Fronto-orbital plate short, sloping away from eye anteriorly, with only one reclinate bristle (in recent forms); antenna somewhat decumbent, with arista inserted sub-basally on segment 3; propleural bristle minute; mesopleural bristle absent; one sternopleural bristle present; dorsocentral bristles 4 or 5 (only one in the little-known *Porsenus*); scutellum with 2 pairs of strong marginal bristles, with or without short hairs; tibiae each with one preapical dorsal bristle; costa with spaced anterior spines between veins 1 and 2, not weakened beyond humeral crossvein; subcosta complete, diverging from vein 1; vein 6 rather long but incomplete; vein 7 usually present as a trace; male postabdomen with tergite 6 much reduced; sternites 6 and 7 more or less fused with sternite 8 on left side.

Suillia (including *Allophyla*) is a large well known genus, but further study of the little-known nearctic genus *Porsenus* is desirable.

Though this tribe is principally holarctic, *Suillia* has penetrated southwards to Colombia and Ecuador (new records for South America, CNC material), to South Africa and Madagascar in the Afrotropical Region (Cogan, 1971), and to Java in the Oriental Region (Hackman, 1977).

Hennig (1965) refers two fossil species to this group (as subfamily Suilliinae). These are placed respectively in *Protosuillia* Hennig and provisionally in *Suillia*.

Tribe Diaciini n.tr.

Cuticle of thorax and abdomen black (cuticle often more or less concealed by grey pruinescence), contrasting with the largely ochraceous to orange head capsule; postfrons anteriorly produced horizontally over ptilinal suture; eye surface much reduced, or slightly so in *Amphidysis*; face below antennal sockets with pair of sclerotized, deeply concave plates, which are separated on median line, or, in *Diacia*, completely

fused, the rest of the face largely desclerotized or, in *Diacia*, with prominent, sclerotized epistomal margin; cheek and parafacial with fingerprint sculpture (weak and concealed by pruinescence in *Diacia*); postgena with vertical fold; ptilinal suture laterally reaching behind and below insertion of vibrissa; fronto-orbital bristles 2, rather close together on posterior half of postfrons, posterior one somewhat reclinate, anterior one somewhat proclinate; vibrissa situated well above oral angle, rather weak except in male of *Diacia*; arista glabrous or very minutely haired, with short thick segment 5, and segment 6 shortly bulbous basally; propleural and prostigmatal bristles both developed, or, in *Amphidysis*, more than one propleural and no prostigmatal bristle; mesopleuron bare or, in *Dichromya*, coarsely setulose; more than 2 upper sternopleural bristles present, or, in *Diacia*, only one; scutellum setulose dorsally, except in *Diacia*; prosternum without precoxal bridges, broad except in *Amphidysis*; costa not noticeably weakened near humeral crossvein, without thickening and flexure at subcostal break; subcosta complete, not much diverging from vein 1 distally; vein 6 long; vein 7 absent, or, in *Amphidysis*, quite long; male postabdomen (Hennig, 1971; author's observations) with tergite 6 larger than in most heleomyzid groups, well sclerotized, setulose, resembling tergite 5 in texture; sternite 6 displaced towards left side; sternite 7 lateral; aedeagus with slightly elongate, sclerotized basiphallus, and largely membranous distiphallus, which is elongate in *Amphidysis*, very broad in *Dichromya* and *Diacia*; female postabdomen with cerci joined by a membrane for their entire length.

The three genera of this tribe, *Diacia*, *Dichromya*, and *Amphidysis*, appear to be closely related on the basis of a considerable number of characters, not all shared between all genera as each genus has some peculiarities. I believe that *Amphidysis* forms a sister group to the other two genera, as evidenced by the following, probably apomorphic characters shared between *Diacia* and *Dichromya*: prosternum broadened; vein 6 incomplete; vein 7 absent. This grouping is supported by geographic distribution (*Amphidysis* in Western Australia, *Diacia* and *Dichromya* in South America). On the other hand there are remarkable similarities between *Dichromya* and *Amphidysis* in facial structure, sculpture of the cheek and parafacial, number of sternopleural bristles, and hairing of the scutellum, not shared with *Diacia*. This character distribution could be accounted for either by a complex convergence between *Dichromya* and *Amphidysis*, or, in some characters, regression towards the apparently primitive condition in *Diacia*.

Hennig (1971) has presented evidence for viviparity in *Dichromya*.

Tribe Zachaetomyiini n.tr.

General coloration fulvous with darker abdomen (in contrast to Diaciini); face evenly sclerotized, not deeply excavated, but with transverse groove just above lower margin (thus more as in Allophylopsini than in Diaciini); fronto-orbital plate with 2 long, outwardly directed bristles; ptilinal suture extending close behind and below insertion of vibrissa; arista with subcylindrical, elongate segment 5; segment 6 only slightly thickened basally, with numerous short hairs, the longer ones about as long as basal diameter of segment; propleural and prostigmatal bristles well developed; mesopleuron bare; usually 3 sternopleural bristles present; dorsocentral bristles 1 + 4; pleurotergite somewhat approaching the allophylopsine condition, with upper part most convex next to the narrow groove separating it from lower part; scutellum without hairs or setulae, with bristles of lateral pair inserted behind middle of length of scutellum; prosternum narrow; fore tibia with one preapical dorsal bristle only; other tibiae with additional bristles including long dorsal one near base, bristling more developed in male; costa slightly weakened just beyond humeral crossvein, with slight thickening and flexure at subcostal break, with short, spaced spines at rather short intervals anterodorsally, and more numerous short, anterior to anteroventral spines; subcosta complete, a little divergent from vein 1; vein 6 almost straight, reaching approximately to margin; vein 7 absent; anal crossvein recurrent, making anal cell scarcely angular posterodistally; male postabdomen with tergite six short but well sclerotized, asymmetrical; sternites 6 and 7 laterally placed; left spiracle 7 located in sternite, other spiracles of segments 6 and 7 located in membrane; sternite 8 well developed, with long bristles posteriorly; surstylus articulated basally; hypandrium with 2 pairs of gonites; aedeagus not very elongate, with distinct basiphallus and broad, anteriorly reflexed distiphallus; cerci widely separated; female postabdomen with segments behind segment 5 progressively shortened; cerci rather elongate, straight, articulated basally, with hairs and pruinescence (thus contrasting with cerci of Blaesochaetophorini).

This tribe may be related to the Blaesochaetophorini and Diaciini, but differs from the former in the structure of the hypofacial, prosternum, vein 6, and female cercus, and from the latter in structure of the face, arista, costa, and anal crossvein. The pleurotergite is rather different from that of both groups.

Tribe Blaesochaetophorini n.tr.

Fronto-orbital plate of moderate length, approximated to eye-margin, with one or 2 outwardly curved bristles; antenna porrect or almost so; arista with numerous short hairs, inserted sub-basally on the broadly rounded segment 3; segment 5 of arista cylindrical, long and rather stout; prelabrum strongly developed; propleural bristle variably developed; mesopleural bristle absent; 2 to 4 sternopleural bristles present, the foremost set higher than hindmost; dorsocentral bristles 0 + 3 or 1 + 3; scutellum without hairs, often with basal pair of bristles longer than apical ones and situated behind middle of scutellum;

prosternum with well developed precoxal bridges; mid tibia with a strong preapical anterodorsal bristle and sometimes series of posterodorsal bristles; costa more or less weakened just beyond humeral crossvein, with long spaced spines, or spines absent beyond end of vein 1; subcosta rather close to vein 1 distally, distinct throughout or obsolete distally; vein 6 gradually fading and curving forwards to become parallel with vein 5 distally, not reaching margin; vein 7 absent; male postabdomen, so far as known, with variably reduced tergite 6; sternites 6 and 7 asymmetrical, sometimes reduced; one pair of articulated surstyli present; aedeagus with prominent, elongate basiphallus and elongate distiphallus directed basad from anterior surface of basiphallus; cerci widely separated; cercus of female elongate, curved, glabrous with compressed terminal spine, basally fused with last visible tergite, resembling cercus of *Canace* (family Canacidae).

It is possible that this tribe is somewhat related to the Zachaetomyiini and Diaciini as all these include at least some forms with strong bristles on much of the length of the mid tibia, and, in all, the ptilinal suture extends close behind the vibrissa. The basic pattern of the fronto-orbital bristles appears to be 2 outwardly directed elements in both Zachaetomyiini and Blaesochaetophorini.

Malloch (1933) recognized the genera *Blaesochaetophora*, with only included species *B. picticornis* (Bigot), and *Dihoplopyga*, which he established to include *D. polita* Malloch (type-species) and *D. norma* Malloch. For *Dihoplopyga* he states:

"Very similar ... to *Blaesochaetophora*, but lacking postero-dorsal bristles on mid tibiae, well-developed propleural and stigmatal bristles, and well-developed costal bristles beyond apex of first vein. There is but one humeral present, and no additional bristle near the long presutural sublateral one; the scutellar bristles are not crowded together on less than the apical half."

A further point of difference is the presence of four pairs of dorsocentral bristles in the described species referred to *Blaesochaetophora* and three pairs in those referred to *Dihoplopyga*.

On examining about 800 specimens of this tribe I find that all these supposed generic characters break down. *Blaesochaetophora picticornis* appears to be simply that species, of a variable complex, with greatest hypertrophy of the bristling, and, if my estimation of specific limits is correct, it is itself somewhat variable in almost every character. Some specimens, possibly diminutives of *B. picticornis*, have the dorsal submedian bristles present on one mid tibia and absent on the other. An apparently undescribed species has four pairs of dorsocentral bristles in combination with two subequal pairs of fronto-orbitals, a vestigial propleural, the lateral pair of scutellars behind middle of scutellum and no submedian dorsal bristles on the mid tibia. Its generic position would depend on which characters are weighted most heavily. Some small specimens of *B. picticornis* have the costal spines between veins 1 and 2 no more differentiated than in large specimens of *D. polita*.

I am convinced that the only reasonable course is the union of these two genera. Thus *Dihoplopyga* Malloch, 1933, becomes a new synonym of *Blaesochaetophora* Czerny, 1904, and the species *D. norma* and *D. polita* are transferred to *Blaesochaetophora*.

Tribe Borboropsini.

Fronto-orbital plate moderately long with 2 subequal, outwardly flexed bristles; cheek bristles long but not forming a horizontal series; antenna decumbent with short segment 2 and broadly rounded segment 3; arista inserted sub-basally on segment 3, with segment 5 cylindrical and segment 6 not markedly swollen basally; propleural bristle moderately developed; mesopleural bristle present; one strong and one or more shorter sternopleural bristles present; dorsocentral bristles several, diminishing in size anteriorly; scutellum without hairs; preapical dorsal tibial bristles variable, often rather weak; costa between veins 1 and 2 with short, spaced spines, scarcely longer than hairs, or these spines indistinguishable; subcosta complete, not much diverging from vein 1 distally; anal crossvein curved; vein 6 reaching margin; vein 7 forming an unpigmented fold in membrane; male postabdomen (Griffiths, 1972) with tergite 6 reduced, sternites 6 and 7 located on left side and linked to sternite 8.

Information on representatives of this monogeneric tribe is given by Hackman & Andersson (1969), Griffiths (1972), and Mathis (1973).

Tribe Chiropteromyzini.

Face concave; postgenal fold absent; fronto-orbital bristles 2, reclinate, the anterior one also sloping outwards; cheek with a horizontal series of bristles; prelabrum rather small; proboscis short, with moderately developed labella; antenna decumbent, with large discoid segment 3; segment 5 cylindrical; propleural bristle well developed; mesopleural bristle absent; one strong sternopleural; dorsocentral bristles 1 + 3; scutellum without hairs; prosternum elongate, anteriorly narrowed, without precoxal bridges; each tibia with one preapical dorsal bristle and no other bristles but the terminal ones; costa not distinctly weakened just beyond humeral crossvein, with spaced spines between veins 1 and 2 distinguishable but sometimes little differentiated, with section basad of subcostal break having one anterior and one dorsal spine at apex, both little differentiated from seriate setulae; subcosta distally very close to vein 1, but latter terminating distinctly beyond subcostal break of costa; veins 2 and 3 distally diverging; second basal and anal cells short; anal crossvein curved; vein 6 almost straight, not reaching margin; vein 7 short but distinguishable; male postabdomen (Griffiths, 1972) with tergite 6 short but distinct; sternites 6 and 7 located on left side; 2 pairs of surstyli present; aedeagus long and slender; female postabdomen without elongate segments; cerci distinct but rather small.

Frey (1952), Hennig (1971), and Griffiths (1972) provide information on the unique genus of this tribe. Treating it under the name *Chiropteromyza*, these authors overlooked the fact that this was the genus known by the earlier name *Neossos* in North America.

Tribe Cinderellini n.tr.

Fronto-orbital plates indistinct, particularly so anteriorly, with usually 2 pairs of reclinate fronto-orbital bristles, or sometimes a weaker third bristle anteriorly; cheek without prominent central bristle; face entirely sclerotized, with low median tubercle or carina usually not reaching epistomal margin, broadly medially emarginate below, with lower lateral part continuous with hypofacial which is broadly visible below cheek in profile; ptilinal suture arched well above level of antennal sockets, its upper lip not overlapping lower but almost level with it, thus with well exposed and sclerotized lunule; antenna usually slightly decumbent, with subcircular segment 3; arista with minute, rather dense pubescence; prelabrum well developed, deep and rather narrow, its somewhat flattened anterior surface fitting into the broad emargination of lower part of face; proboscis with rather large reflexed labella; propleural bristle usually small and weak; prostigmatal bristle longer; mesopleuron without hairs or bristles; sternopleuron with at least one strong bristle, usually with hairs or incipient bristles anteriorly, but not with anterior elements set higher than posterior bristle; dorsocentral bristles usually 0+2; acrostichal bristles usually represented by the prescutellar pair only; scutellum without hairs (other than pubescence), with lateral pair of bristles rather close to scutellar suture; pleurotergite as in Rhinotorini; prosternum broadly subtriangular, filling area between fore coxae, with well sclerotized precoxal bridges, each of which is traversed by an impressed suture; mid femur with one or more anterior bristles and one preapical posterior bristle; mid tibia with one or 2 preapical dorsal bristles; other tibiae with or without one preapical dorsal bristle; costa slightly weakened just beyond humeral crossvein, with or without spaced anteroventral spines between veins 1 and 2; veins 2 and 3 divergent distally; second basal and anal cells short; vein 6 fading distally, but sometimes extending rather near margin, situated much nearer to posterobasal margin of anal region of wing than to vein 5; vein 7 absent; male postabdomen with tergite 6 reduced, little sclerotized; sternites 6 and 7 laterally placed, the latter joined to sternite 8; spiracles of segment 6 located in membrane; left spiracle 7 located within margin of sternite 7; right spiracle 7 located on a small sclerite near median ventral line; epandrium with pair of basally articulated surstyli; hypandrium without prominent gonites; aedeagus not very complex, rather short (*Cinderella lampra* Steyskal and *C. macalpinei* Hennig: see Steyskal, 1969; Hennig, 1969), or long, slender and strap-like (*C. steyskali* Hennig; author's observations); cerci separate, rather small; female postabdomen with tergites and sternites separate, but those behind segment 7 largely desclerotized; cerci slender, separate; spermathacae 3, 2 of them sharing a common duct (Steyskal, 1969; Hennig, 1969).

