Moth Flies

DIPTERA : PSYCHODIDAE

Phil Withers

Dipterists Digest No. 4

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Fancy quantitative lab work often wins all the kudos, while field naturalists, with their detailed and specific knowledge, are unfairly dismissed as stamp collectors....there is no substitute for detailed knowledge of natural history and taxonomy.

Stephen J. Gould, 1983

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Contents

For Dawn and Lydia, with much love

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Introduction

The moth flies or owl midges of the family Psychodidae are probably among the most neglected members of an otherwise popular group, the Nematocera. They are readily recognisable by their small size, hairy wings and antennae which resemble strings of beads. In this respect it may be possible to confuse them with gall-midges of the family Cecidomyiidae; they are distinguishable by the many more wing veins and the tendency of many moth flies to hold the wings folded tentlike when at rest (see figure 1).Many Nematocera, such as the crane-flies, are ungainly in appearance and fly with jerky, erratic movements which imply fragility. Relatively few can be classed as large and obvious, and it is in part because of their size that psychodids have been so neglected. Most moth flies are little bigger than 5mm in length, and allied to their secretive behaviour this has meant that they are largely overlooked by most students of Diptera, despite the fact that they can be both widespread and numerous. Certain species are regularly found on window panes at dusk or occasionally swarm round sink overflows. The present British fauna stands at 89 species.

The family is found in all zoogeographic regions, extending to oceanic islands and the more hospitable areas of the Antarctic. Trichomyiinae are considered a primitive group now in decline. Members of this subfamily are characteristically rare and found in low densities. It is possible that the esoteric larval habits of the few species known in this stage, if found to be consistent across the group, are a contributing factor. Psychodinae, in contrast, show extreme morphological diversity and ecological radiation, and all but three British species are contained within this subfamily. Quate (1961) considers how regional faunas may have arisen, but the relative paucity of recent studies in some geographic areas means that this is likely to remain a theoretical model for some time. It is notable, for instance, how the extensive work by Duckhouse on the Australasian, South American and Ethiopian faunas has forced a continual revision of hypotheses and apparent truths, as ever more material becomes available.

There is considerable proliferation of form in tropical regions, and many extraordinary genera are unrepresented in the Palaearctic region. It is probable that only about 30% of the known world psychodid fauna is found in this region, and less than 30% of these are presently known from Great Britain.

The subfamilies represented in Great Britain (Trichomyiinae and Psychodinae) have no medical significance, unlike the tropical Phlebotominae, or sandflies, the females of which are blood-suckers and may actively bite man. They are important as vectors of visceral leishmaniasis and kala-azar. Some psychodids do occasionally become a nuisance if they, for example, breed in numbers in domestic drains. Others have been proved, as larvae, to graze bacteria in trickle-filter sewage works; adults which result may represent a significant nuisance to workers in this industry.

A previous key to this family in the Royal Entomological Society Handbook series was written by Freeman (1950) based on the seminal work of Eaton and Tonnoir.It placed much reliance on such characters as scale patterning and the shape of the apical antennal segments, without figuring in any detail many of the genitalic features which have since been shown to be so useful. Freeman (1953) added a further 2 species to the British fauna and in 1962, Duckhouse redescribed adults and larvae of selected species, discussing alleged "species pairs". Since that time, a number of European works have added considerably to the body of knowledge of the family, culminating in the monumental Palaearctic revision, still in progress, by Vaillant (1971 continuing). It had been intended that the present work would be published as a Royal Entomological Society Handbook, but this has not ultimately proved possible,

It is nonetheless hoped that the fresh approach represented by this new key will rekindle interest in this family in the British Isles.

Acknowledgements

My greatest debt of gratitude falls to Dr Henry Disney, whose initial despair at my dislike of Nematocera I trust has been replaced by a certain relief. He has for some years been both friend and mentor, and his kindness in loaning me the Psychodid fascicles of *Die Fliegen der Palaearktische Region* spurred my initial enthusiasm greatly.

Both Drs Peter Cranston and Richard Lane allowed me generous access and loan facility of the collections at the British Museum (Natural History) in their care. Peter was also instrumental in supplying me with copies of some necessary papers I lacked.

Considerable assistance has been afforded to me by many continental specialists, and in particular I wish to thank Dr Salih Krek (Yugoslavia), Dr Jan Jezek (Czechoslovakia), Dr Rudi Wagner (W. Germany) and Prof.

François Vaillant (France) for some critical determination and a wealth of informative separates. Dr Derek Duckhouse (Australia) assisted in untangling some taxonomic knots.

A number of people generously responded to my desperate pleas for material in fluid, and notable collections were provided by Dr Disney, R. George, D. Henshaw, D. Howse, M. Gilchrist, J. Owen, Dr A. Irwin, M. Drake and P. Chandler.

The customary artistic fluency of Mrs. Howse has resulted in the cover being adorned by a *Pericoma trivialis* of exceptional realism. My deepest thanks are due to her.

My wife has been both patient and supportive during the many periods of doubt and frustration, and her ability with a typewriter far exceeded my own. I owe her much more than the time spent in isolation in my study.

Immature stages (e.g fig.2)

Preliminary work on the immature stages of British psychodids was undertaken by Satchell, who described and figured the larvae of many Psychoda species (1947), the pupal respiratory horns of Psychoda (1948) and a number of larval "Pericoma" species now variously contained in the genera Pericoma, Tonnoiriella and Peripsychoda (1949).

The mainstay of Vaillant's revisionary work (loc. cit.) is the attempt to derive systematic relationships between sub-groupings of broader classical genera, based on examination of larval and adult features, as well as certain ecological information. From this synthesis, a number of biotypic groups can be derived. Saprophytic larvae can be found in a variety of aqueous habitats: banks of springs, brooks or trickles, in collections of standing water, always feeding among dead vegetable matter (probably grazing on algae, bacteria or diatoms). Some, notably Peripsychoda auriculata, are known to live within the epidermal leaf layers of composted alders (Satchell, 1949).

It is possible to distinguish two basic saprophytic types: lotic, requiring fresh, usually running, water (Pericoma crispi, P. mutua) and lentic, more tolerant of very stagnant conditions (Pericoma trivialis, Paramormia ustulata).

A number of species are regularly found in dung. Such coprophages vary in their requirements according to the moisture content of the dung. *Psychoda brevicornis* is regularly found in very wet dung, whilst *Psychoda minuta* is an inhabitant of much drier deposits. No species is known to occur only in the dung of one animal, but *Psychoda minuta* and *P. albipennis* seem to prefer carnivore and bird excrement, whereas *P. phalaenoides* is more frequent in rodent, ruminant or equine dung (Satchell, 1947). *P erminea* has recently been reared from otter spraint (R.M. Payne, pers. comm.).

An extension of the dung habitat, although unnatural, is manure slurry or abattoir outwashes, and psychodid larvae can be found in great numbers in such material. The species involved, such as *Pericoma nubila* and *P. trivialis*, possibly reflect a larval tolerance of high organic levels and/or anaerobic conditions.