This tribe includes only the genus *Cinderella*, but the 8 known species (2 still undescribed) show a range of morphological variation which might have justified earlier workers in dividing the group into several genera. *Cinderella hirsuta* Hennig differs from other species in possessing 5, instead of 2 or 3, pairs of dorsocentral bristles, and otherwise has the bristling of the thorax and abdomen better developed; but, as pointed out by Hennig (1969), it is closely related to *C. steyskali* Hennig and the general hypertrophy of the chaetaxy is probably a recently acquired character. There is some diversity in postabdominal characters. *Cinderella steyskali* has large, conspicuous postabdominal spiracles with pigmented rims, but in *C. lampra* Steyskal they are apparently small, if present at all, as Steyskal (1969) was unable to locate them. On the other hand, they are present in *C. macalpinei* Hennig according to Hennig (1969). *Cinderella lampra* and *C. macalpinei* have the aedeagus short and compact, while *C. steyskali* has a very elongate, strap-like aedeagus. Postabdominal characters are not recorded for the other species.

My studies suggest that the genus is divisible into 3 natural (? monophyletic) groups.

Key to Species Groups of *Cinderella*

1. Costa with spaced anteroventral spines between veins 1 and 2; haltere pale yellowish.....Group 1

——Costa without such differentiated spines; haltere brown.....2

2. Mid tibia with 2 approximated preapical dorsal bristles; head, thorax, and abdomen shining black, scarcely pruinescent.....Group 2

——Mid tibia with 1 preapical dorsal bristle; most of body pruinescent and little shining.....Group 3

Group 1 includes *C. steyskali* Hennig, and *C. hirsuta* Hennig. Group 2 includes *C. lampra* Steyskal, *C. aczeli* Steyskal, and *C. macalpinei* Hennig. Group 3 includes 2 undescribed species from Chile (CNC).

Tribe Epistomyiini n.tr

Fronto-orbital plate of moderate length, with 2 subequal bristles inclined backwards and outwards; antenna decumbent; arista with numerous short hairs; prelabrum large and prominently projecting anteriorly; propleural bristle large; mesopleural bristle absent; sternopleural bristles several, decreasing in size anteriorly; dorsocentral bristles 1+4; acrostichal bristles, including some anterior ones, well developed; scutellum not haired, with one sub-basal and one apical

pair of bristles; pleurotergite somewhat like that of Allophylopsini and Cnemospathini, but with deeper groove more completely separating the two convexities; mid femur with series of anterior bristles distally and a large, isolated subapical posterior bristle; mid tibia with one strong preapical dorsal bristle and strong apical bristles as follows: one anterodorsal, one posterodorsal, 2 ventral; fore and hind tibiae each with one preapical dorsal bristle; costa with spaced anteroventral spines beyond end of vein 1, not very noticeably weakened just beyond humeral crossvein; subcosta not weakened distally, reaching costa but in contact with dilated distal part of vein 1; veins 2 and 3 subparallel distally; vein 6 long, with slight curvature, discontinued a very short distance from margin; vein 7 absent; male postabdomen with sternite 5 bearing pair of prominent horn-like lobes; tergite 6 reduced; sternites 6 and 7 well developed, laterally placed; spiracles of segments 6 and 7 present in membrane; epandrium with one pair of articulated surstyli; aedeagus short and broad; cerci separate, broad; female postabdomen with terminal segments elongate, folding telescopically; cerci somewhat elongate, separate.

Epistomyia has much in common with *Prosopantrum* (Cnemospathini) including many features of chaetotaxy. I have considered placing them in the one tribe but the two genera do not appear to share any distinctive apomorphic characters. Further, it seems possible that *Epistomyia* is as closely related to *Notomyza* (which has a similar pleurotergite), and perhaps to other groups, as it is to *Prosopantrum*. *Prosopantrum*, on the other hand, is perhaps more closely related to the Allophylopsini than to *Epistomyia* on the basis of the pleurotergite and vein 6.

Epistomyia also differs from *Prosopantrum* in the enlarged prelabrum, 5 pairs of dorsocentral bristles, stronger propleural bristle, the progressive shortening anteriorly of the sternopleural bristles, differentiated costal spines, the presence of a pair of processes on male sternite 5, and the short, broad aedeagus.

Tribe Cnemospathini

Fronto-orbital plate of moderate length, usually with 2 bristles inclined outwards and backwards; antenna decumbent; arista with numerous short hairs; propleural bristle small; mesopleural bristle absent; 2 sternopleurals present; dorsocentral bristles usually 0+3 or 0+4; some rather well developed acrostichal bristles often present in front of the prescutellar pair; scutellum not haired, with one sub-basal and one apical pair of bristles; pleurotergite as in Allophylopsini; mid femur armed as in Allophylopsini; mid tibia with 2 or 3 strong dorsal bristles on distal part, including one just before apex and one at about apical third; costa without spaced spines, visibly weakened just beyond humeral crossvein; subcosta distally weakened and close to vein 1; vein 6 as in Allophylopsini; vein 7 absent; male postabdomen with sternite 5 simple, sternites 6 and 7 situated on left side; aedeagus elongate, strap-like; female postabdomen with separate cerci.

The possible sister-group relationship with the Allophylopsini is mentioned below. There are, however, some similarities between Notomyzini and Cnemospathini (notably in the armature of the basal part of the costa), which might seem to negate such a sister-group relationship.

Tribe Allophylopsini

Fronto-orbital plate rather long or moderate, often somewhat separated from eye-margin anteriorly, with 2 reclinate bristles which are sometimes sloped outwards; antenna somewhat decumbent; arista sub-basal on segment 3, varying from extensively short-haired to long-plumose; propleural bristle minute; mesopleural bristle absent; usually one sternopleural bristle present; dorsocentral bristles 0+3, 1+2, or 1+3; scutellum with 2 pairs of major bristles one of which is sub-basal; pleurotergite of distinctive structure (see above); mid femur with a series of anterior bristles distally and a large, isolated apical to subapical posterior bristle; mid tibia with 2 large, approximated dorsal bristles beyond middle, and no other bristles but the terminal ones; costa distinctly weakened just beyond humeral crossvein, usually with visible but rather short spaced spines; subcosta either distally weakened and approximated to vein 1, or well developed and distally diverging from vein 1 (*Leriopsis*); vein 6 abruptly discontinued well before margin, its distal end often slightly curving towards posterior margin; vein 7 absent; male postabdomen (Tonnoir & Malloch, 1927; McAlpine 1967; Griffiths, 1972) with tergite 6 free, sternites 6 and 7 laterally placed; spiracle of segment 7 absent; female postabdomen with separate cerci, with spiracle of segment 7 absent so far as known (McAlpine, 1967).

The apomorphic features of the pleurotergite appear to indicate that the Allophylopsini and Cnemospathini are sister groups. Further evidence of relationship between these tribes is provided by the extent and contour of vein 6, the break or weak point in the costa just beyond the humeral crossvein, which is more distinct than in most heleomyzids, and the pair of slightly enlarged spines at the distal end of the succeeding costal section next to the subcostal break.

A key to the genera of this tribe is given by McAlpine (1967).

Tribe Borboroidini n.tr

Fronto-orbital plate of moderate length with one strong posterior bristle, which is reclinate and variably sloped outwards, and an anterior one, that may be directed outwards or forwards, or is much reduced; antenna porrect or slightly decumbent; arista inserted sub-basally on segment 3, with numerous very short hairs; proboscis with well developed labella; propleural bristle vestigial or absent; mesopleural bristle absent; sternopleural bristles usually 2, very unequal; at most 3 dorsocentral bristles; scutellum not haired, with one

sub-basal and one apical pair of bristles; prosternum rather short and broad, usually subtriangular, without precoxal bridges; mid tibia with pair of approximated preapical dorsal bristles and one to 3 anterior bristles near middle, or (in *Heleomicra*) all these bristles absent; costa not spinose; subcosta distally distinct and slightly diverging from vein 1, or distally obsolete and somewhat approximated to vein 1; veins 2 and 3 forking well before level of base of discal cell; anal cell angular posterodistally, often obtusely so; anal crossvein nearly straight; vein 6 not reaching margin; vein 7 absent; male postabdomen with tergite 6 reduced (*Heleomicra*) or absent (*Borboroides*); sternites 6 to 8 united into a single large sclerite; cerci separate in both sexes.

There is an element of doubt regarding the degree of relationship between the 2 included genera, *Borboroides* and *Heleomicra*. Although their type-species are superficially very similar insects, there are some important differences and the shared apomorphic characters do not form a very distinctive set.

Tribe Notomyzini

Face somewhat concave, with slightly raised median line; postgenal fold absent; fronto-orbital bristles 2, curved outwards, in addition the anterior one somewhat proclinate, the posterior one somewhat reclinate; no outstanding central cheek bristle present; other cheek bristles not entirely seriate; prelabrum moderately developed; proboscis rather short, with labella of moderate size; antenna almost porrect; distal surface of segment 2 not markedly oblique; segment 3 discoid; arista densely short-haired throughout; segment 5 somewhat swollen; propleural bristle minute; mesopleural bristle absent; one strong sternopleural bristle present; dorsocentral bristles 0 + 3; acrostichal bristles absent, or a weak prescutellar pair present; scutellum without hairs; prosternum without precoxal bridges; pleurotergite intermediate between allophylopsine and rhinotorine types; each tibia with one preapical dorsal bristle, and no other bristles but the terminal ones; costa weakened beyond humeral crossvein, without spaced spines; subcosta distally obsolete; veins 2 and 3 slightly converging distally; second basal and anal cells of moderate length; anal crossvein somewhat curved and recurrent; vein 6 rather short and abruptly discontinued; vein 7 absent; male postabdomen (Malloch, 1933; Griffiths, 1972; author's observations) with remarkably large, setulose tergite 6; sternites 6 to 8 absent and the protandrium symmetrical (Griffiths, 1972), or of these only sternite 6 present, linear and asymmetrically placed; surstylus basally articulated; aedeagus forming a short tube; cerci fused below anus or small and more or less separate; female with simple, separate cerci.

Notomyza, the only included genus of this tribe, has been assigned an isolated position in a monogeneric family of doubtful relationship by Griffiths, 1972, but, except for peculiarities of the male postabdomen, it is not remarkably different from some other south-temperate heleomyzids. There are remarkably few constant characters for separation of *Notomyza* from *Prosopantrum* (Cnemospathini), even the bristling of the mid tibia being the same as in some species of *Prosopantrum*. The resemblance of *Notomyza* to *Borboroides* is also close, the pleurotergite being quite similar in both.

Griffiths describes the male postabdomen of *Notomyza* as 'fully symmetrical', on the basis of material of *N. edwardsi* Malloch. My material of an unidentified species of *Notomyza* from Vicuña, Tierra del Fuego, (AM) (Fig. 83) has an asymmetrically placed sternite (6 or 6 + 7). The absence of sternite 8 and the large tergite 6 appear to be constant characters of the genus.

Tribe Gephyromyzini n.tr.

Face almost flat or slightly prominent along median line; vertical postgenal fold absent; fronto-orbital bristles 3, somewhat reclinate, the anterior one slightly incurved; central cheek bristle absent; prelabrum not prominent; labella moderately developed; antenna porrect or almost so; arista inserted near base of segment 3; segment 5 rather large; propleural bristle vestigial; mesopleural bristle absent; sternopleural bristles usually 2, unequal; dorsocentral bristles 0 + 3, 1 + 3, or 1 + 4; scutellum without hairs; prosternum rather small, without precoxal bridges; each tibia with one preapical dorsal bristle and no other bristles but the terminal ones; costa with prominent spaced spines between terminations of veins 1 and 2; subcosta complete or almost so, distally approximated to vein 1; vein 2 long, distally diverging from vein 3; anal crossvein much curved; vein 6 variable in length; vein 7 absent; male postabdomen (author's observations) with tergite 6 much reduced; sternites 6 and 7 laterally displaced, well sclerotized; sternite 8 large; postabdomen of female variable (Hennig, 1969); segment 6 with free tergite and sternite; cerci often free.

This principally neotropical tribe is well defined but it is difficult to determine its relationship to other tribes. I provisionally accept the limits of the genera as given by Malloch (1933) and Hennig (1969), but a detailed morphological study might result in a realignment of the species. The number of sternopleural bristles, used by Malloch as a distinguishing character between *Gephyromyza* and *Cephodapedon*, has proved too variable with the discovery of additional species of the latter genus, and the difference in the length of vein 6 is not great.

The aedeagus is variable in size and structure in this tribe, and its diversity is perhaps a product of the speciation process, as in *Diplogeomyza*. In *Cephodapedon nigriventer* Hennig, the aedeagus is quite long and slender, in *C. fulvicorne* Malloch it is stouter and distally expanded (Hennig, 1969), in *Gephyromyza penicillipes* Malloch it is small and slender with

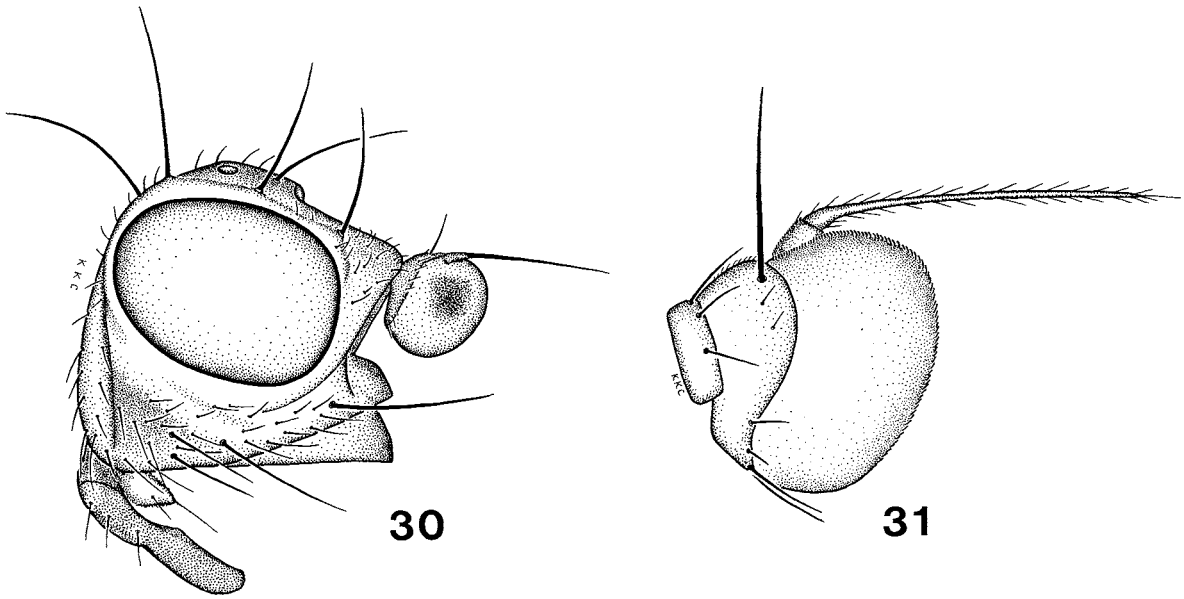
attenuated sclerotized apical section, and in *Paraneossos arizonicus* Wheeler it forms a short, simple tube (my observations). The arrangement of the protandrial sclerites, on the other hand, is fairly uniform in the tribe, so far as it has been investigated.