Vaillant (1971) defines psammobiontic larvae as those found in sand or muds, especially where these occur on banks in slow-flowing rivers. Many species of *Telmatoscopus* are known to breed in such habitats, and *Paramormia ustulata* is often found in the mud of springs washed by seawater, indicating considerable saline tolerance. *Telmatoscopus similis* has been reared from salt-marsh mud.

Rock pools and solution hollows in limestone rock are particularly favoured by *Pericoma canescens*, whereas the larvae of most known *Mormia* live in the mud, deposits of calcareous dust or capillary water films in such substrates. The moss which forms on such rocks in upland areas is often the habitat of *Pericoma blandula*.

The humus-rich rot-holes of trees are the only known habitat of *Telmatoscopus rothschildi*, *T. tristis*, *T. laurencei* and *T. advenus*, whereas *Trichomyia urbica* is a most unusual associate of wood in having larvae which bore into rotten tissue (Keilin, 1914; Keilin & Tate, 1937). *Philosepedon humeralis* has frequently been recorded as a parasite or parasitoid of molluscs.

A number of species routinely breed in leaf litter and generalised rotting vegetation, for example *Trichopsychoda hirtella*, which occurs perhaps more commonly in gardens than anywhere else.

Psychoda lobata has only been recorded as breeding in higher fungi, but I have reared four other species of *Psychoda* from either *Coprinus atramentarius* or *Polyporus squamosus*. Despite the apparent specificity of many psychodid larvae, occasional species display remarkable catholicism, such as Paramormia ustulata and Psychoda alternata. Much more work is required on larval preferences in the British Isles, and there are still numbers of species which have never been reared or described as larvae.

All too little is recorded of the parasites of moth flies. Satchell (1947) comments on Psychoda as carriers of larval Rhabdites (Nematoda), observing that any of the dung-breeding species may pick up such worms if exposed to a dung sample containing them. The most commonly infected species he found was P. phalaenoides, and this is indeed the only species I have encountered with such an infection. He also occasionally discovered worms as internal parasites, identified by Goodey (1930) as a relative of Tylenchinema oscinella Goodey. The protozoan Glaucoma was occasionally encountered in the body cavity. E.A. Ellis (pers.comm.) records larvae commonly succumbing to attacks by the hyphomycete fungus Cylindrodendron suffultum Petch. Leatherdale (1970) records the same fungus attacking Boreoclytocerus ocellaris adults, and unidentified psychodids succumbing to Entomophthora dipterigena (Thaxt.)Sacc. There is great scope here for more systematic evaluation.

Myiasis (invasion of living tissues by fly larvae) has been caused by the pantropical Clogmia albipunctatus Williston on several occasions, either nasopharyngeal, intestinal or urogenital (e.g. Mohammed & Smith, 1976; Smith & Thomas, 1979; Zumpt, 1965)

Morphology

The HEAD (fig.16-22) of a moth fly is characterised by eyes produced dorsally into a prominent eye bridge, in all species but Trichomyia and Sycorax. Occasionally this eye bridge meets in the midline. Ocelli are absent. The palps are long, segmented and free. The antennae are composed of a basal scape, which may be spherical or elongate, and 14, 15 or 16 segments, the first of which, the pedicel, is usually spherical, The other segments are either barrel-shaped or possess an obvious neck (figs.41-50,124-129). One or more of these segments may show modification of shape, such as the bulls-eye organ in certain Mormia (fig.16,fig.177) or carry accessory organs such as the antennal brush of Boreoclytocerus (fig.50). All segments carry ASCOIDS, thought to be sensory in function. These vary greatly in shape, most commonly being pairs of single digitate structures but, especially in Mormia, may be leaf-like, rake-like, multiple or forked (figs.124-129). All ascoids are transparent and their attachment weak, so specimens examined may appear to possess few or none. Occasionally the head bears accessory CORNICULI (fig.18,20).

The THORAX is broadly domed in lateral view, and this appearance is exaggerated by the low attachment of the head (fig.1). Features of the pleura and dorsum have not been found useful in separating species, but reference to the thoracic sensory organs may be found below.

The ABDOMEN is clearly divided into tergites and sternites, joined laterally by a broad membraneous area. In life, the abdomen is usually extensively covered in light or dark hairs and scales, but these are readily shed when placed in fluid.

The WINGS (figs.4-15) are characteristic among the Nematocera in their generally ovate shape and lack of cross-veins. The two main forks are always present, though they may be incomplete basally (fig.7). Vein homologies are uncertain, so these are referred to as upper and lower forks respectively. Their position relative to the cubital vein is important to note, as is which fork occurs nearest the wingtip. The wings too are densely clothed in scales in life, and many species show elegant patterns of dark and light hairs seen macroscopically as patches or spotting. These hairs are also easily shed in preservative. In <u>Pericoma fuliginosa</u> is found a peculiar pouch in the wing of the male, which has a higher density of scales than the rest of the wing (fig.9). The function of this structure is unknown.

The male GENITALIA are complex compared to many other Nematocera, but conform to a basic pattern. Principal parts are labelled in fig.3. A torsion of 180° brings the aedeagus to an apparently dorsal aspect. The aedeagus is usually bilaterally symmetrical, although exceptions do occur; asymmetry is normal in <u>Tonnoiriella</u> species. Particular note should always be made of the form and numbers of the erectile setae at the apex of the cercopod (RETINACULA); the absolute numbers may show slight variation, especially at higher values. The current state of knowledge does not allow separation of females in most genera, but this is possible in <u>Psychoda</u>. Here, the shape of the ninth sternite is diagnostic (see figs.147-162). Female <u>Psychoda</u> terminalia should thus be mounted ventral side uppermost.

The LEGS are noteworthy in a few species, such as <u>Paramormia ustulata</u>, where the fore femur has a double row of short spines (fig.39) and <u>Mormia</u>

andrenipes, where the fore femur is prominently thickened bearing specialised hairs called androconia (fig.40).

Sense organs of male psychodids

Considerable research into the function of many of the accessory organs borne by male psychodids was undertaken by Feuerborn (1922). His conclusions form the basis of these paragraphs, which must only be regarded as tentative in the absence of further work.

Accessory organs, some or all of which may be sensory in function, can be found on the wings, head, antennae or thorax of many male psychodids. The prominent row of cubital bristles on the wing of Pericoma mutua may possibly be sensory, as they are evidently much better attached than the other trichia of the membrane. The corniculi, where present on the head, may be either long and club-shaped, as in certain Telmatoscopus, or short and squat, such as Boreoclytocerus. In either case they bear many recurved hairs each with a bulbous tip. It is possible that these serve as tactile appendages, working in harmony with the ascoids (see below).

The thoracic organs are variable in shape, size and position, but all are considered to be secretory and probably pheromonal. The scent has been demonstrated to alter the behaviour of females, leading to arousal activity, indicating readiness to the male. Many of these organs are eversible and covered with contrasting hairs. A pair of bare, chitinised, hookshaped erectile pegs are found in Peripsychoda. Pericoma cognata possesses two large mesothoracic "patagia" which are inflatable. Peripsychoda and Pericoma nubila carry one fixed "tegula", whilst in Pericoma fuliginosa these are paired. The tegulae protect the wing locking apparatus by a special fold of the wing membrane. On the prothorax of Pericoma nubila and P. trivialis is found a single granulated peg.