The genus *Paraneossos*, described by Wheeler (1955) from Arizona, U.S.A., is here recorded from South America for the first time on the basis of material from Calamarca Province, Argentina, and Malleco Province, Chile, in CNC. These specimens are specifically distinct from but closely related to *P. arizonicus* Wheeler. *Paraneossos* differs from *Gephyromyza* in its smaller size (wing length under 3 mm in the former, over 4 mm in the latter), in the lesser curvature of the basal part of vein 2, and in the smaller palpus; it differs from *Cephodapedon* in having only three dorsocentral bristles, though one available Chilean specimen, otherwise agreeing with *Paraneossos*, has five unequal dorsocentral pairs. Also *Paraneossos* has a characteristic band of dense, pale pubescence-pruinescence across the lower margin of the face, laterally passing above the vibrissa and along the orbital margins of the cheek and postgena. Species of the other two genera do not have such a well defined zone of thick pruinescence.

Tribe Nephellini n.tr.

Fronto-orbital plate extending over most of length of postfrons, approximated to eye margin, bearing 2 reclinate bristles; sockets of ocellar bristles situated behind anterior ocellus and about as far apart as the posterior pair of ocelli; cheek with strong bristle a little below middle; postgenal fold very deeply incised; face broad, entirely sclerotized, with short median carina above, convexly prominent at epistomal margin on entire width; ptilinal suture laterally terminating behind vibrissa, where it curves posteriorly; antenna porrect, with segment 3 subcircular; arista rather short and stout, minutely densely haired, inserted slightly before middle of segment 3, with segment 5 relatively large and segment 6 a little thickened basally; prelabrum large and prominent; palpus very short; proboscis with labella much reduced; propleural bristle long; prostigmatal bristle absent; mesopleuron and sternopleuron bare, except for 2 sternopleural bristles; dorsocentral bristles 1 + 4; acrostichal bristles scarcely differentiated; anterior notopleural bristle reduced; scutellum moderately short, with 2 pairs of bristles and few hairs; prosternum narrow-oblong; fore femur with dorsal and posteroventral bristles; tibiae without bristles; costa a little weakened just beyond humeral crossvein, with pair of spines terminating section proximal to subcostal break, on succeeding section with slightly differentiated spines among the hairs of the posteroventral series; subcosta almost complete, distally very close to vein 1; veins 2 and 3 slightly convergent distally; vein 6 discontinued well away from margin; vein 7 absent; male postabdomen: protandrium behind segment 6 strongly dorsoventrally compressed; tergite 6 and sternite 6 fused into an attenuated transverse band, which is broadly discontinuous on right side; a spiracle (apparently of segment 6) situated on each side behind this band; sternite 7 apparently absent; sternite 8 large and rounded; genital segment compact, deflexed; epandrium with one pair of basally articulated surstyli; aedeagus short, simple, symmetrical, flanked on each side by an equally long gonite; cerci fused into a triangular structure, joined on each side to a small convex sclerite at each posteroventral angle of epandrium; female postabdomen with free, rather elongate cerci.

The monotypic temperate South American genus comprising this tribe has some features suggesting relationship to the Rhinotorini, viz. the porrect antenna



Figs 30–31. *Nephellum dendrophilum* (Malloch). **30**, head. **31**, left antenna (medial aspect).

with the arista inserted not very close to the base of segment 3, the reduced palpus, the absence of the preapical tibial bristles, and the fusion of the cerci. Except for the first character, these are, within the Rhinotorini, marked trends rather than ground-plan characters, and in the greater number of dorsocentral bristles *Nephellum* is perhaps more plesiomorphic than the Rhinotorini. In most characters of chaetotaxy (other than reduction of the preapical tibial bristles), *Nephellum* agrees with the tribe *Pentachaetini*, but it differs in the abovementioned points of resemblance to the Rhinotorini; in the greater number of sternopleural bristles; in the different relative sizes of the two notopleural bristles; and in the more reduced protandrium. The deeply impressed postgenal fold is unique among heleomyzids; in the Rhinotorini and Pentachaetini there is no visible postgenal fold. In Malloch's figure 45, illustrating the head of *N. dendrophilum*, the postgenal fold is clearly shown, but the head was somewhat collapsed and the details of the antenna are not accurate. My figures 30, 31 correct these points.

Nephellum dendrophilum (Malloch) is apparently uncommon, as the type-material is all that has been available to me. Like certain rhinotorines, it has been found on exudations on tree trunks.

Tribe Rhinotorini

Vertex of head more or less excavated (scarcely so in *Zentula* and in some species of *Anastomyza* and *Apophoneura*); face uniformly sclerotized, usually clitelliform or with transverse furrow near middle, often with epistomal margin prominent; cheek rather broad, with strong bristle near centre (except in *Zentula* and *Cairnsimyia*); hypofacial usually extensively visible in lateral aspect below cheek; fronto-orbital bristles reclinate, 2 present or anterior one variably reduced; prelabrum generally large, often prominent; proboscis somewhat elongate with small labella; antenna more or less porrect, with segment 3 usually subcircular to horizontally ovoid; arista inserted near or beyond middle of dorsal surface of segment 3, with minute pubescence or sometimes almost glabrous; propleural bristle variably developed, often vestigial; mesopleural bristle absent (except in *Cairnsimyia cavifrons* Malloch); sternopleural bristles usually 2 or more; dorsocentral bristles 0+3 to 0+1; prosternum rather narrow, without precoxal bridges; preapical dorsal tibial bristles often weak or absent; hind femur with one isolated preapical dorsal bristle in American forms other than *Anastomyza*; costa often somewhat weakened just beyond humeral crossvein, with spaced spines in some primitive South American forms only; anal crossvein curved; vein 6 discontinued well before margin, straight or slightly curved backwards distally; vein 7 absent; male postabdomen (McAlpine, 1968; Griffiths, 1972) with tergite 6 variably reduced, often fused with sternite 8; sternite 6 and 7 placed on left side, often joined to sternite 8; sometimes (*Rhinotora*, *Neorhinotora*, *Apophoneura*) segment 6 with a complete ventral band of secondary sclerotization; postabdomen of female simple, with cerci of variable length, sometimes joined to proctiger for part of their length.

I previously (McAlpine, 1968) gave reasons for considering *Anastomyza* and *Apophoneura* to be related to the Rhinotorini but defined the tribe so as to exclude them. I now feel that these genera should be included in the Rhinotorini.

Griffiths (1972) considers it probable that *Cairnsimyia* is less closely related to *Rhinotora* and its immediate allies than are *Anastomyza* and *Apophoneura* – in other words the neotropical rhinotorines together form a monophyletic group. While this is a possibility, one would then have to assume that the more extreme modifications of the head capsule and the loss of the spaced costal spines evolved independently in Australia and South America. In both the Australian and Neotropical Region there are southern forms with simple, possibly plesiomorphic head structure (e.g. *Zentula vittata* n.sp. and *Anastomyza fractura* Malloch, 1933, Fig. 46), and northern tropical forms with apparently highly apomorphic head structure (e.g. *Cairnsimyia aroana* McAlpine and *Neorhinotora* species). On the other hand, no Australian rhinotorine is known with well developed spaced costal spines like those of *Anastomyza* and *Apophoneura* species. The absence of the postvertical bristles is characteristic of the American *Rhinotora* and *Neorhinotora* and some Australian *Cairnsimyia* species, the rest of the tribe having normal convergent postverticals. Probably the isolated central cheek bristle, the long vein 2 apically converging with vein 3, and the supernumerary crossveins in the marginal cell are groundplan characters for the whole neotropical rhinotorine stock, but these characters do not occur in Australian representatives of the tribe. On the other hand, there is a strong general resemblance between *Rhinotoroides* and certain *Cairnsimyia* species which may not be entirely convergent, and the possibility should not be overlooked that *Anastomyza* represents the sister group to the rest of the tribe. An interesting, apparently apomorphic character of the genus *Anastomyza*, not found in any other genus of the tribe, is the thickening of the costa immediately before its junction with the subcosta, and the particularly deep incision of the costa next to the thickening (Fig. 26).

Adult rhinotorines have been found at exudations on tree trunks in Australia, New Guinea, and South America. They may be very cryptically coloured in this habitat.

Three clearly monophyletic groupings in the tribe Rhinotorini are defined as follows:

Subtribe 1 (*Cairnsimyia*, *Zentula*, Australian Region). Cheek bristle absent; presutural bristle absent or minute; dorsocentral bristles one, or 2 closely placed; scutellum setulose; propleuron centrally haired or not; hind femur with or without short series of preapical dorsal to anterodorsal bristles; spaced costal spines absent or scarcely differentiated; costal break at end of subcosta

simple; male postabdomen: sternite 5 not bilobed; sclerites of segment 6 widely discontinuous on right side; surstylus movably articulated at base.

Subtribe 2 (*Anastomyza*, southern Neotropical Region). Cheek bristle present; presutural bristle present; dorsocentral bristles three; scutellum not setulose; propleuron with fine hairs (in addition to pruinescence); preapical anterodorsal bristle of hind femur absent, or short and almost terminal; spaced costal spines distinct; costa thickened on basal side of break, which is deeply incised; male postabdomen: sternite 5 bilobed (except in *Anastomyza discalis* Malloch); tergite 6 distinct and separate; sclerites of segment 6 widely discontinuous on right side; surstylus immovably fused with epandrium.

Subtribe 3 (*Apophoneura*, *Rhinotoroides*, *Rhinotora*, *Neorhinotora*, Neotropical Region). Cheek bristle present; presutural bristle present; dorsocentral bristles 2, well separated; scutellum without setulae; propleuron without hairs except at lower extremity; hind femur with one strong anterodorsal bristle at about apical fifth; spaced costal spines absent (except in *Apophoneura*); costal break simple; male postabdomen: sternite 5 deeply bilobed; tergite 6 never present as a separate sclerite; sclerites of segment 6 encircling abdomen without a break, except sometimes in mid-dorsal region where parts are fused with sternite 8 (condition unrecorded in *Rhinotoroides*); surstylus movably articulated at base (rather rigidly so in *Rhinotoroides*).

Tribe Pentachaetini n.tr.

Fronto-orbital plate extending most of length of postfrons, approximated to eye margin, bearing 2 reclinate bristles; sockets of ocellar bristles situated behind anterior ocellus and rather close together; cheek strongly bristled near middle, without postgenal fold; face evenly sclerotized, concave or almost flat; ptilinal suture laterally terminating well behind vibrissa (*Pentachaeta*), or directly above it (*Dioche*); antennal segment 3 markedly decumbent, oval; arista inserted sub-basally on segment 3, with segment 5 very short and segment 6 scarcely thickened basally; prelabrum moderately developed, rather prominent; palpus rather long; proboscis moderately short, with well developed labella; propleural bristle present or absent; prostigmatal bristle minute or absent; mesopleuron and pteropleuron bare; sternopleural bristles one or 2; notopleural bristles long, the anterior one larger; dorsocentral bristles 1 + 4 or, in *Dioche*, 1 + 3, all long; acrostichal bristles absent; scutellum of moderate size with 2 pairs of bristles, otherwise bare or with very few hairs; prosternum short and narrow; fore femur with long dorsal and posteroventral bristles; each tibia with one preapical dorsal bristle only; costa broken only at end of subcosta (*Pentachaeta*), or also visibly weakened just beyond humeral crossvein (*Dioche*), without spaced spines; subcosta rather distinct distally, diverging a little from vein 1 (*Pentachaeta*) or apically fusing with vein 1 (*Dioche*); veins 2 and 3 distally parallel or convergent; vein 6 rather abruptly discontinued well away from margin; vein 7 absent; male postabdomen with tergite 6 not greatly reduced, but little sclerotized and pigmented; sternites 6 and 7 laterally placed, distinct in *Dioche*, not separately identifiable in *Pentachaeta*, in either case sclerotically linked to sternite 8; spiracles of segments 6 and 7 located in pleural membrane; epandrium with one pair of basally articulated surstyli; hypandrium with one or 2 pairs of gonites posteriorly; aedeagus with stout capsular distiphallus and smaller basiphallus, the latter with large unpigmented posterior process; aedeagal apodeme complex, its distal (posterior) part continuous with basiphallus, its anterior part elbowed and connected to anterior part of hypandrium; cerci separate.