On the antennal segments of some Mormia are found the asymmetrical projections variously called bulls-eye organs or port-hole organs. The function of these modified segments is unknown. Feuerborn (1922) categorises the hyaline ascoids as secretory rather than sensory, and he considers them the source of the "sexual scent". In some species these are actively displayed to the female and a fundamental behavioural change results in females "advertised" to in this way, with increased wing beat frequency and adoption of a submissive attitude rather than the normal wariness. Ascoids show an extraordinary range of form, from simple pairs of fingerlike projections to elaborate leaves, rakes or tridents. Vaillant (1971) has proposed a theoretical evolutionary scheme by which these differing types may have arisen. Finally, the function of the diagnostic antennal brush of male Boreoclytocerus is unknown.

Observations on courtship behaviour have been documented for some tropical species, but little is known about British psychodids in this respect - observation of even common Psychoda is badly needed.

Collecting, preservation and examination

Adult psychodids are found in most environments, sometimes in shade and sometimes settled on sunnier vegetation. Certain Psychoda species are common emergents from drains and sink overflows. A variety of collecting strategies may be employed to collect specimens, with varying success.

As the known larvae of many mothflies have a close association with water, sweeping in damp areas can be highly productive. Psychodids are unmistakeable in the net with their prominently scaled wings, and are not strong fliers, so little confusion with other insects is likely, and they can be quite leisurely removed.

A fine sweep net will produce many specimens, especially if employed near water, but inspection of the net bag at frequent intervals will produce a higher proportion of specimens which are intact - antennae are especially liable to dislocation and coarse weave nets increase the incidence of such damage. Pooting individual specimens from vegetation or tree bark may be useful in locations where a net is difficult to use. Duckhouse (1978) records considerable catches of Trichomyia species at light traps in Australia, and some Psychoda are attracted to domestic lighting at dusk. It is quite probable that many psychodids are actively nocturnal, as implied by Lewis & Taylor (1964) in their studies of nocturnal peaks; close attention to smaller Diptera visiting moth-traps could repay dividends, especially in upland regions. Sticky traps, frequently used by ecologists as a quantitative tool, do not leave delicate specimens such as psychodids in a suitable state for examination: most of the critical features seem to be left behind in the grease or oils used in such traps.

Without doubt, however, two passive trapping methods are particularly productive of psychodids. The Malaise trap has been demonstrated as an especially effective sampler of populations of flying insects, particularly Diptera. Perhaps the only drawback of this method is the the sheer volume of material produced in any time period; sorting this material can be time -consuming, but has the reward of turning up species present in very low densities in the given area.

An increasing number of ecologists and entomologists are employing water-traps as sampling tools. The advantage of a washing-up bowl half full of water with a little detergent added is self-evident: such a trap is cheap, requires little maintenance and is eminently portable. It is also, in the author's experience, remarkably efficient at catching psychodids. As has been demonstrated (Disney, *et al.*, 1982) the colour of the trap radically affects both catch numbers and type. White or cream have been found most effective.

In the author's experience, many moth flies are more active at night, and significant catches may be made using light-traps. At least 6 species of Psychoda have been taken around domestic lighting, and suburban gardens have been demonstrated to contain large numbers of certain species if trapping methods such as water- or Malaise-traps are used. Such traps have repeatedly proven their usefulness in sampling Diptera, and psychodids are well represented in such samples. Some of the species additional to the known fauna in Great Britain have only been collected in such a manner, in certain cases in quite large numbers.

Specimens should be preserved initially in 70% alcohol, but long-term storage of small Diptera in this medium has been found to bleach or even dissolve specimens; a certain stiffness may also be found, even over short periods. Proposed lengthy storage media are still the subject of unresolved debate, but perhaps a fluid similar to Berlese mountant but lacking the gum arabic offers the best option so far (see below).

Rearing of larvae can be productive, albeit somewhat unpredictable, and may be the best way of obtaining certain species, especially rot-hole associates such as Telmatoscopus rothschildi. Retention of the pupal case is advisable as a number of taxonomically useful features can be found, especially in the respiratory horns.

Many early dipterists were exclusive advocates of micro-pinning all flies (although the Reverend A.E. Eaton was slide-mounting psychodids as early as 1904). In the past 30 years, a minor revolution has taken place, wherein particularly small flies are now conventionally mounted on slides; the rationale behind this is simple - more information is obscured or destroyed by the action of pinning than is usefully gained. Micro-dissection and slide mounting are now standard practise in Chironomidae, Ceratopogonidae, Cecidomyiidae and Phoridae, and there are proponents for yet more families to be treated likewise.

Another valid justification from the ecological standpoint has been lucidly explained by Disney (1983) in his Handbook to the Phoridae. In principle, an ecologist is far more likely to use an identification guide which advocates wet preservation, and may thus contribute much valuable information. Equally, a large majority of continental workers are routinely slide mounting their material, and illustrations of the critical characters of new species are best compared to specimens prepared in a like manner.

An ideal mountant is still a subject for debate among psychodid authorities. Some prefer the classic resin-based Canada balsam mountants or synthetic equivalents, although a series of ascending alcohol washes and clearing in clove oil and xylene is necessary. Others (myself included) prefer the water soluble gum bases, and Berlese fluid has been found effective, as advocated by Lewis (1973) in preparing Phlebotominae. The formula is as follows:

Gum arabic (picked lumps)	12g
Chloral hydrate crystals	20g
Glacial acetic acid	5ml
50% w/w glucose syrup	5ml
Distilled water	30-40ml

One criticism of this mountant, that it crystallises with age, is probably attributable to impurities in the gum, and Henshaw (1981) has suggested immersion of the gum arabic in water in a cotton bag. The gum dissolves into solution, leaving the impurities in the bag. Proprietary formulations may be acquired from dealers, such as GBI Laboratories Ltd, Shepley Industrial Estate, Audenshaw, Manchester, M34 5DW, but it is advisable to specify the above recipe, as a number of formulae have been evolved. Berlese fluid clears specimens to a certain extent; there is no need for a preparatory soak in caustic potash. Transfer is accomplished direct from alcohol, and the slides dry quicker than when using resin mountants.

Ringing the dried results is essential, but here again no consensus exists. Clear nail varnish or Euparal have been used, but the latter may dissolve over time and reacts with Berlese fluid to produce a black polymer, whilst the former has unknown properties after storage. Glyceel has been recommended, but is not widely available. Discussion will doubtless continue: for general use, nail varnish seems the best, but will require periodic monitoring.

Micro-dissection should follow the method outlined below. The most important features are the genitalia, and these should be free from compression or distortion. The genitalia coverslip should therefore be supported, either on small glass beads, a circle of ringing medium or broken pieces of coverslip. A standard 22 x 22 mm coverslip can be cut with a diamond marker pen (used for identifying glassware) - careful scoring should yield six oblong pieces per coverslip.

The specimen is gently blotted to remove excess preservative and placed on a slide in a drop of Berlese fluid. Dissection is carried out as shown in figure 180. The head (H) is removed, and mounted anterior aspect uppermost, taking care to include the corniculi if present. The left wing (W) is removed close to the wing root and mounted dorsal surface uppermost. The tip of the abdomen with the genitalia (G) is sliced off, taking care not to sever the spatulate region of the aedeagus, which may penetrate the abdomen. This is orientated with the dorsal side uppermost. In some cases it may be found useful to further dislocate the cercopods, as these may obscure the aedeagus. The remainder of the specimen is retained as thorax, abdomen and legs (TA) under a further coverslip. It is useful to detach one of the forelegs and arrange it so as to be clearly seen from the side.

Remounting a pinned specimen can be effected using the method outlined in Disney (1983).Considerable progress can be made through the keys using a stereo dissecting microscope, but the fine details of the genitalia are best examined using a compound microscope.

Checklist

TRICHOMYIINAE

TRICHOMYIA Curtis in Haliday, 1839

urbica Curtis in Haliday, 1839

SYCORACINAE
SYCORAX Curtis in Haliday, 1839
silacea Curtis in Haliday, 1839
similis (Muller, 1927)

PSYCHODINAE
BOREOCLYTOCERUS Duckhouse, 1978
dalii (Eaton, 1893)
ocellaris (Meigen, 1804)
   ?*americana* Kincaid, 1901
rivosus (Tonnoir, 1919)

BAZARELLA Vaillant, 1971
neglecta (Eaton, 1893)

PERICOMA Walker, 1856
blandula Eaton, 1893
calcilega Feuerborn, 1923, larva; Tonnoir, 1940, adult
canescens (Meigen, 1804)
cognata Eaton, 1893
compta Eaton, 1893
crispi Freeman, 1953
   hungarica Szabo, 1960
diversa Tonnoir, 1920
exquisita Eaton, 1893
   minutissima Vaillant, 1963
   petricola Vaillant, 1962
extricata Eaton, 1893
   mirousei Vaillant, 1960
fallax Eaton, 1893
fuliginosa (Meigen, 1804)
   hirta Walker, 1856, ? nec (Linnaeus,1761)
gracilis Eaton, 1893
mutua Eaton, 1893
   alispina Feuerborn, 1922
neoblandula Duckhouse, 1962
nubila (Meigen, 1818)
palustris (Meigen,1804)
pilularia Tonnoir, 1940
pseudexquisita Tonnoir, 1940
   avicularia Tonnoir, 1940
rivularis Berden, 1954
tonnoiri Vaillant, 1971
   calcilega Tonnoir, 1940, partim
trifasciata (Meigen, 1804)
   ripicola Vaillant, 1955
trivialis Eaton, 1893

PERIPSYCHODA Enderlein, 1935
auriculata (Curtis, 1839)
   fusca (Freeman, 1950) nec (Macquart, 1924)

fusca (Macquart, 1924)
   auriculata (Freeman, 1950) nec (Curtis, 1839)

SZABOIELLA Vaillant, 1971
hibernica (Tonnoir, 1940)
   bezzii Sara, 1963

TONNOIRIELLA Vaillant, 1971
nigricauda (Tonnoir, 1919)
pulchra (Eaton, 1893)

ATRICHOBRUNETTIA Satchell, 1953
   MIROUSIELLA Vaillant, 1971
angustipennis (Tonnoir, 1920)

MORMIA Enderlein, 1935
andrenipes (Strobl, 1910)
caliginosa (Eaton, 1893)
eatoni (Tonnoir, 1940)
   tenella Krek, 1972
furva (Tonnoir, 1940)
incerta (Eaton, 1893)
palposa (Tonnoir, 1919)
revisenda (Eaton, 1893)
satchelli (Jung, 1963)

PARAMORMIA Enderlein, 1935
   DUCKHOUSIELLA Vaillant, 1971
decipiens (Eaton, 1893)
fratercula (Eaton, 1893)
polyascoidea (Krek, 1971)
ustulata (Walker, 1856)
   limosus (Vaillant, 1954)

PHILOSEPEDON Eaton, 1904
humeralis (Meigen, 1818)
   bullata (Walker, 1856)

PSYCHODA Latreille, 1796
   LOGIMA Eaton, 1904
albipennis Zetterstedt, 1850
   inornata Grimshaw, 1901
   severini Tonnoir, 1922
   parthenogenetica Tonnoir, 1940
   satchelli Quate 1955
   zetterstedti Jezek, 1983
alternata Say, 1824
   sexpunctata Curtis, 1839
brevicornis Tonnoir, 1940
buxtoni Withers 1987
cinerea Banks, 1894
   compar (Eaton, 1904
crassipenis Tonnoir, 1940
erminea Eaton, 1893
gemina Eaton, 1904
grisescens Tonnoir, 1922
   pusilla Tonnoir, 1922
lobata Tonnoir, 1940
minuta Banks, 1894

spreta Tonnoir, 1940
phalaenoides (Linnaeus, 1758)
setigera Tonnoir, 1922
sigma Kincaid, 1899
surcoufi Tonnoir, 1922
trinodulosa Tonnoir, 1922

FEUERBORNIELLA Vaillant, 1971
obscura (Tonnoir, 1919)
eximia (Feuerborn, 1923)
uniretinacleum (Krek, 1971)

TELMATOSCOPUS Eaton, 1904
acuminatus Szabo, 1960
mooni Duckhouse, 1962
riparius (Bellier, 1967)
advenus Eaton, 1893
albifacies Tonnoir, 1919
ambiguus Eaton, 1893
britteni Tonnoir, 1940
consors Eaton, 1893
interna Nielsen, 1964
denticulatus Krek, 1971
ellisi Withers 1987
goetghebueri Tonnoir, 1919
labeculosus Eaton, 1893
latinervosus (Vaillant, 1964)
laurencei Freeman, 1953
longicornis Tonnoir, 1919
diminuens (Feuerborn, 1923)
maynei Tonnoir, 1920
thienemanni (Vaillant, 1954)
miksici (Krek, 1979)
morulus Eaton, 1893
incanus Nielsen, 1964
notabilis Eaton, 1893
? *scotti* Eaton, 1913
parvulus Vaillant, 1960
sylviae Duckhouse, 1962
pseudolongicornis (Wagner, 1975)
rothschildi Eaton, 1912
similis Tonnoir, 1922
soleata Walker, 1856
tristis (Meigen, 1810)
xylophilus Mirouse & Vaillant, 1960
vaillanti Withers, 1986

THRETICUS Eaton, 1904
lucifugus (Walker, 1856)

TRICHOPSYCHODA Tonnoir, 1922
hirtella (Tonnoir, 1919)

Notes on psychodid nomenclature

The classification of psychodids in the Palaearctic region is an area of great instability. The major recent monograph of the family (Vaillant, 1971) is essentially sound at the species level, but his generic concepts have engendered heated discussion. A major fault is his designation of types of new genera, without full appreciation of the restricted taxonomic sense of the term "type". As he has recently said (1982), his term type would be better styled typical example, and criticisms of his resultant genera are often well-founded. His major achievement must be seen as the attempt to harmonise larval characteristics with those of the adult in constructing a classification. Duckhouse has recorded some corrections as he perceives them (1978) but prefers to wait until *Die Fliegen* is complete for this family before attempting further amendment (personal communication.). Allied to this confusion is the progressive erosion of any stability within the family by subdivision of existing Vaillant genera - Jezek, 1983a, 1983b, 1984a and 1984b being particularly notable in this respect.