Tribe Trixoscelidini

Fronto-orbital plate approximated to eye-margin, long, extending in front of middle of postfrons, with two strong bristles, both reclinate or the anterior one incurved, or fronto-orbital bristles absent; ocellar bristles either situated one on each side of anterior ocellus, or approximated within ocellar triangle; central cheek bristle sometimes present; antenna more or less decumbent; segment 3 oval; arista inserted sub-basally on segment 3; proboscis with labella well developed or somewhat reduced; prosternum small, oval; propleural bristle moderate to small; mesopleuron with several setulae, often upwardly directed, and one or 2 strong posterior bristles (the latter absent in *Paratrixoscelis*); sternopleural bristles usually 2, with some associated setulae; dorsocentral bristles generally 2 + 3; scutellum not haired, with one lateral sub-basal and one subapical pair of bristles; tibiae each with one or 2 pairs of preapical dorsal bristles rather close to apex; mid femur usually with anterior bristles and one preapical posterior bristle; costa deeply incised at end of subcosta, without visible weakening just beyond humeral crossvein, with pair of bristles or spines terminating section before subcosta, and with spaced spines of variable length between subcosta and vein 2; subcosta distally touching the expanded distal part of vein 1 (not distinctly so in *Psiloplagia*); veins 2 and 3 distally diverging; anal crossvein curved, making an obtuse angle with vein 6; vein 6 sclerotized and pigmented basally, distally reduced to a crease in membrane not reaching margin; vein 7 absent; male postabdomen (in *Trixoscelis*) with tergite 6 much reduced, free; sternites 6 and 7 located on left side and joined to the dorsal sternite 8; spiracles of segment 6 located in membrane, those of segment 7 apparently absent; epandrium with posteriorly located articulated surstylus (the 'anterior surstylus' of Cogan, 1971, may be a gonite); aedeagus variable (Hackman, 1970), without differentiated sclerotized basiphallus, usually elongate, partly membranous, often lobed distally, with variable longitudinal pigmented strips; cerci reduced, often fused; female postabdominal segments, so far as known, all short; segment 7 with tergite and sternite fused (*Trixoscelis*, *Stuckenbergiella*)

and without spiracle (*Trixoscelis*: Hennig, 1958).

Melander (1952) divided the true trixoscelidines known to him into three genera, viz. *Trixoscelis*, *Spilochroa*, and *Zagonia*. The two latter are defined on the basis of coloration, representing the most and the least pigmented species respectively, with little if any constant morphological difference from *Trixoscelis* s. str. I doubt if these groupings form a natural classification on a world basis, and I include *Spilochroa* and *Zagonia* in synonymy of *Trixoscelis*.

Cogan regards the South African genus *Stuckenbergiella* Cogan, 1971, as a member of this tribe, and I concur. Thanks to Dr A. Soós I have been able to examine material of the genera *Paratrixoscelis* (from Mongolia) and *Psiloplagia* (the latter known only from the type-material of *Ps. pachypterna* Czerny, 1928, from Transcaspian U.S.S.R.). These genera clearly also belong in the Trixoscelidini.

There is often sexual dimorphism of the hind tarsus in this tribe. In *Paratrixoscelis* and some species of *Trixoscelis* the hind basitarsus is slightly or markedly thicker in males. In males of *Psiloplagia* the basitarsus of every tarsus is strongly inflated, and the second segment is also modified. In females these segments are quite slender. The male of *Stuckenbergiella* is unknown to me.

There are two probably monophyletic groups in the tribe, which are characterised as follows:

Subtribe 1 (*Trixoscelis*, *Paratrixoscelis*). Ocellar bristles inserted in front of level of anterior ocellus and farther apart than centres of lateral ocelli; segment 6 of arista gradually thickened basally; face not remarkably high and narrow.

Subtribe 2 (*Stuckenbergiella*, *Psiloplagia*). Ocellar bristles inserted behind level of anterior ocellus and less far apart than centres of lateral ocelli; segment 6 of arista with strong basal swelling; face more than twice as high as wide.

Tribe Fenwickiini n.tr.

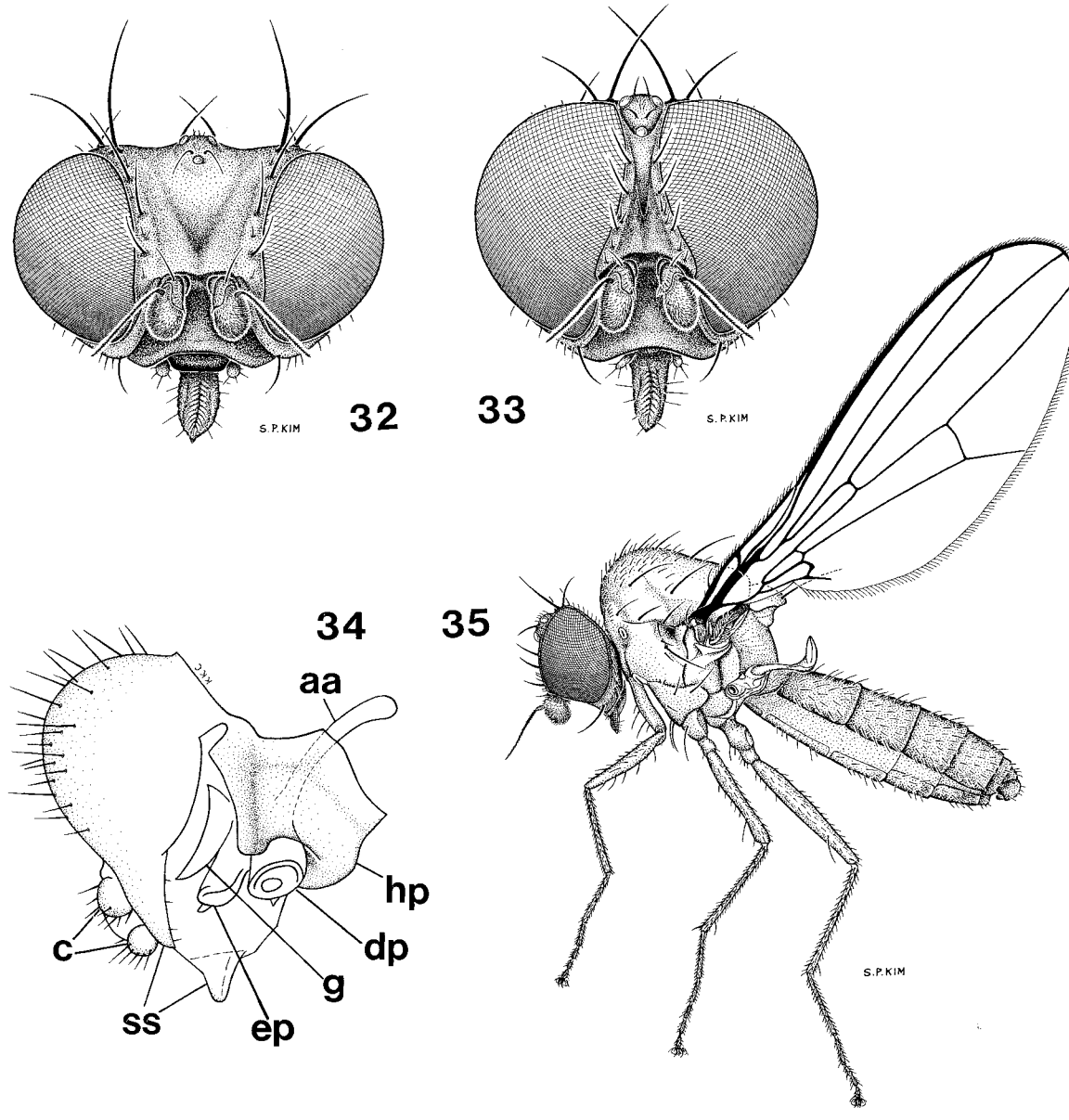
Fronto-orbital plate long, parallel with eye margin, bearing 3 reclinate bristles; cheek without differentiated central bristle; face uniformly sclerotized, with complete submarginal groove; antenna with segment 3 oval, more or less decumbent; arista densely short-haired, with segment 5 subcylindrical; prelabrum prominent; proboscis with well developed labella; propleural bristle present, usually short; mesopleuron with long posterior bristle and short setulae not directed upwards; sternopleural bristles one or 2; dorsocentral bristles 1 + 3 or 0 + 3; scutellum usually without hairs (exception: *Fenwickia hirsuta* Malloch); prothoracic spiracle normal, with filter of hairs within aperture; prosternum narrow, without precoxal bridge; hind femur with preapical anterodorsal bristle and, in male only (as far as known), with strong ventral bristle before middle; each tibia with one preapical dorsal bristle; costa not visibly weakened just beyond humeral crossvein, with section before subcostal break terminated by one strong bristle, preceded by one or 2 long anterodorsal bristles; section of costa between veins 1 and 2 with short, spaced anteroventral spines; subcosta distally not desclerotized but fusing with the apically thickened vein 1; veins 2 and 3 diverging distally; anal crossvein strongly curved; vein 6 short or very short; vein 7 absent; second basal and anal cells short; male postabdomen (examined in detail only in *Fenwickia claripennis* Malloch) almost symmetrical with reduced tergite 6; cerci often large and united with proctiger to form a broad lobe; female postabdomen with all segments short; segment 7 with tergites and sternites united into a complete ring in at least some species; cerci short.

The Fenwickiini resemble the Waterhouseiini in a number of characters, viz. the 3 reclinate fronto-orbitals, the strong mesopleural bristle, and most characters of wing venation. Some species of this tribe even have an indication of the dilation of the anal crossvein at the point of maximum curvature, as in *Waterhouseia*, and geographically the tribes are not remote. On the other hand there are great differences in the male postabdomen between *Waterhouseia* and the only fenwickiine species yet examined in detail, *Fenwickia claripennis*. The tendency towards symmetry of the protandrium is shared by both.

The main features of the postabdomen of *F. claripennis* are as follows (Fig. 96; Harrison, 1959: Fig. 195): tergite 6 reduced to a narrow transverse dorsal strip, only strongly sclerotized along anterior margin, with one or 2 setulae near each lateral extremity; a composite, complete, slightly asymmetrical protandrial ring present behind tergite 6, which, from comparison with *Waterhouseia*, probably includes tergite and sternite 7 and possibly sternite 6; anterior margin of protandrial ring sclerotically thickened on entire circumference; median ventral part of ring well sclerotized and setulose, perhaps representing sternite 6; left lateral part of ring, probably representing sternite 7, also with a few setulae; spiracles of segment 6 in membrane just below each lateral margin of tergite 6; right spiracle 7 in lateral part of protandrial ring; left spiracle 7 apparently absent; sternite 8 large, setulose, joined to protandrial ring at its narrowest median dorsal point; one pair of basally articulated surstyli present; one pair of gonites present; aedeagus long, strap-like, asymmetrical, not differentiated into basiphallus and distiphallus, with pair of longitudinal pigmented strips on basal half, fusing in the more complex distal half; aedeagal apodeme joined before its posterior end, not to hypandrium, but to aedeagus; ejaculatory apodeme of sperm pump rod-like, curved, slightly thickened at anterior end, very obliquely cut off posteriorly; cerci large, forming with the proctiger a ventrally projecting plate.

Tribe Waterhouseiini n.tr

Head sexually dimorphic, with postfrons narrowed in male; fronto-orbital plate very long and



Figs 32–35. *Waterhouseia cyclops* Malloch. **32**, head of female. **33**, head of male. **34**, male genital segment (right lateroventral aspect). **35**, whole insect (male). **aa**, aedeagal apodeme. **c**, cercus. **dp**, distiphallus. **ep**, epiphallus. **g**, gonite. **hp**, hypandrial plate. **ss**, surstylus.

approximated to eye margin, with 3 strong reclinate bristles; cheek narrow, without outstanding central bristle; face uniformly sclerotized, with complete submarginal groove; antenna slightly decumbent, with segment 3 rounded-oval; arista densely short-haired; segment 5 cylindrical; prelabrum prominent; proboscis with rather large labella; propleural bristle small but distinct; mesopleuron with one long posterior bristle and a few downwardly directed setulae; sternopleural bristles 2; dorsocentral bristles 1 + 3 or 1 + 4; scutellum without hairs, with 2 subequal pairs of bristles, one of which is sub-basal; prothoracic spiracle apparently closed or almost so; prosternum short, oblong, bare, without precoxal bridges; tibiae without preapical bristles; costa not weakened just beyond humeral crossvein, without spaced spines; subcosta complete though slightly weakened on a short preterminal section, close to vein 1 throughout; veins 2 and 3 diverging distally; anal crossvein strongly reflexed, dilated at bend; vein 6 short; vein 7 absent; second basal and anal cells short; abdomen slender, subcylindrical; male postabdomen with segment 6 symmetrical, its tergite and sternite well developed and setulose; surstylus imperfectly articulated at base; aedeagus short, stoutly cylindrical, with stout posterior process flanked by the paired gonites; cerci short, well separated; female postabdomen simple, having all segments short, with separate tergites and sternites; cercus short.

This is an Australian tribe of a single known species. It may be related to the Fenwickiini of New Zealand (q.v. for comparison).

Tribe Mayomyiini n.tr.

Fronto-orbital plate of moderate length, with 3 short bristles sloped backwards and outwards; cheek without prominent central bristle; face desclerotized except for narrow lateral plates against parafacial sutures and small sclerotized area between antennal sockets; antenna decumbent, with segment 2 deeply notched dorsally on distal margin, segment 3 very large and leaf-like; arista with segments 4 and 5 remarkably long; labella of proboscis rather small; propleural bristle present or absent; mesopleural bristle present; one sternopleural bristle present; dorsocentral bristles 0+2; acrostichal bristles absent; scutellum with 2 pairs of bristles and no hairs; pleurotergite as in Rhinotorini; prosternum short, without precoxal bridges; mid femur with usually one anterior bristle near middle and, in males only, a well developed, somewhat oblique series of posterior bristles, but no outstanding subapical posterior bristle; hind femur with one or 2 preapical dorsal bristles; mid tibia usually with short preapical dorsal bristle; costa without spaced spines, broken only at end of subcosta but not very distinctly so; subcosta distally merging with the dilated vein 1; veins 2 and 3 slightly convergent distally; vein 4 strongly curved forward distally to meet vein 3 at its termination in costa; vein 6 short; vein 7 unpigmented, distinguishable only as a curved fold in membrane; wing membrane with zone of minute, crowded microtrichia on distal side of anal crossvein; male postabdomen with tergite 6 reduced to a narrow strip; sternite 6 reduced, laterally placed, its upper end just below left lateral extremity of tergite 6; sternite 7 laterodorsally placed, not fused to sternite 8; spiracles of segment 6 situated near each end of tergite 6; left spiracle 7 situated near upper end of sternite 7, a little to the right of median dorsal line; right spiracle 7 not found in the single preparation, perhaps absent; epandrium with one pair of broad, basally articulated surstyli; hypandrium with one pair of slender, rod-like gonites and, in *Mayomyia nigripalpis* Malloch only, a long median posterior process; aedeagus moderately stout, short to moderately long, almost symmetrical, little sclerotized; cerci separate, of moderate size, or, in *M. nigripalpis*, very large; female postabdominal segments not very elongate, segments 6 and 7 with separate tergites and sternites; cerci separate, rather slender.

The only included genus, *Mayomyia*, appears to have no close allies. Though it resembles Heleomyzini and certain Diaciini in the desclerotized median part of the face, I can find no other evidence of relationship to those tribes. *Mayomyia* resembles the tribes Fenwickiini and Waterhouseiini in having 3 pairs of reclinate fronto-orbital bristles in combination with a strong mesopleural bristle, and further approaches Waterhouseiini in reduction of the preapical dorsal tibial bristles. The protandrium and face are quite different in these groups, while the apical confluence of veins 3 and 4 distinguishes *Mayomyia* from all other known heleomyzids.