Faced with such a farrago of nomenclatorial opinion, it was felt to be most constructive to maintain, wherever possible, familiar generic names. Jezek (1983b) attempts to demonstrate phylogenetic relationships within the subfamily Psychodinae, whilst indicating that agreement on rank thus assigned is likely to be debatable. The cladogram he presents is useful in several respects. By following the clades backwards to critical nodes, it is possible to reconstruct most of the classical genera in this subfamily. This demonstrates that further subdivision of Telmatoscopus is unnecessary and undesirable in the main. The genus Mormia is worthy of separate status by this same reasoning, but his attempts to further subdivide Psychoda mean very little, except to demonstrate clearly that P. obscura is not really retainable in Psychoda, and deserves a genus of its own (which Vaillant calls Feuerborniella).

It is thus hoped that the genera used in this Handguide will be generally familiar to the reader; differences are discussed below, with reference to the views of different authors.

British members of the subfamily Trichomyiinae remain in the undisputed genera Trichomyia and Sycorax. The interpretation of Clytocerus is unaltered, except that I follow Duckhouse (1978), who has recognised that this genus is properly associated with Afrotropical species, in his erection of Boreoclytocerus to house the Palaearctic species.

As stated above, Psychoda obscura *auctt* has affinities outside Psychoda, not least in possession of an unarmed labium, and I follow Vaillant (1971) in placing this species in Feuerborniella. P. lucifugus and P. humeralis, located in Psychoda by Freeman (1950) clearly belong respectively to Threticus and Philosepedon, as recognised in Kloet & Hincks (1976). I do not at this stage choose to follow Jezek (1984a) in elevating species groups within Psychoda to generic rank; I have preliminarily discussed synonyms within this genus in a recent paper (Withers, 1988a). Trichopsychoda is unaltered in interpretation.

The genus Telmatoscopus *sensu lato* is a readily recognised assemblage which has unfortunately been narrowed in its interpretation by different authors, sometimes in contradiction of the International Code for Zoological Nomenclature. Kloet & Hincks (1976) acknowledge that some subdivision of the genus will be inevitable, as witness their inclusion of Panimerus in the checklist. The limits of the proposed divisions are, however, hotly disputed, and rather than arbitrarily adopting one system instead of another, it is felt more helpful to retain most species in Telmatoscopus until a consensus is agreed. The exceptions are where species have clearly been erroneously attributed or where current opinion is uniform. An example of the former case is the species angustipennis Tonnoir, placed on the British list on the basis of a solitary female example. Wagner & Vaillant (1982) have noted that this female appears conspecific with females of Atrichobrunettia, a genus with highly distinctive male features. They were unable to examine the male type of angustipennis, but I have now located this, and the synonymy is valid (see Withers, 1987b). Mormia is accepted by most authors as a discrete genus, easily recognised, but I resist the temptation to further subdivide the taxon, as proposed by Jezek (1983a). The species ustulata, decipiens , fratercula and polyascoidea have features suggestive of a common ancestry, such as a distally paired aedeagus (R. Wagner, personal communication), quite unlike Telmatoscopus. I follow Vaillant (1982) in his adoption of the genus Paramormia to contain these species.

The species formerly contained within Pericoma comprise essentially an homogeneous assemblage, but certain species do not show characteristics of form suggestive of a monophyletic origin. A different ancestry, for example, must be argued for the species with gross asymmetry of the aedeagus, since this feature does not recur in other palaearctic pericomines. Vaillant places all such species in his genus Tonnoiriella. Another atypical species, hibernica, has only one other close European relative. Material of these species is very limited and until further specimens are available to more clearly establish affinity, these species are best housed in their own genus, Szaboiella. Although neglecta has no close relatives in the British fauna, there are a number of other closely related forms in Europe seeming to share common origins. Vaillant's genus Bazarella has been created to house these, and this appears a sensible approach. Another small grouping, typified as the only psychodids to possess a prominent anal area to the wing, constitute the genus Peripsychoda, as shown in Kloet & Hincks (1976).

The remaining species are retained in the familiar genus Pericoma; it is worthy of note that two distinct groupings occur in this major genus: those with a very uniform pattern of genitalia (e.g blandula, nubila, trivialis) and those that show no clear pattern or trend in the terminalia. It is difficult, however, to find consistent features other than this to separate these groups harmoniously, and I have favoured their maintenance in Pericoma, although accepting that other authorities recognise at least three genera.

Notes on the keys

As far as possible, the use of unfamiliar or specialist terminology has been avoided, and in any unavoidable case the feature has been adequately illustrated. The majority of distinguishing features are found in structures of the head, wings and terminalia, and all these structures are visible at 40x magnification or less. Although preferable it is by no means easy to preserve psychodid antennae intact, as the terminal segments are often annoyingly deciduous. For this reason I have resisted the traditional use of these features, but have provided confirmatory figures in *Psychoda* based on intact antennae, where appropriate. Ascoids may be difficult to see on selected segments, but variations in lighting such as phase contrast, and examination of a number of median segments should resolve difficulties. Genitalia are very apt to distort if the coverslip is not well supported, and slight variations in orientation need to be allowed for in comparison with the figures. It is very easy to create "new" species in this way, and care is needed to compare *all* the features shown (some being easier to depict than describe). Numbers of retinacula occasionally vary from those quoted and are therefore not an infallible guide. ALWAYS CHECK THE GENITALIA. In some instances, the "fork-line" is used - this is defined as an imaginary line connecting the fork bases (fig.11)

Because of the unreliability of many published records of British psychodids, I have based the phenology and distribution of each species exclusively on material I have examined. In amassing material preparatory to writing this Handguide, I have added a number of species to the British fauna. It is likely that many more remain to be discovered, and I will gladly examine any species apparently not covered by this Handguide.

Key to genera

1 One vein between the two main forks (fig.4,5). Eye bridge absent (fig.17) 2
- Two veins between the two main forks (fig.6-15). Eye bridge present (fig.19) 3
2 Upper vein of anterior fork long, basal cell shorter. (fig.4)..**Trichomyia**
- Upper vein of anterior fork short, basal cell longer. (fig.5)...**Sycorax**
3 Antennal segments barrel-shaped (fig.41)..............................4
- Antennal segments with elongate neck (fig.42).........................9
4 Antennal scape elongate, at least 5 times longer than wide. Third antennal segment with brush of wavy hairs (fig.50); if all hairs are missing, an oval scar remains. Wing membrane infuscated...**Boreoclytocerus**
- Antennal scape short, third segment without brush. Wings clear or entirely dark...5
5 Three retinacula, one much reduced and hairlike (fig.29).....**Szaboiella**
- More than three retinacula, all of similar size......................6
6 Anal area of wing well developed, membrane dark (fig.6)....**Peripsychoda**
- Anal area of wing undeveloped (fig.7)................................7
7 Aedeagus grossly asymmetrical, to left or right (fig.67,68)...**Tonnoiriella**
- Aedeagus bilaterally symmetrical (e.g fig.69)........................8
8 Gonocoxite with inner convoluted process (fig.66)...........**Bazarella**
- Gonocoxite not like this....................................**Pericoma**
9 1-3 retinacula (e.g fig 28)..10
- More than three retinacula...13
10 One retinaculum only..11
- Two or three retinacula..12
11 Labium without finger like apical processes (fig.33), aedeagus symmetrical..**Feuerborniella**
- Labium with prominent finger like apical processes (fig.32), aedeagus often asymmetrical.......................................**Psychoda**
12 Two retinacula ....**Philosepedon**
- Three retinacula...**Threticus**
13 Retinacula thin with umbrella-like tips (fig.31)........**Trichopsychoda**
- Retinacula spoon-shaped (fig.38)......................**Atrichobrunettia**
- Retinacula simple...14

14 Antennal segments with one predominant pair of ascoids, which are either digitate, flat or curved (fig.42)...............**Telmatoscopus**

- Antennae with ascoids not as above, either forked, rake-like or multiple (fig.124-129)..15

15 Numerous unbranched digitate ascoids on each antennal segment (fig.128) ....**Paramormia**

- Ascoids forked, leaf-like or rake-like (fig.124-127,129)........**Mormia**

Genus **Trichomyia** Curtis in Haliday
(Figs.4,17,60)

This genus includes 4 Palaearctic species, recently revised by Wagner (1982). A revision by Duckhouse (1978) indicates some 40 species in Australia and New Guinea, and he considers this area the evolutionary epicentre for this ancient genus. It is notable that many of his specimens were taken in light traps.

Trichomyia larvae are unusual among psychodids in exhibiting xylophagy, a trait thought by Duckhouse to be primitive.The larvae supposedly bore holes in the direction of the wood grain. Elm and beech have been recorded as being attacked in this way (Chandler, 1973), and I have seen Irish material from a base-rotted trunk of birch (Withers, 1987a). Adults are rare in collections, but searching deep clefts in trees is often productive of specimens, so the apparent rarity may be illusory.

- Antennal segments elongate, cylindrical; eye bridge absent (fig.4) ; male genitalia fig.60.....................**urbica** Curtis in Haliday
  Berks, Bucks., Cambs., Cumbria, Cheshire, Denbigh, Devon, Dorset, Gloucs., Hants., Kent, Herts., Middlesex, Somerset, Surrey, I. of Wight., Wilts., Yorks. Ireland: Offaly, Down, Wicklow. v-vii.

Genus **Sycorax** Curtis in Haliday
(Figs.5,58,59)

This genus includes 6 Palaearctic species. Krek (1970) details the majority of these.

The larvae of Sycorax are extraordinarily ornate and found in moss near springs and trickles. The adults are very small, and because of the somewhat rounded wings could be mistaken for cecidomyiids. The females of several species appear to be bloodsuckers, primarily of amphibia. Desportes (1942) reports S. silacea females fed on filarial infected Rana esculenta blood developed the larvae up to the third larval (infective) stadium. Parrott (1951) records females of S. similis collected with animal blood in the abdomen.

1 Retinaculum as long as cercopod; terminal antennal segment much longer than wide; genitalia fig.59......................similis (Muller)
Norfolk (Thompson Common). vi.

\- Retinaculum only half to 3/4 as long as cercopod; terminal antennal segment not much longer than wide; genitalia fig.58.....silacea Curtis in Haliday
Berks., Devon, Norfolk, Yorks., Suffolk, Somerset. Ireland: Kildare, Westmeath v-vii.

Genus **Peripsychoda** Enderlein
(Figs.6,61,62)

This genus includes 2 Palaearctic species. These are among the largest psychodids to occur in Britain.

The larvae of P. auriculata occur in rich leaf mould or moist leaf compost by streams and slow watercourses.

1 Retinacula spread over distal half of cercopod; genitalia fig.61 ....fusca (Macquart)
Cheshire, Devon, Kent, Somerset, Yorks. v.

\- Retinacula gathered in distal quarter of cercopod; genitalia fig.62 ....auriculata (Curtis)
Anglesey, Cheshire, Cumbria, Devon, Dorset, Herts, Leics., Somerset, Suffolk, Sussex, Wilts, Yorks., Cardigans. Ireland: Kilkenny, Westmeath vi-vii.

Genus **Boreoclytocerus** Duckhouse
(Figs.50-52,63-65)

This genus contains 12 Palaearctic species, which are treated by Vaillant (1971). The peculiar brush of hairs on the third antennal segment is immediately diagnostic of males of this genus, but adequate non-genitalic separation of two of the British species has proved impossible. Previously quoted differences in wing venation have been shown to be unreliable. B. dalii is rarely recorded outside Great Britain (Nielsen, 1966 the only instance known to me) but this may well be due to inadequacy of previous genitalia figures.

The larvae are found living as saprophages in standing water, and B ocellaris is a widespread species found around stagnant shaded pools and ponds, usually in woodland.

1 Sternal bridge thickened over most of length (eg.fig.64)....2

\- Sternal bridge with abrupt medial thickening. Aedeagal spatula basally very narrow, widening greatly at apex (fig.63).... **ocellaris** (Meigen)
Anglesey, Cheshire, Cornwall, Devon, Dorset, Durham, Essex, Hants., Hunts., Kent, Norfolk, Somerset, Suffolk, Surrey, Wilts, Yorks. Caerns, Cardigans., Pembroke. Ireland: Armagh, Cork, Offaly, Kerry, Wicklow v-vii,ix

2 Alula of wing gently curved,with extensive microtrichial coverage (fig.51). Aedeagal side arms clearly chitinised, with apical thorny projections (fig.65)......................... **rivosus** (Tonnoir)
Norfolk (Wheatfen Broad) vi-vii

\- Alula of wing more conical, microtrichial coverage more limited (fig.52) Aedeagus in form of wide flattened plate, not strongly chitinised. Aedeagal spatula almost parallel sided (fig.64)....
....**dalii** (Eaton)
Cornwall, Devon, Surrey. v,viii

Genus **Szaboiella** Vaillant

(Fig.29,179)

This genus includes 2 Palaearctic species, separable using Vaillant (1971)

The larvae are found among dead leaves in calcareous water bodies, and this may account for the national rarity of this species. Only one recent specimen of this species has been seen by the author.

Cercopod with three retinacula, one hairlike and small (fig.29); genitalia fig.178............................**hibernica** (Tonnoir)
Somerset, Yorks., Caerns. Ireland: Kerry, Waterford vi-vii.

Genus **Bazarella** Vaillant

(Figs.55,66)

This genus includes 5 Palaearctic species, treated by Vaillant (1971). The species are distinctive in the male by virtue of the unusual additional internal processes arising from the gonocoxite.