Geographic Distribution.

The Heleomyzidae are essentially a temperate climate group, though of limited representation in the tropics.

Apart from the fact that southern Africa has been occupied only by tribes of northern origin (presuming *Stuckenbergiella* to be a trixoscelidine and *Prosopantrum* to be introduced by man), the tribes fall clearly into either north- or south-temperate categories. Outside the African Region, probably no tribe in the one category has speciated in the opposite temperate zone. Though more species have been described from the north-temperate zone than the south-temperate, the number of tribes belonging to the former zone is less than half that of the latter. The north-temperate tribes are: Heleomyzini, Borboropsini, Suilliini, Chiropteromyzini, and Trixoscelidini. Though these tribes differ in regional representation, none is to be classed as either principally palearctic or nearctic.

By contrast, the south-temperate heleomyzid groups show a more complex distribution pattern, which is no doubt due to the more prolonged isolation of the southern land-masses from each other. I class the southern tribes thus:

Australian tribes: Tapeigastrini, Borboroidini, Waterhouseini.

New Zealand tribe: Fenwickiini.

Tribe common to Australia and New Zealand: Allophylopsini.

South American tribes: Zachaetomyiini, Blaesochaetophorini, Cinderellini, Epistomyiini, Cnemospathini, Notomyzini, Gephyromyzini, Nephellini, Mayomyiini.

Tribes common to Australia and South America: Diaciini, Rhinotorini, Pentachaetini.

I note that where tribes are common to more than one southern area, the genera in the different areas are all distinct.

It has become usual to regard taxa with restricted south-temperate distributions as being Gondwanaland relicts. However some characteristic southern groups (e.g. Sciadoceridae and Ironomyiidae) have been found as fossils in the north-temperate zone, and there is a possibility that numerous other groups presently with a southern distribution may have formerly occurred in the northern hemisphere. In the absence of fossil heleomyzids in the southern hemisphere, and their meagre representation in collections from the northern hemisphere, we have no evidence as to whether southern heleomyzid groups are of Gondwanaland origin, or whether they are relict groups formerly of wider distribution. From the available fossil evidence, the radiation of the Schizophora appears not to have begun till the early tertiary when Gondwanaland had started to disintegrate. There remains the possibility that the component continents, except perhaps Africa, were still

close enough to allow some interchange of fauna. That the initial differentiation of heleomyzid groups was quite early is demonstrated by the presence in Baltic amber (Eocene–Oligocene) of forms possibly referable to the tribes Heleomyzini and Suilliini (Hennig, 1965).

The limited tropical representation of the Heleomyzidae is interesting, because the tropical zone seems often to have been a major barrier to dispersal, even, to some extent, in Africa. Representatives of the Rhinotorini are successful in tropical lowlands both in Australia–New Guinea and the Americas, in the latter area crossing the tropics to the southern U.S.A. In New Guinea they are the only known heleomyzids. The genus *Cinderella* (tribe Cinderellini) is distributed from Tierra del Fuego to the United States but the tropical records refer to localities at and above 2000 m elevation in Ecuador (Hennig, 1969). The Gephyromyzini are another essentially South American group represented by one species in the United States. The few heleomyzids in the tropics of the Oriental Region are derivatives of the north-temperate fauna and perhaps occur mainly at higher altitudes (tribes Suilliini and Heleomyzini). They have no relationship to the heleomyzids of the Australian Region.

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References

Bezzi, M., 1923. Note on the Australian genus *Tapeigaster* Macq. (Diptera) with descriptions of new species. The Australian Zoologist 3: 72–78.

Brues, C.T., A.L. Melander & F.M. Carpenter, 1954. Classification of insects. Bulletin of the Museum of Comparative Zoology 108: v + 917 pp.

Cogan, B.H., 1971. The Heleomyzidae of the Ethiopian Region (Diptera). Annals of the Natal Museum 20: 627–696.

Collin, J.E., 1943. The British species of Helomyzidae (Diptera). The Entomologist's Monthly Magazine 79: 234–251.

Crampton, G.C., 1942. The external morphology of the Diptera. Connecticut geological and natural history survey bulletin 64: 10–165.

Curtis, J., 1837. A guide to an arrangement of British insects etc. Second edition: 294 pp. London.

Czerny, L., 1904. Revision der Helomyziden. Wiener Entomologische Zeitung 23: 199–244, 263–286, pl. 2.

———1924. Monographie der Helomyziden (Dipteren). Abhandlungen der Zoologisch-botanischen Gesellschaft in Wien 15(1): 166 pp, 1 pl.

———1927a. Helomyzidae + Trichoscelidae + Chiromyidae. In Lindner, E. (ed.) Die Fliegen der Palaearktischen Region 22 (53): 56 pp.

———1927b. Ergänzungen und Berichtigungen zu meiner Monographie der Helomyziden. Konowia 6: 35–49.

———1928. Eine neue Trichosceliden-Gattung und Art aus Transkaspien (Dipt.). Entomologische Mitteilungen 17: 251–252.

Enderlein, G., 1912. Die Insekten des Antarkto-Archiplato-Gebietes (Feuerland, Falklands-Inseln, Süd-Georgien). Kungl svenska Vetenskapsakademiens Handlingar 48(3): 170 pp, 4 pl.

———1938. Die Dipterenfauna der Juan-Fernández-Inseln und der Oster-Inseln. In Skottsberg (ed.): The natural history of Juan Fernandez and Easter Island 3: 643–680.

Fallén, C.F., 1820. Heteromyzides Sveciae: 10 pp. Lund.

Frey, R., 1952. Ueber *Chiropteromyza* n.gen. und Pseudopomyza Strobl (Diptera Haplostomata). Notulae Entomologicae 32: 5–8.

Garrett, C.B.D., 1921. Notes on Helomyzidae and descriptions of new species. Insecutor Inscitiae Menstruus 9: 119–132.

———1925. Seventy new Diptera – key to the *Pseudoleria* Helomyzidae: 16 pp. Cranbrook, B.C.

Gill, G.D., 1962. The heleomyzid flies of America north of Mexico (Diptera : Heleomyzidae). Proceedings of the United States National Museum 113: 495–603.

———1965. Family Heleomyzidae (Helomyzidae). A catalog of the Diptera of America north of Mexico: 808–816. U.S. Department of Agriculture.

———1968. Family Heleomyzidae (Helomyzidae) including the Trixoscelididae (Trichoscelidae). A catalogue of the Diptera of the Americas south of the United States 85: 13 pp.

Gorodkov, K.B., 1959. Revision of the palearctic species of the genus *Oecothea* Hal. (Diptera, Helomyzidae). Revue d'Entomologie de l'URSS 4: 905–922. In Russian.

———1962a. The new palearctic species of the family Helomyzidae (Diptera). Travaux de l'Academie des Sciences de l'URSS 30: 310–325. In Russian.

———1962b. Revision of the palearctic species of the genus *Leria* R.-D. (Diptera, Helomyzidae). Revue d'Entomologie de l'URSS 41: 643–671. In Russian.

———1970. 80. Family Helomyzidae (Heleomyzidae). In Bey-Bienko (editor): Checklist of insects of the European part of the USSR 5: 306–325. Leningrad. In Russian.

———1971. The Evolution of the male genitalia of Helomyzidae (Diptera) and the taxonomy of the family. XIII International Congress of Entomology, Moscow, 1968. Proceedings 1: 248–249.

Griffiths, G.C.D., 1972. The phylogenetic classification of the Diptera Cyclorrhapha with special reference to the structure of the male postabdomen. W. Junk, The Hague, 340pp.

Hackman, W., 1970. Trixoscelidae (Diptera) from southern Spain and description of a new *Trixoscelis* species from northern Europe. Entomologica Scandinavica 1: 127–134.

———1977. Family Heleomyzidae; Family Heteromyzidae. A catalog of the Diptera of the Oriental Region 3: 388–390.

Hackman, W. & H. Andersson, 1969. *Trixoscelis puberula* (Zetterstedt), a heleomyzid fly (Diptera). Notulae Entomologicae 49: 269–270.

Haliday, A.H., 1838. New British insects indicated in Mr. Curtis's guide (part). Annals of Natural History; or, Magazine of Zoology, Botany, and Geology 2: 112–121.

Harrison, R.A., 1959. Acalypterate Diptera of New Zealand. N.Z. Department of Scientific and Industrial Research Bulletin 128: 382 + vii pp.

Hendel F., 1916. Beiträge zur Systematik der Acalyptraten Musciden (Dipt.). Entomologische Mitteilungen 5:

294–299.
———1917. Beiträge zur Kenntnis der acalyptraten Musciden. Deutsche Entomologische Zeitschrift 1917: 33–48.
Hennig, W., 1958. Die Familien der Diptera Schizophora und ihre phylogenetischen Verwandtschaftsbeziehungen. Beiträge zur Entomologie 8: 505–688.
———1965. Die Acalyptratae des Baltischen Bernsteins und ihre Bedeutung für die Erforschung der phylogenetischen Entwicklung dieser Dipteren-Gruppe. Stuttgarter Beiträge zur Naturkunde 145: 215 pp.
———1969. Neue Gattungen und Arten der Acalypteratae. The Canadian Entomologist 101: 589–633.
———1971. Neue Untersuchungen über die Familien der Diptera Schizophora (Diptera : Cyclorrhapha). Stuttgarter Beiträge zur Naturkunde 226: 76 pp.
———1973. 31. Diptera (Zweiflügler). Handbuch der Zoologie 4(2)2: 337 + 4 unnumbered pp.
Hutton, F.W., 1901. Synopsis of the Diptera brachycera of New Zealand. Transactions and Proceedings of the New Zealand Institute 33: 1–95.
Loew, H., 1862. Ueber die europäischen Helomyzidae und die in Schlesien vorkommenden Arten derselben. Zeitschrift für Entomologie Breslau 13: 3–80.
———1872. Diptera Americae septentrionis indigena. Centuria decima. Berliner Entomologische Zeitschrift 16: 49–124.
McAlpine, D.K., 1966. Description and biology of an Australian species of Cypselosomatidae (Diptera), with a discussion of family relationships. Australian Journal of Zoology 14: 673–685.
———1967. The Australian species of *Diplogeomyza* and allied genera (Diptera, Heleomyzidae). Proceedings of the Linnean Society of New South Wales 92: 75–106.
———1968. The genus *Cairnsimyia* Malloch (Diptera, Heleomyzidae, Rhinotorini). Records of the Australian Museum 27: 263–283.
———1973 (1972). The Australian Platystomatidae (Diptera, Schizophora) with a revision of five genera. The Australian Museum Memoir 15: 256 pp.
———1978. Description and biology of a new genus of flies representing a new family (Diptera, Schizophora, Neurochaetidae). Annals of the Natal Museum 23: 273–295.
———1984. The species of *Pseudoleria* introduced into Australia. General and Applied Entomology 16:45–48.
McAlpine, D.K. & D.S. Kent, 1982. Systematics of *Tapeigaster* (Diptera : Heleomyzidae) with notes on biology and larval morphology. Proceedings of the Linnean Society of New South Wales 106: 33–58.
M'Lachlan, R., 1871. An attempt towards a systematic classification of the family Ascalaphidae. The Journal of the Linnean Society (London). Zoology (1873) 11: 219–276.
Macquart, P.J.M., 1835. Diptères. In Histoire Naturelle des Insectes 2: 710 pp., 12 pl.
———1847. Diptères Exotiques Nouveaux ou Peu Connus. Supplément 2: 86–87.
———1851. Diptères Exotiques Nouveaux ou Peu Connus. Supplément 4(2): 161–309, pl. 15–28.
Malloch, J.R., 1925. Notes on Australian Diptera, No. vi. Proceedings of the Linnean Society of New South Wales 50: 80–97.
———1926a. Notes on Australian Diptera. No. viii. Proceedings of the Linnean Society of New South Wales 51: 31–49.
———1926b. Notes on Australian Diptera. No. ix. Proceedings of the Linnean Society of New South Wales 51: 545–554.
———1927. Notes on Australian Diptera. No. x. Proceedings of the Linnean Society of New South Wales 52: 1–16.
———1931. Notes on Australian Diptera. XXIX. Proceedings of the Linnean Society of New South Wales 56: 292–298.
———1933. Acalyptrata (Helomyzidae, Trypetidae, Sciomyzidae, Sapromyzidae, etc.). Diptera of Patagonia and South Chile 6: 177–391, pl. 2–6.
———1935. Notes on and descriptions of new species of Australian Diptera. The Australian Zoologist 8: 87–95.
———1936. Notes on Australian Diptera. XXXVI. Proceedings of the Linnean Society of New South Wales 61: 259–261.
Mathis, W.N., 1973. A review of the genus *Borboropsis* (Diptera : Heleomyzidae). The Pan-Pacific Entomologist 49: 373–377.
Melander, A.L., 1952. The American species of Trixoscelidae. Journal of the New York Entomological Society 60: 37–52.
Papavero, N., 1972. Family Rhinotoridae. A Catalogue of the Diptera of the Americas South of the United States 87: 4 pp.
Paramonov, S.J., 1955. Notes on Australian Diptera (XX). A review of the genus *Tapeigaster* Macq. (Neottiophilidae, Acalyptrata), Diptera. Annals and Magazine of Natural History (12) 8: 453–464.
Peterson, B.V. & G.D. Gill, 1982. *Neoecothea*, a new name for *Oecothea* (Diptera : Heleomyzidae). Memoirs of the Entomological Society of Washington 10: 219.
Schneider, M.A., 1982. A comparative morphological study of the reproductive systems of some species of *Tapeigaster* Macquart (Diptera : Heleomyzidae). Proceedings of the Linnean Society of New South Wales 106: 59–65.
Séquy, E., 1934. Diptères (Brachycères) (Muscidae acalypterae et Scatophagidae). Faune de France 28: 832 pp. 27 pl.
———1952. Diptera fam. Scatophagidae. Genera Insectorum (P. Wytsman) 209: 107 pp.
Soós, A., 1977. Taxonomische und faunistische Untersuchungen über die mongolischen Trixoscelididen (Diptera : Acalyptratae). Acta Zoologica Academiae Scientarum Hungaricae 23: 395–413.
Speight, M.C.D., 1969. The prothoracic morphology of acalyptrates (Diptera) and its use in systematics. Transactions of the Royal Entomological Society of London 121: 325–421.
Steyskal, G.C., 1957. The postabdomen of male acalyptrate Diptera. Annals of the entomological society of America 50: 66–73.
———1969. The postabdomen of *Cinderella*, with a new species from Argentina (Diptera : Heleomyzidae). Journal of the Kansas Entomological Society 42: 80–83.
Thompson, F.C. & W.N. Mathis, 1980. Haliday's generic names of Diptera first published in Curtis' A guide to ... British insects (1837). Journal of the Washington Academy of Sciences 70: 80–89.
Tonnoir, A.L. & J.R. Malloch, 1927. New Zealand Muscidae Acalyptratae. Part III. – Helomyzidae. Records of the Canterbury Museum 3: 83–100, pl. 18–20.
Walker, F., 1853. Insecta Saundersiana. Diptera 4: 253–414.
———1858. Characters of undescribed Diptera in the collection of W.W. Saunders, Esq., F.R.S. & c (Continued). The Transactions of the Entomological Society of

London. New series 4: 119–158, 190–235.
Westwood, J.O., 1840. Synopsis of the genera of British insects. In An introduction to the modern classification of insects: 158 pp. London.
Wheeler, M.R., 1955. *Paraneossos*, a new genus of Trixoscelidae (Diptera : Acalyptrata). The Wasmann Journal of Biology 13: 107–112.
Williston, S.W., 1896. Manual of the families and genera of North American Diptera: 167 pp. New Haven, Conn.