The larvae have been found in clumps of moss around mill races and waterfalls, where the moss remains above water. Duckhouse (1962) reared specimens from larvae in the moss Eurhynchium ripariodes; also reared from Potamogeton wrack (R.H.L. Disney, pers. comm.).

- Cercopod with apical projection; 20-30 retinacula with comb-like tips; lower wing fork with backward projection (eg.fig.12); 3 or 4 prominent spines on 3rd antennal segment, with clear area between (fig.55); genitalia fig.66........................**neglecta** (Eaton)
Devon, Herts., Leics., Somerset, Yorks. Scotland: Kincardine. viii

Genus **Tonnoiriella** Vaillant

(Figs.10,11,67,68)

This genus contains at least 6 Palaearctic species, all typified by an asymmetrical aedeagus. This asymmetry can be to either right or left, which argues an unusual behaviour at courtship. Are there, for example, right and left handed females? The retinacula are of a feathery type. The larvae occur in springs and unpolluted flowing streams, on the underside of stones and leaves which are moistened by constant lapping.

1 Lower wing fork normal(fig.11); genitalia fig.67 ....**pulchra** (Eaton)
Bucks., Derbys., Devon, Hants., Herts., Leics., Norfolk, Somerset. Ireland: Kildare vii

Lower wing fork with a backward projection (fig.10); genitalia fig.68 ....**nigricauda** (Tonnoir)
Norfolk (Upton Broad). vi

Genus **Pericoma** Walker

(Figs.9,12-15,21-24,30,36,37,41,46,47,69-87)

This genus contains over 70 Palaearctic species. Vaillant's attempt to further subdivide this genus is generally unconvincing, and it is felt more constructive to retain the genus. Many species are found in rotting vegetation or among moss on stones in fast flowing rivers. Larvae of cognata have been recorded in loamy fissures in damp rocks by mountain roads, and trifasciata larvae are found in lime-rich streams, often covered with lime particles. Tufa formations are especially rich in these larvae.

1 Third antennal segment with lateral spines (fig.46,47)................2
- Third antennal segment bare 3

2 Wing with prominent pouch, often covered in dense scales (fig.9); basal antennal segments elongate, with spines on segment 3 only (fig.46); genitalia fig.69.................................**fuliginosa** (Meigen)
Anglesey, Cornwall, Cumbria, Devon, Dorset, Essex, Hants., Herts., I. of Wight, Kent, Norfolk, Oxon, Salop., Somerset, Surrey, Wilts. Yorks., Caerns. Scotland: Inverness, Perth. Ireland: Down, Kildare, Kilkenny, Offaly, Wicklow. iv-viii

- Wing without pouch; basal antennal segments short, segments 3 and 4 fused, with two groups of spines corresponding to each sègment (fig.47); genitalia fig.70 ....**cognata** Eaton
The fusion of segments 3 and 4 is quoted by Vaillant (1971) as not being typical of cognata, and material thus runs to montium Vaillant. However, my specimens have been identified by Dr Wagner as definite cognata.
Cornwall, Devon, Hants., Leics., Somerset, Surrey, Yorks. Scotland: Banffshire. iv-ix

3 Gonostylus with recurved stem (fig.71-73)............................4
- Gonostylus more typical 6

4 Recurved stem with flattened spines (fig.71,72)......................5

- Recurved stem bare (fig.73)...........................extricata Eaton

  Caerns., Middx., Northants., Oxon., Somerset, Yorks.

  Scotland: Ayr. vi-ix

5 Recurved stem with three widely spaced spines(fig.71); cercopod with 6 or 7 retinacula; ....pilularia Tonnoir

  Devon, Dorset, Hants., Norfolk, Salop., Yorks. Ireland: Armagh, Tyrone, Wexford, Wicklow. iii,v,ix-x

- Stem with four closely grouped spines(fig.72); cercopod with more than 20 retinacula...compta Eaton

  Caerns., Devon, Dorset, Kent, Middx., Norfolk, Somerset, Yorks.

  Ireland: Armagh, Tyrone. x

6 Cubital vein thickened, bearing upright bristles along length; if all bristles missing, scars clearly visible (fig.14);genitalia fig.74...mutua Eaton

  Denbigh, Devon, Somerset, Surrey, Yorks. Scotland: Aberdeens., Elgin, Easterness, Inverness., Sutherland. vi

- Cubital vein normal and bare...7

7 Lower wing fork with backward projection (fig.12)....................8

- Lower wing fork without such a projection 9

8 5-6 retinacula; subgenital plate deeply excised; aedeagal spatula narrow, gonostyles with bulbous base and narrow apical section genitalia fig. 75 ....tonnoiri Vaillant

  Cumbria (River Kent) vi

- 10 retinacula; subgenital plate unexceptional; aedeagal spatula wide genitalia fig.76................................canescens (Meigen)

  Devon, Dorset, Somerset. Scotland: Banff. ix

9 More than 10 retinacula, aedeagus forked; genitalia fig.77......crispi Freeman

  Yorks (Leeds). Scotland: Perth (Pass of Killiekrankie) Ireland: Wicklow (Glen of the Downs) viii-ix

- Less than 10 retinacula, aedeagus otherwise shaped.....10

10 Gonostylus with bulbous base and abruptly narrowed apical section (fig.78,79)..11

- Gonostylus gradually tapering to tip (fig.80,81)...................12

11 Gonostylus with long bristle beneath at tip, genitalia fig.79....... ....calcilega Feuerborn

  Somerset vi

E

- Gonostylus without this bristle; genitalia fig. 78.. **trifasciata** (Meigen)

  Cumbria, Derbys., Devon, Somerset, Yorks. vi

12 8-9 retinacula; fork line beyond tip of Cu (fig.13); genitalia fig.82.. ....**palustris**(Meigen)/**gracilis** Eaton

  Devon, Herts., Suffolk, Yorks. Ireland: Armagh v

  I am unable to adequately separate these species on the basis of material examined. Dr. R. Wagner (pers. comm.) has indicated his belief that these species are identical.

- 7 or less retinacula; fork line at or before tip of Cu (fig.15)......13

13 Eye bridge at widest point at least 7 facets wide (fig.24)...........14

- Eye bridge at widest point only 4 facets wide (fig.23)..............15

14 Frons not extending beyond first palp segment; all palp segments of similar width (fig.22); fore tibia normal (fig.37); genitalia fig.84 ....**trivialis** Eaton

  Anglesey, Avon, Cumbria, Denbigh, Devon, Dorset, Essex, Hants., I. of Wight, Notts., Somerset, Surrey, Wilts, Yorks., Caerns., Cardigans., Pembroke. Scotland: Ayr,. Perth. Ireland: Kildare, Westmeath, Wicklow. v-x

- Frons clearly extending beyond first palp segment; second palp segment wider than third (fig.21); fore tibia dilated (fig.36); genitalia fig.84 ....**nubila** (Meigen)

  Anglesey, Cambs., Cheshire, Cornwall, Devon, Dorset, Essex, Hants., Herts., I. of Wight, Kent, Norfolk, Salop., Somerset, Suffolk, Surrey, Sussex, Wilts., Yorks. Brecon, Caerns., Cardigans., Pembroke. Scotland: Ayr, Dumfries, Perths. Ireland: Cork, Kilkenny, Offaly, Westmeath, Wexford. *iii,v-viii,x*