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Appendix 1.
A New Neotropical Genus and Species.

Dioche n.gen.

Type-species. *D. khooi* n.sp.

Description. Flies resembling *Pentachaeta* in many characters, but lacking the characteristic thoracic and wing markings of that genus. Thorax and abdomen thinly pruinescent and somewhat shining.

Head: postrons with fine scattered hairs but no anterior marginal bristles; cheek with most setulae near lower margin short and not seriate; lower occipital bristle shorter than in *Pentachaeta*; palpus a little shorter than in *Pentachaeta*.

Thorax: propleural bristle absent; dorsocentral bristles 4; scutellum with very few fine hairs (3 in available specimen); chaetotaxy otherwise as in *Pentachaeta*. Tibiae of male not swollen. Second basal and anal cells very small for the family, each about 0.1 of length of discal cell.

Abdomen: protandrium rather similar to that of *Pentachaeta*, but with sternite 7 distinct, laterally placed, narrowly joined to sternites 6 and 8; details of genital segment generally as given for *Pentachaeta*; hypandrium with one pair of short posterior gonites; distal capsule of aedeagus less complex than in *Pentachaeta*.

Further characters are as given under the tribe Pentachaetini.

Discussion. *Dioche* differs from other South American heleomyzid genera with a strong central cheek bristle in having four pairs of dorsocentral bristles and very small anal and second basal cells. The large, decumbent antennal segment 3 with arista inserted close to its base further distinguishes it from the rhinotorine genera, while the presence of one strong preapical dorsal bristle on each tibia and the absence of an impressed postgenal fold distinguish it from *Nephellum*. It differs from *Trixoscelis* in the more approximated ocellar bristles, the absence of the mesopleural bristle and spaced costal spines, and in the longer vein 2. *Dioche* is apparently most closely related to the Australian genus *Pentachaeta*, from which it differs in the number of dorsocentral bristles (4 instead of 5), the absence of the propleural bristle, and the absence of the distinctive markings on the wing and thorax of the latter genus.

Dioche has a superficial resemblance to species of the family Pseudopomyzidae (see Hennig, 1969). It differs from these in having the arista inserted sub-basally on antennal segment 3, the face uniformly sclerotized, the two pairs of scutellar bristles subequal, one strong preapical dorsal bristle on each tibia, and quite different male postabdomen.

Etymology. The generic name is derived from the Greek διοχη, distance, in reference to its geographic remoteness from the other genus of the tribe Pentachaetini. It is feminine.

Dioche khooi n.sp.

Figs 36–39,62,94

Description (male). *Coloration*: generally tawny-brown with brown-black bristles and hairs; possibly darker in fresh material. Head tawny, with brown zone surrounding ocelli; face paler. Antenna with segments 1 and 2 pale yellowish, segment 3 tawny. Palpus and proboscis pale fulvous. Legs pale tawny; fore femur predominantly brown; tarsi slightly browned distally. Wing faintly yellowish, without markings. Haltere tawny, with creamy capitellum.

Postabdomen: surstylus broadly oblong.

Dimensions: total length 3.4 mm; length of thorax 1.4 mm; length of wing 4.3 mm.

Distribution. Chile – Valdivia Province.

HOLOTYPE ♂ (unique). Pucatrihue, 40°28'S, 73°47'W, 12 iii 1965 (CNC), L.E. Peña.

Appendix 2.
Key to Neotropical Genera of Heleomyzidae

1. Fronto-orbital bristles 3, reclinate.....2

——Fronto-orbital bristles 1 or 2.....5

2. Face desclerotized medially; vein 4 curved forward to meet vein 3 near wing apex.....*Mayomyia*

——Face uniformly sclerotized; veins 3 and 4 widely separated apically.....3

3. More than 3 pairs of dorsocentral bristles present.....*Cephodapedon*

——Only 3 pairs of dorsocentral bristles present.....4.

4. Wing over 4 mm long; vein 2 with sigmoid curvature in basal half. .....*Gephyromyza*

——Wing under 3 mm long; vein 2 almost straight.....*Paraneossos*

5. Face desclerotized except on pair of deep, rounded subantennal pits; major scutellar bristles less than half as long as scutellum; wing membrane blackish, without pattern.....*Dichromya*

——Face not as above; scutellar bristles longer; wing not thus pigmented.....6

6. Face divided into 3 panels, the median one little sclerotized, the lateral ones strongly so; subcosta strongly developed and diverging from vein 1 distally; vein 6 extending faintly to margin.....7.

——Face uniformly sclerotized; if vein 6 extending approximately to margin, then subcosta not markedly diverging from vein 1.....8

7. Pteropleuron bristled; mid tibia with only the preapical bristle; scutellum not setulose.....*Pseudoleria*

——Pteropleuron bare; mid tibia with 2 anterodorsal and 1 posterodorsal bristle in addition to preapical bristle; scutellum setulose.....*Aecothea*

8. Mesopleural bristle present; sockets of ocellar bristles placed well apart and level with anterior ocellus.....*Trixoscelis*

——Mesopleural bristle absent (scattered setulae sometimes present); sockets of ocellar bristle at least slightly behind anterior ocellus.....9

9. Fronto-orbital plate short, sloping away from eye margin anteriorly, and bearing one bristle only; costa with strong, spaced spines; vein 1 terminating far beyond subcosta.....*Suillia*

——Fronto-orbital plate parallel with eye or bearing more than 1 bristle; other characters variable.....10

10. Vein 6 curved forwards so that its unpigmented distal extremity is subparallel with vein 5.....11

——Vein 6 not thus curved.....12

11. Face deeply concave; 1 distinct sternopleural bristle present; prosternum without precoxal bridges.....*Diacia*

——Face not concave; 2 or more sternopleural bristles present; prosternum with distinct precoxal bridges.....*Blaesochaetophora*

12. Hind tibia with strong dorsal bristles near and before middle; lateral scutellar bristles situated behind middle of length of scutellum; size large, wing over 6 mm long.....*Zachaetomyia*

——Hind tibia with, at most, only the preapical dorsal bristle; lateral scutellar bristles situated before middle of length of scutellum; size often smaller.....13

13. 1 strong central cheek bristle present above level of lower marginal hairs of cheek.....14

——Central cheek bristle absent.....20

14. Dorsocentral bristles 4 or 5.....15

——Dorsocentral bristles 2 or 3.....16

15. Dorsocentral bristles 5; postgenal fold forming a deep groove; preapical dorsal tibial bristles absent..... *Nephellum*

——Dorsocentral bristles 4; postgenal fold absent; each tibia with one preapical dorsal bristle..... *Dioche*

16. Dorsocentral bristles 3; costa much thickened on proximal side of break at end of subcosta..... *Anastomyza*

——Dorsocentral bristles 2; costa not thus thickened..... 17

17. Postvertical bristles absent; vertex of head deeply excavated; scutellum much modified..... 18

——Postvertical bristles present; vertex less deeply or not excavated; scutellum not modified..... 19

18. Scutellum with marked median dorsal channel, without apical median tubercle; face with convexity on each side near vibrissa; eye, in profile, rounded oval..... *Neorhinotora*

——Scutellum without dorsal channel, with apical median tubercle; face without pair of convexities; eye, in profile, narrowly oblique..... *Rhinotora*

19. Costa with spaced anteroventral spines beyond end of subcosta; supernumerary crossveins in marginal cell simple or absent; fore femur without short ventral spines..... *Apophoneura*

——Costa without spaced spines; supernumerary crossveins in marginal cell branched; fore femur with numerous short ventral spines near middle. ..... *Rhinotoroides*

20. Hypofacial broadly visible below cheek in profile; fronto-orbital bristles reclinate; prosternum with sclerotized precoxal bridges..... *Cinderella*

——Hypofacial vestigial, scarcely visible in profile; at least anterior fronto-orbital bristle directed outwards; precoxal bridges absent..... 21

21. Dorsocentral bristles 5, subequal; vein 6 long, extending almost to margin. ..... *Epistomyia*

——Dorsocentral bristles fewer than 5, or the anterior ones vestigial; vein 6 short. 2

22. Postfrons with coarse proclinate setulae near middle anteriorly; at least 2 strong sternopleural bristles present..... *Prosopantrum*

——Postfrons with proclinate setulae absent or very minute; only 1 strong sternopleural bristle present..... *Notomyza*

Appendix 3.
Partial Key to Palearctic Genera of Heleomyzidae

1. Vein 6 discontinued before reaching wing margin..... 2

——Vein 6 continued to margin though faint distally..... 6

2. Fronto-orbital bristles absent; vein 1 terminating near middle of length of wing (at 0.46 - 0.48 of length of wing from its base)..... *Psiloplagia*

——Fronto-orbital bristles present; vein 1 terminating well before middle of wing..... 3

3. Mesopleural bristle long; fronto-orbital bristles 2, both reclinate..... *Trixoscelis*

——Mesopleural bristle absent or undifferentiated; fronto-orbital bristles variable. 4

4. Only 1 fronto-orbital bristle present, the fronto-orbital plate bearing it sloping away from eye-margin anteriorly; subcosta and vein 1 distally divergent. ..... *Suillia*

——2 fronto-orbital bristles present, both close to eye-margin; subcosta and vein 1 not distally divergent..... 5

5. Dorsocentral bristles in 4 pairs; antennal segment 3 subcircular..... *Neossos*

——Dorsocentral bristles in 5 pairs; antennal segment 3 oval, longer than wide ..... *Paratrixoscelis*

6. Face uniformly sclerotized, with prominent lower margin; mesopleural bristle long..... *Borboropsis*

——Face with median stripe desclerotized or little sclerotized; mesopleural bristle usually absent, if present small..... Other genera (tribe Heleomyzini)

I omit the numerous genera of the tribe Heleomyzini from this key as I have not made a detailed comparative study of them. They are included in the keys given by Czerny (1924; 1927a), Séguy (1934), Collin (1943), and Gorodkov (1970). It should be noted that, in the work of Collin, the name *Helomyza* is applied to the genus otherwise known to modern workers as *Suillia*.

Appendix 4.
List of New Names, Synonymy, and Combinations.

(1) Heleomyzidae.

New tribal names: Diaciini, Blaesochaetophorini, Zachaetomyiini, Cinderellini, Epistomyiini, Borboroidini, Gephyromyzini, Nephellini, Pentachaetini, Fenwickiini, Waterhouseiini, Mayomyiini.

New tribal status: Borboropsini, Chiropteromyzini, Cnemospathini, Notomyzini.

New generic names: *Ollix*, *Amphidysis*, *Heleomicra*, *Zentula*, *Pentachaeta*, *Dioche*, *Nephellum* (replacement name for *Nephoneura* Malloch, 1933).

New generic synonymy: *Dihoplopyga* Malloch, 1933 = *Blaesochaetophora* Czerny, 1904.

New specific names: *Ollix cogani*, *Amphidysis hesperia*, *Heleomicra collessi*, *Zentula vittata*, *Pentachaeta physopus* (the above species all from Australia), *Dioche khooi* (Chile).

New combinations: *Nephellum dendrophilum* (Malloch) (*Nephoneura*), *Blaesochaetophora norma* (Malloch) (*Dihoplopyga*), *Blaesochaetophora polita* (Malloch) (*Dihoplopyga*).

Nomen dubium: *Helomyza marginalis* Walker, 1858 - probably not a heleomyzid.

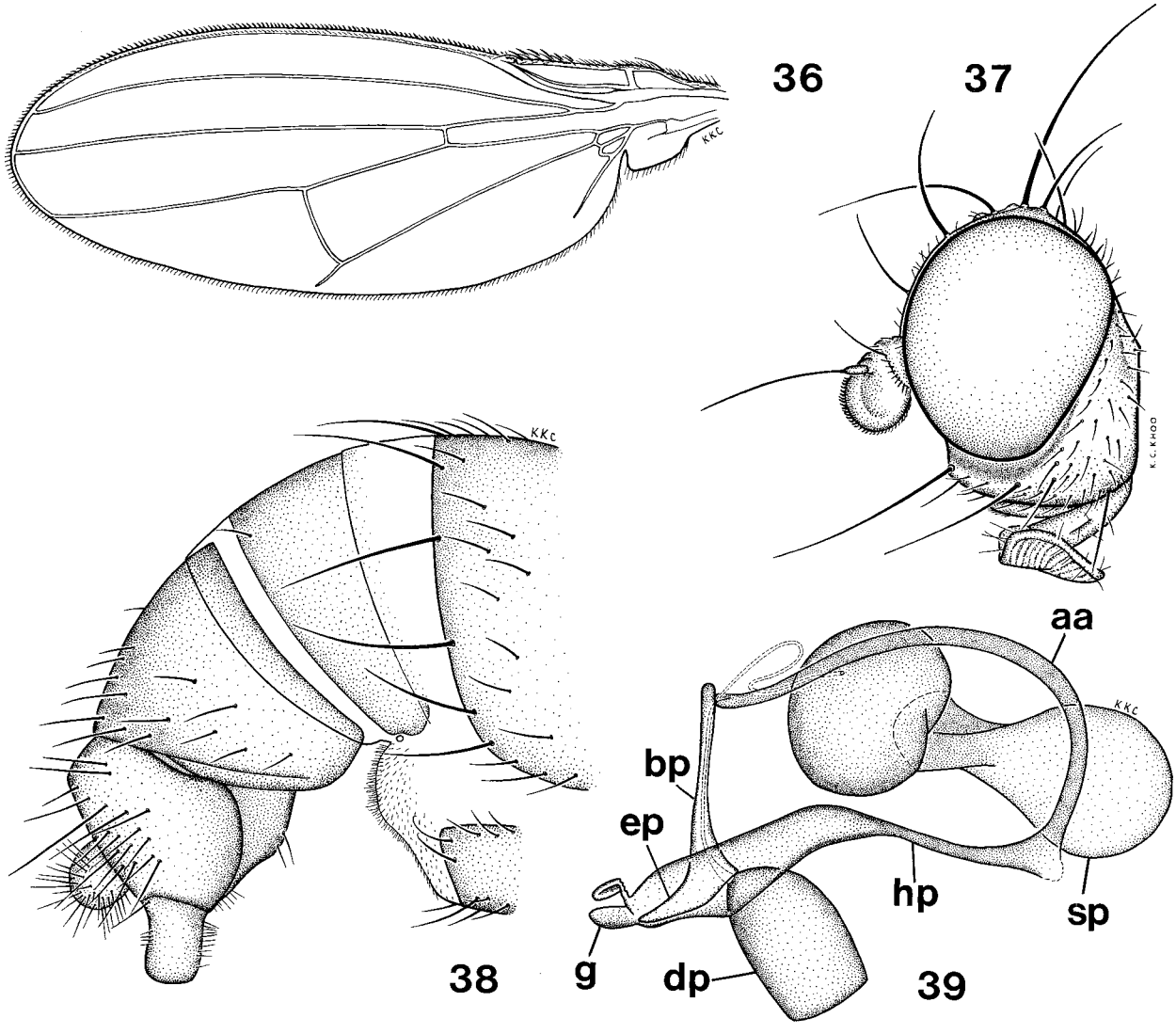
(2) Lauxaniidae.

New combinations: *Meiosimyza lineata* (Walker) (*Sciomyza*), *Sapromyza rufifrons* (Walker) (*Helomyza*).

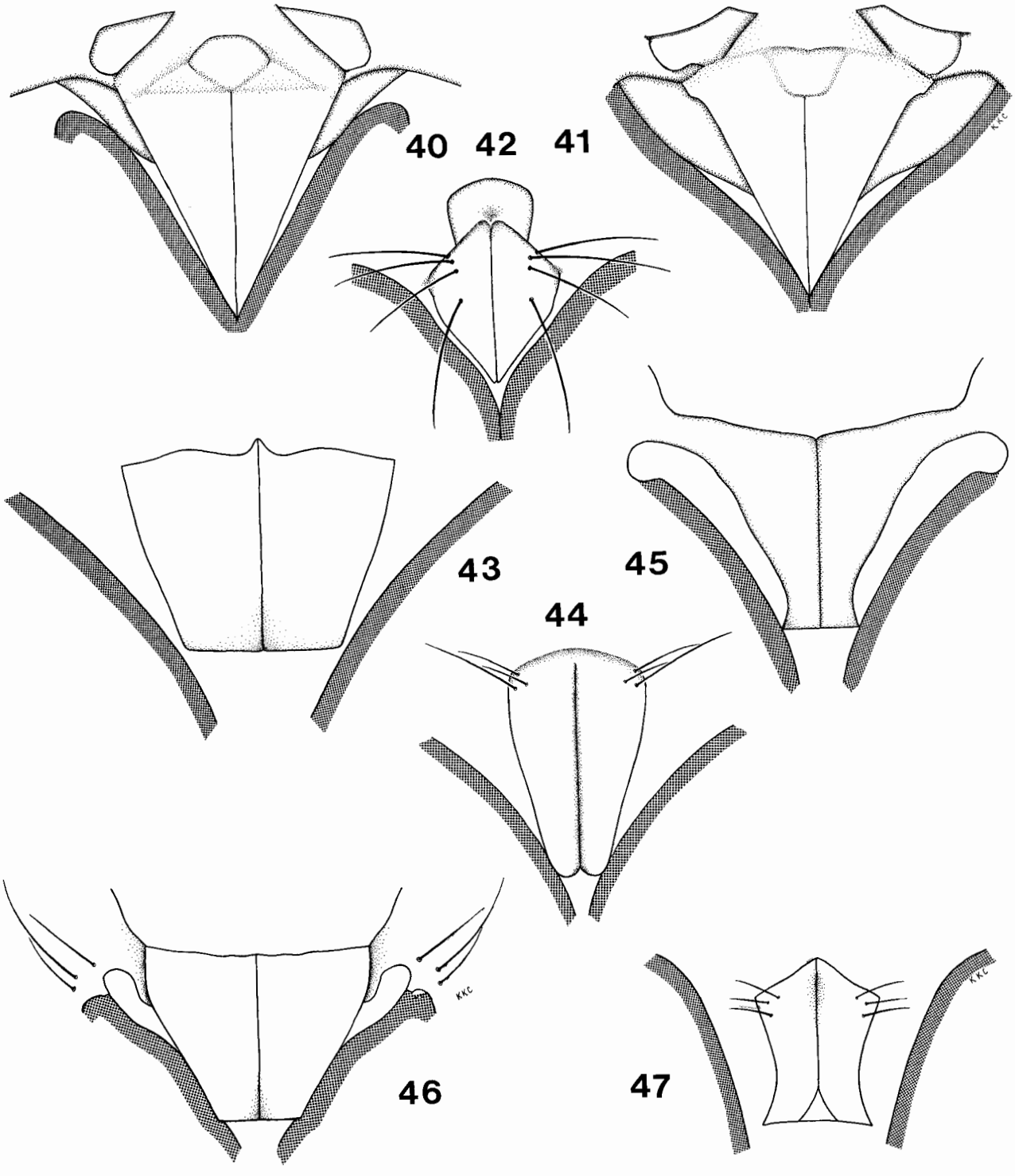
New specific synonymy: *Sapromyza bicoloripes* Malloch 1926a = *Meiosimyza lineata* (Walker, 1853), *Helomyza pallida* Walker, 1853 (not *H. pallida* Fallén, 1820) = *Sapromyza rufifrons* (Walker, 1853).

(3) Helcomyzidae.

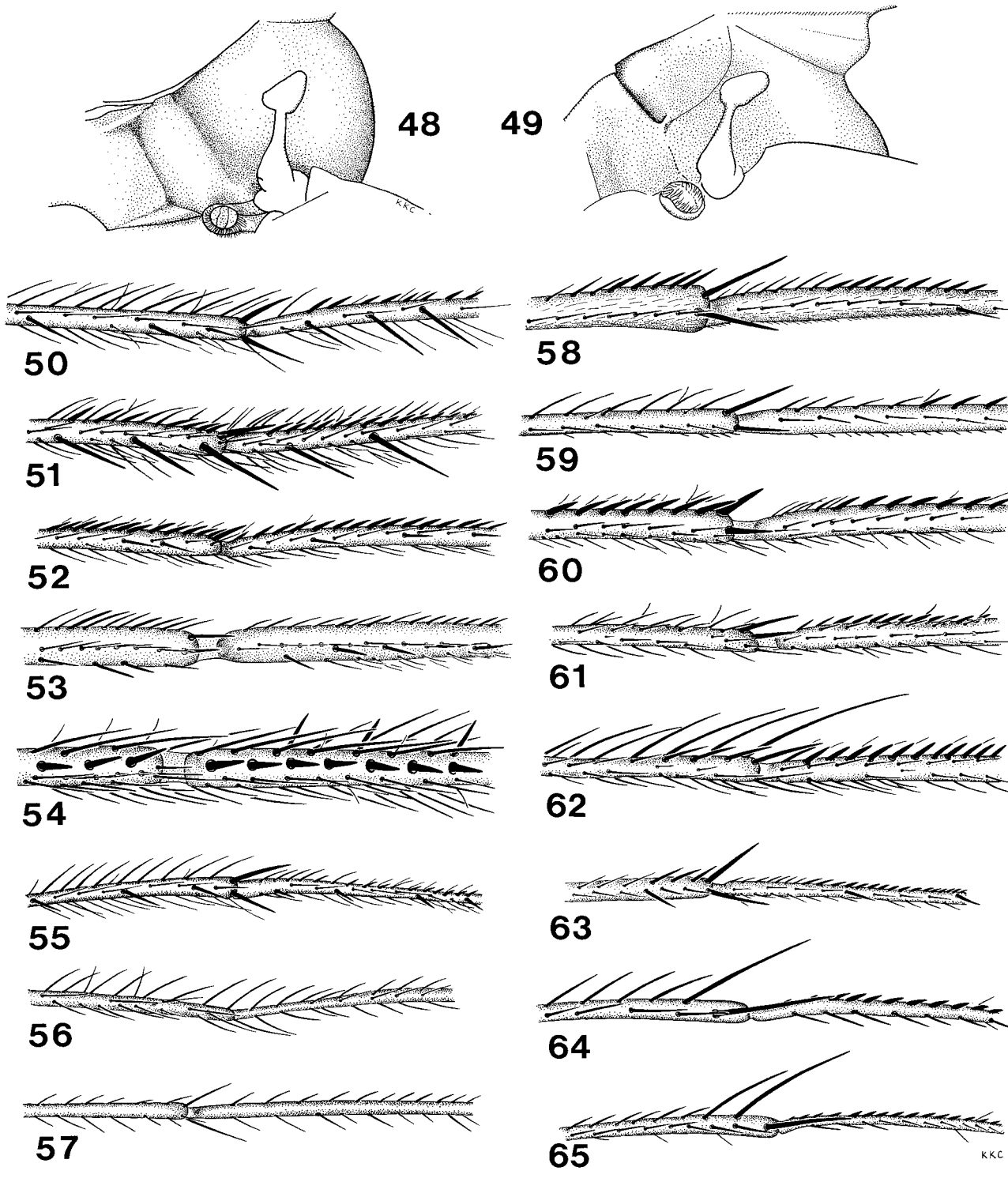
New combination: *Helcomyza vittata* (Macquart) (*Helomyza*) - status in genus and locality doubtful.



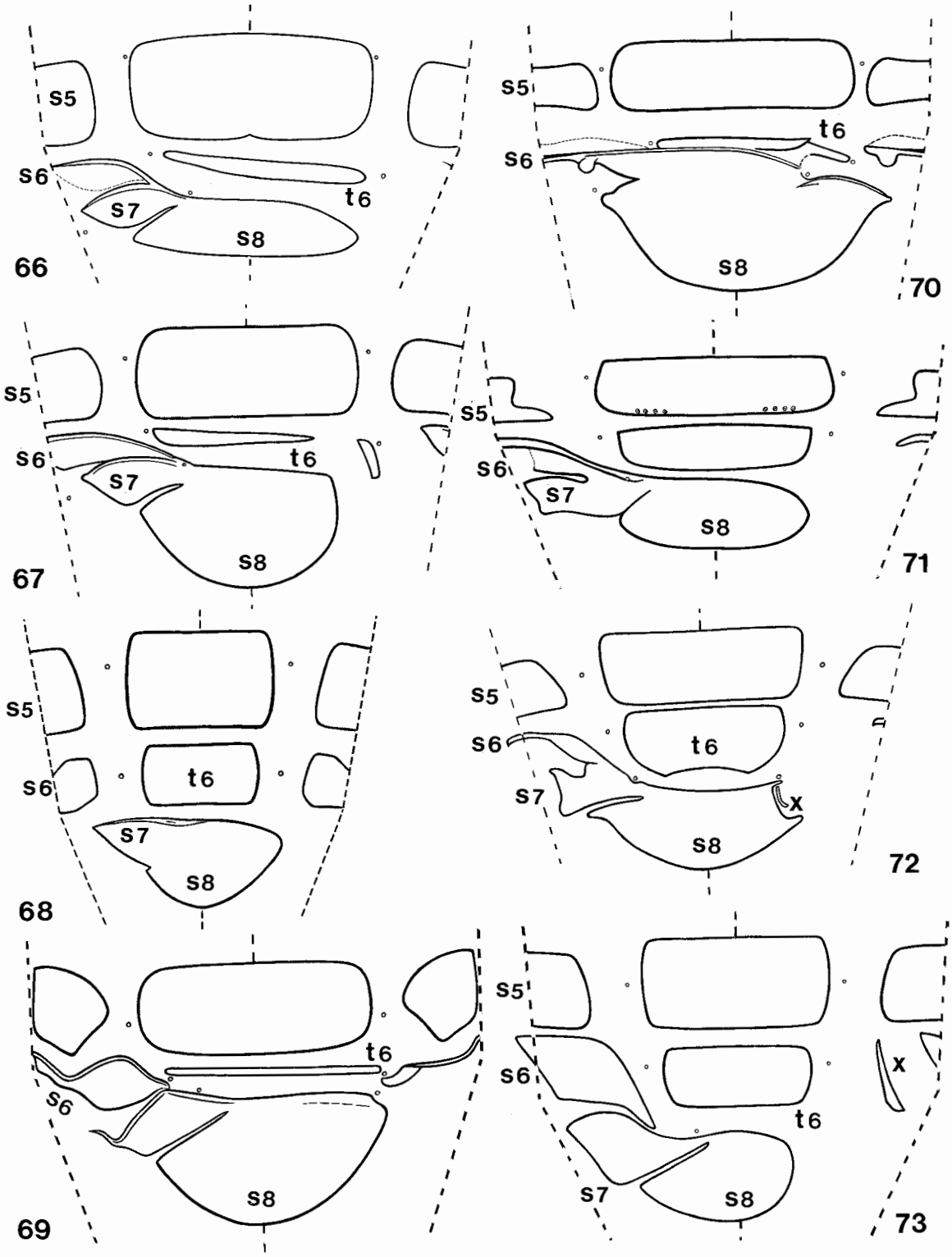
Figs 36–39. *Dioche khooi* n.sp. **36**, wing. **37**, head. **38**, male postabdomen from segment 5. **39**, hypandrium with aedeagus (right lateral aspect). **aa**, aedeagal apodeme. **bp**, basiphallus. **dp**, distiphallus. **ep**, epiphallus. **g**, gonite. **hp**, hypandrium. **sp**, sperm pump.



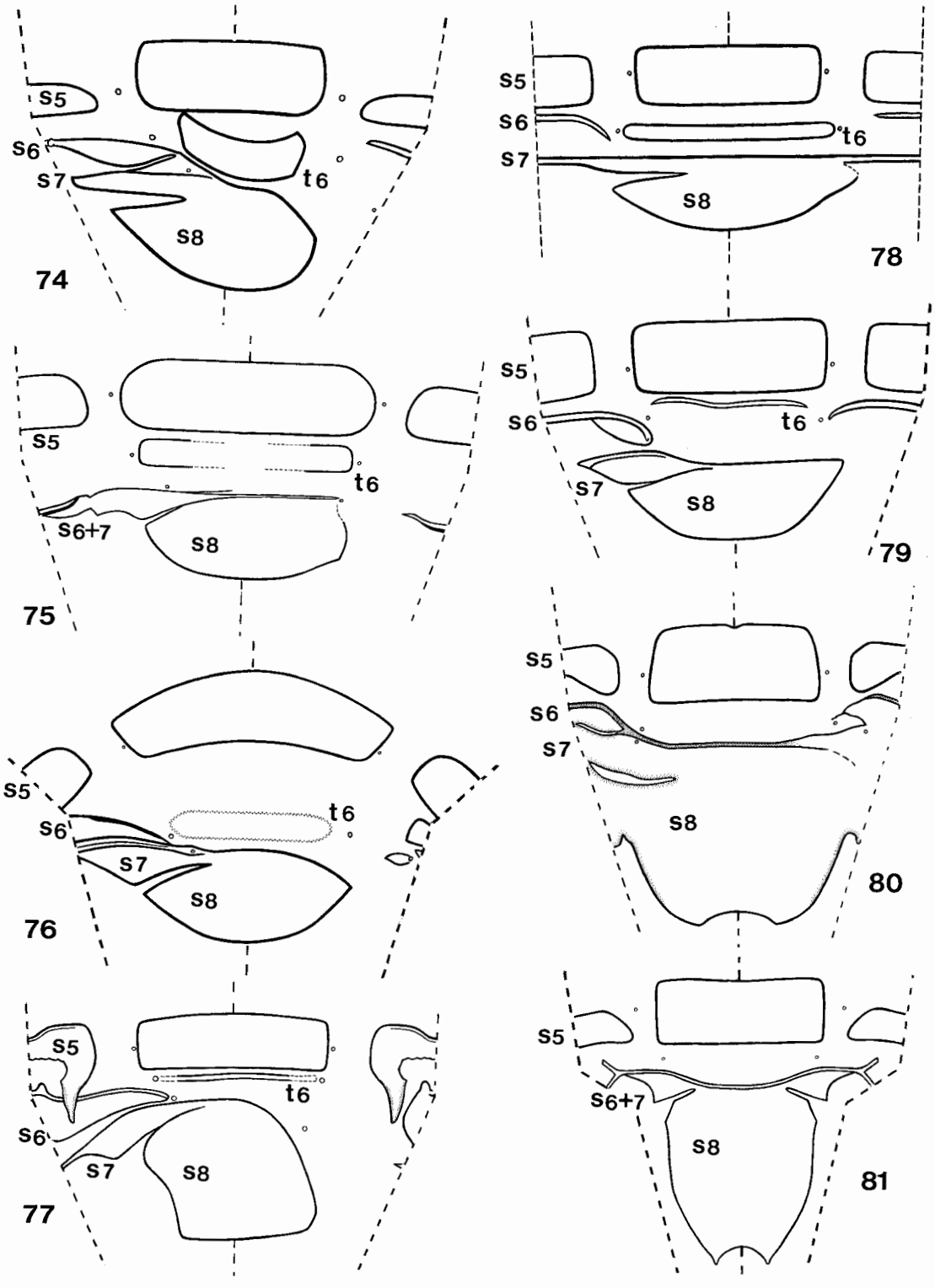
Figs 40–47. Prosterna of heleomyzid flies (margins of fore coxae stippled). **40,** *Pseudoleria placata* (Hutton). **41,** *Tephrochlamys rufiventris* (Meigen). **42,** *Amphidysis hesperia* n.sp. **43,** *Dichromya sanguiniceps* (Wiedemann). **44,** *Suillia* sp. **45,** *Blaesochaetophora* sp. **46,** *Cinderella steyskali* Hennig. **47,** *Mayomyia diversipennis* Malloch.



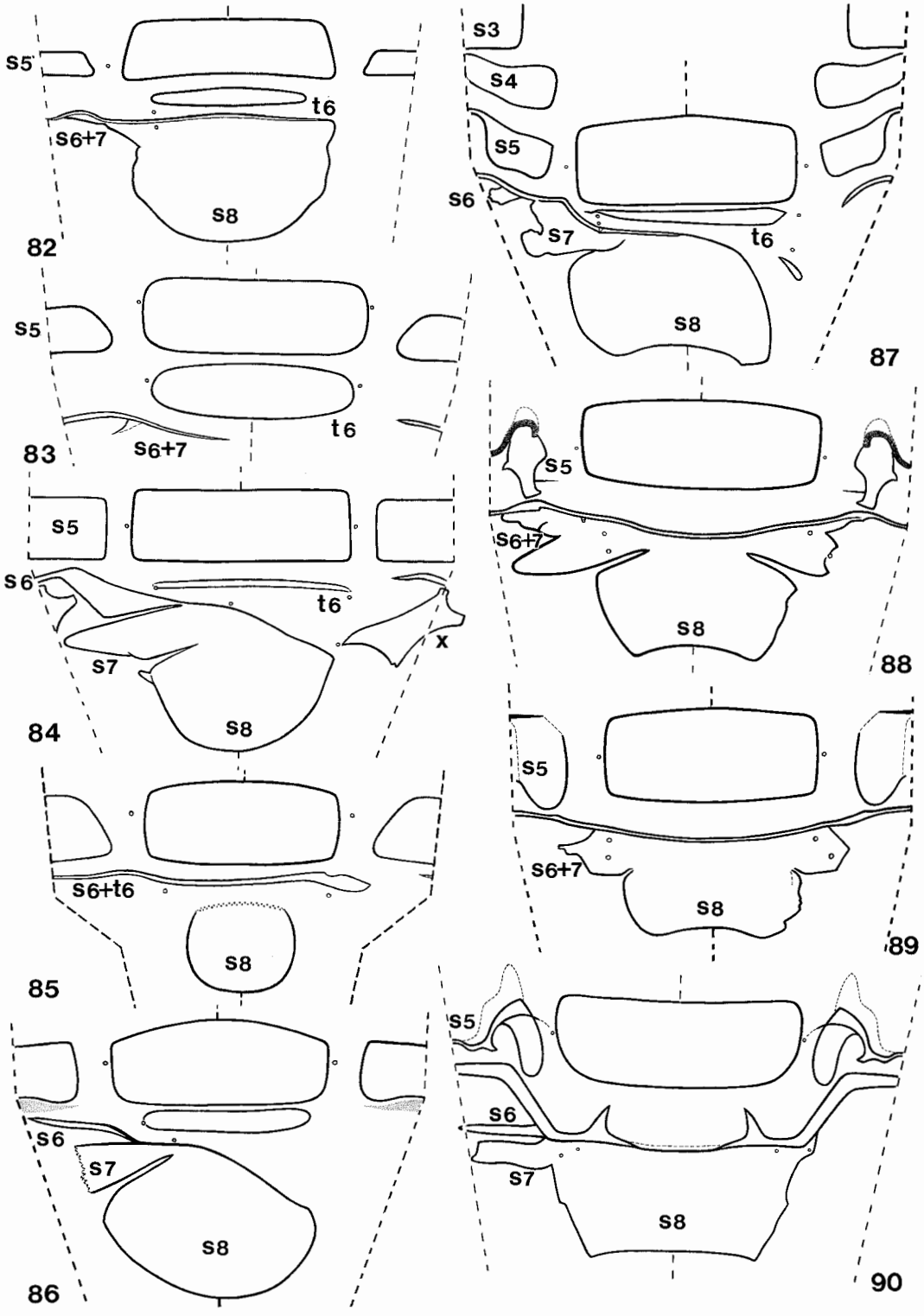
Figs 48–65. 48, region of pleurotergite of thorax of *Tapeigaster annulipes* Macquart to show rhinotorine structure. **49**, the same of *Diplogeomyza spinosa* McAlpine to show allophylopsine structure. **Figs 50–65.** Part of costa near termination of subcosta (anterior aspect) of left wing. **50**, *Heleomyza serrata* (Linné). **51**, *Scoliocentra villosa* (Meigen). **52**, *Heteromyza rotundicornis* (Zetterstedt). **53**, *Diacia diadema* (Wiedemann). **54**, *Zachaetomyia atriventris* Malloch. **55**, *Austroleria truncata* McAlpine. **56**, *Borboroides* sp. **57**, *Nephellum dendrophilum* (Malloch). **58**, *Anastomyza hyalipennis* Malloch. **59**, *Rhinotoroides bifurcata* Lopes. **60**, *Cairnsimyia* sp. (Mooney Mooney Creek, N.S.W., AM). **61**, *Pentachaeta physopus* n.sp. **62**, *Dioche khooi* n.sp. **63**, *Trixoscelis ornata* (Johnson). **64**, *Fenwickia hirsuta* Malloch. **65**, *Xeneura picata* (Hutton).



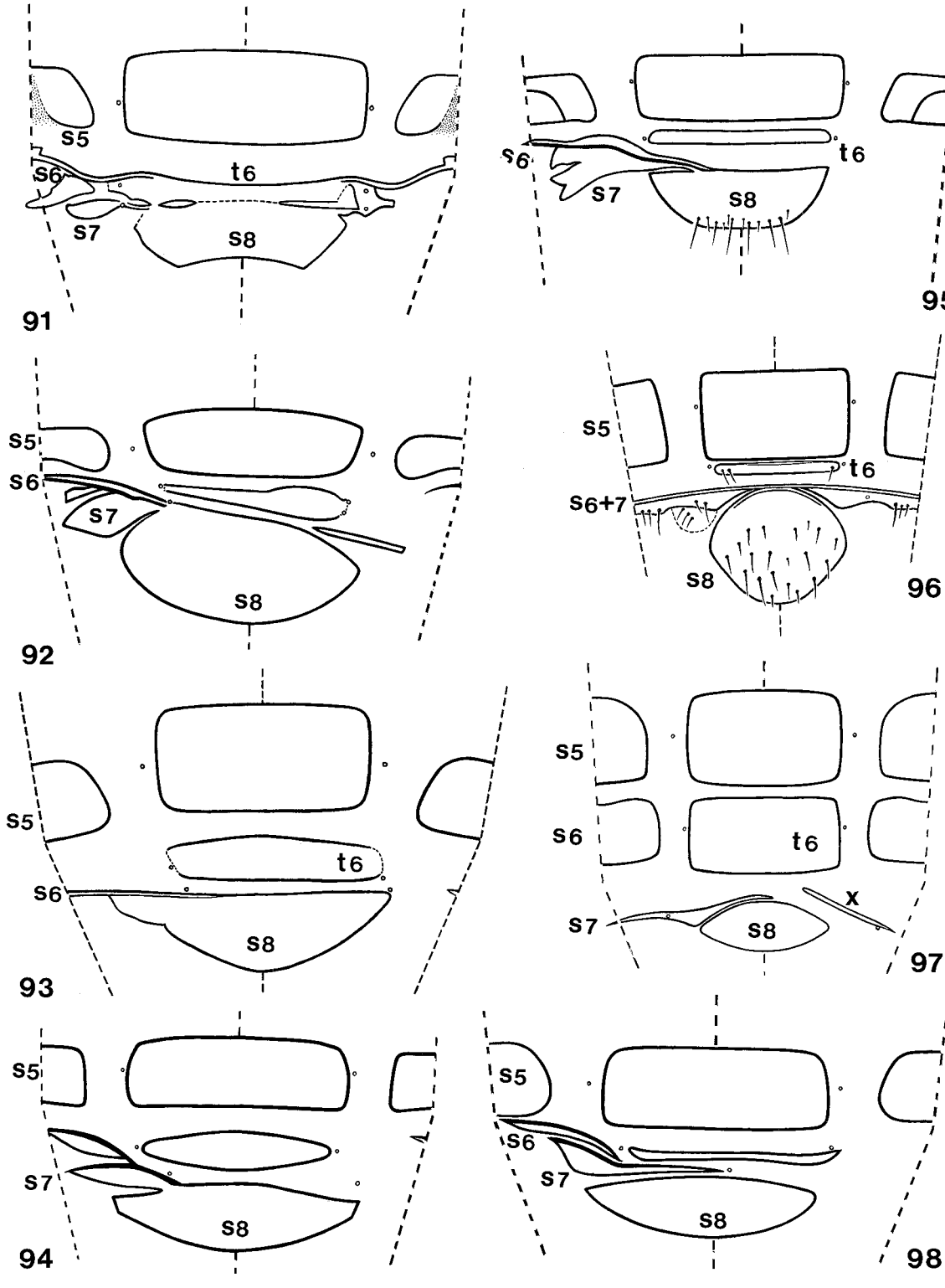
Figs 66–73. Protandrograms of Heleomyzidae. **66**, *Pseudoleria pectinata* Loew. **67**, *Scoliocentra villosa* (Meigen). **68**, *Heteromyza rotundicornis* (Zetterstedt). **69**, *Tapeigaster annulata* (Hendel). **70**, *Suillia ustulata* (Meigen). **71**, *Diacia diadema* (Wiedemann). **72**, *Dichromya sanguiniceps* (Wiedemann). **73**, *Amphidysis hesperia* n.sp. **s5–s8**, sternites 5–8. **t6**, tergite 6. **x**, supernumary or unidentified sclerite.



Figs 74–81. Protandrograms of Heleomyzidae. **74**, *Zachaetomyia atriventris* Malloch. **75**, *Blaesochaetophora picticornis* Bigot. **76**, *Cinderella steyskali* Hennig. **77**, *Epistomyia aurifrons* Malloch. **78**, *Austroleria truncata* McAlpine. **79**, *Allophylopsis inconspicua* Tonnoir and Malloch. **80**, *Borboroides* sp. (Mount Wilson, N.S.W., AM). **81**, *Borboroides atra* Malloch.



Figs 82–90. Protandrograms of Heleomyzidae. **82**, *Heleomicra* sp. (Tasmania, ANIC). **83**, *Notomyza* sp. (Tierra del Fuego, CNC). **84**, *Gephyromyza penicillipes* (Enderlein). **85**, *Nephellum dendrophilum* (Malloch). **86**, *Anastomyza discalis* Malloch. **87**, *Anastomyza* sp.A (CNC). **88**, *Apophoneura* sp. B (CNC). **89**, *Apophoneura* sp. A (CNC). **90**, *Rhinotora pluricellata* Schiner.



Figs 91–98. Protandrograms of Heleomyzidae. **91**, *Neorhinotora mutica* (Schiner). **92**, *Cairnsimyia uniseta* McAlpine. **93**, *Pentachaeta* sp. B (AM). **94**, *Dioche khooi* n.sp. **95**, *Trixoscelis ornata* (Johnson). **96**, *Fenwickia claripennis* Malloch. **97**, *Waterhouseia cyclops* Malloch. **98**, *Mayomyia diversipennis* Malloch.

Index to supraspecific taxa