15 Narrow region of gonostylus half or more of the total length of the gonostylus.Lateral arms of aedeagal armature wide; tip of aedeagus not visible at apex (fig.81)......................**riyularis** Berden

  *Yorks. (**Malham** Tarn). Scotland: Easterness (Drynachan) vi*

- Narrow region of gonostylus substantially less than half of the total length of the gonostylus...16

16 Never more than 4 retinacula 17

- Usually more than 4 retinacula.....................................18

17 Subgenital plate almost parallel sided, aedeagus basally narrower than tip, genitalia fig.83...........................**exquisita** Eaton

  Caerns., Cheshire, Derbys., Devon, Dorset, Lancs., Leics., Somerset, Wilts. Scotland: Arran, Westerross. Ireland: Kerry. vii-ix

- Subgenital plate with tapering sides, aedeagus almost parallel sided, genitalia fig.85..**fallax** Eaton
Cheshire, Cumbria, Devon, Hants., Leics., N.Yorks., Somerset. Scotland: Westerross. Ireland: Cork, Kilkenny vi-viii

18 Lower edge of gonostylus sinuous (fig 80a) Tip of aedeagus narrower than mid junction (in profile, prominently curved outwards).; genitalia fig.87..............................**pseudexquisita** Tonnoir
Cumbria, Hunts., Leics., Notts., Oxon., Surrey, Yorks. Pembs. Scotland: Invernessh, Perth, Sutherland. Ireland: Antrim, Kerry, Wicklow. v-ix

- Lower edge of gonostylus smoothly curved (fig80b)...19

19 Gonocoxite about as long as wide, gonostyli basally spherical with short tip (fig.80b),genitalia fig 57...**blandula** Eaton and **neoblandula** Duckhouse

Pericoma neoblandula Duckhouse is separable only in the larval stage (see Duckhouse, 1962)
Anglesey, Cheshire, Corwall, Devon, Dorset, Kent, Leics., Somerset, Suffolk, Surrey, Yorks. Caerns. Ireland: Cork, Down, Offaly, Kilkenny, Wicklow. v-viii

- Gonocoxite about twice as long as wide, gonostyli more regularly tapered with longer tip (fig.86).....................**diversa** Tonnoir
Devon, Leics., Norfolk, Somerset, Yorks. Scotland: Ayr. Ireland: Kerry, Offaly v-vii

Genus **Philosepedon** Eaton
(Figs.44,89)

This genus includes 12 Palaearctic species, of which only one is so far recorded from Britain. Superficially much like Psychoda species, the presence of two retinacula distinguish the males, whilst the atypical larval habits justify a separate genus.

The larvae of P. humeralis have been frequently recorded as occuring in the tissues of various molluscs: among the recorded species of pulmonate host, the following occur in Britain - Cepaea nemoralis, C. hortensis, Helix aspersa, H. pomatia, Candidula intersecta, Arianta arbustorum. Vaillant (1961) demonstrated that larvae are unable to invade live molluscs or freshly dead tissue - only the brown fluid which collects in the posterior chambers after some days or weeks is attractive to females, and adequate pabulum for the larvae. Attempts to rear larvae through other media (horse flesh and fish muscle) were unsuccessful. Spärck also records larvae in rotten potatoes (1920). The larva is figured by Smith & Grensted (1963).

- Two retinacula on each cercopod; antennal segments moderately widened basally comparable with Psychoda, ascoids Y-shaped with upper branches leaf-like (fig.44); genitalia fig.89......**humeralis** (Meigen) *Cambs., Cumbria, Dorset, Devon, Essex, Gloucs., Hants., Lincs., Norfolk, Somerset, Suffolk, Sussex, Yorks. Cardigans., Pembroke. Ireland: Armagh, Clare, Kildare, Tyrone, Offaly, Wexford. iii-ix*

Genus **Threticus** Eaton
(Figs.43,88)

This genus includes at least 7 Palaearctic species, of which only one is so far recorded from Britain.

The larvae are recorded as inhabiting rotting leaves at the margin of streams.

Three retinacula on each cercopod, all of equivalent size; antennal segments basally only slightly wider than neck; ascoids I-shaped (fig.43); genitalia fig.88 ....**lucifugus** (Walker) *Devon, Salop., Somerset, Yorks. Pembroke. Ireland: Kildare, Wicklow v-vi,x*

Genus **Trichopsychoda** Tonnoir
(Figs.7,31,90)

This genus includes 2 Palaearctic species, separable using Vaillant (1971). The unusual retinacula are a diagnostic feature of this genus.

The larvae are among the most terrestrial of all psychodid larvae, and have been found in rotten fruit, compost heaps and lawn cuttings.

- Wing forks incomplete basally, membrane with coarse trichial coverage (fig.7); genitalia fig.90.........................**hirtella** (Tonnoir) *Hunts., I. of Wight, Kent, Surrey. Ireland: Kilkenny vi*

Genus **Atrichobrunettia** Satchell
(fig.38,91)

This genus includes 4 Palaearctic species. Wagner & Vaillant (1982) describe A. tenuipennis, and suggest that a number of features of the known female of A. angustipennis (as Mirousiella sensu Vaillant) are indicative of its inclusion in this genus. Fresh material recently collected confirms this synonymy (Withers, 1987b),

The larva of the British species has recently been described (Vaillant & Withers, 1989).

Wings exceptionally long and thin with tips of some veins thickened (fig.56); retinacula racquet-shaped (fig.38); genitalia fig.91 .... angustipennis (Tonnoir)
Herts.(Letchworth), Norfolk (Thompson Common & Wheatfen Broad)
Ireland: Kildare (Newbridge Fen) v-viii

Genus **Telmatoscopus** Eaton
(Figs.18-20,34,35,42,45,48,49,53,54,92-113,176)

This genus, more than any other, has been the subject of much revision. As explained above, it is felt more useful to maintain as many species within Telmatoscopus as possible, as the genus is generally easily recognisable and well understood.

Adults are often infrequent in collections, probably due to low population densities. Distinct groupings within the genus, either by virtue of larval ecology or adult morphology are notable for Palaearctic species, although worldwide the limits are often less clear.

As presently defined, the genus contains over 40 species in the Palaearctic; I have recently described three further species of this genus (Withers, 1986, 1987c, 1989a).

A number of larvae have been noted as inhabiting mud of river banks, but there are many other niches occupied. T. tristis, T. laurencei, T. rothschildii and recently, T. advenus, have been reared from tree rot-holes (Withers, 1987a, 1988b), T. britteni from leaf mould and trickles on rock faces, whilst T. similis is an inhabitant of salt-marsh mud. Many larval habits are unknown and some larvae are undescribed.

1 Corniculi present (fig.18,20); antennal segments distinctly smaller than pedicel (fig.49)..2

- Corniculi absent; antennal segments no smaller than pedicel(fig.19)..9

2 Pedicel spherical...3

- Pedicel asymmetrical (fig.49)..5

3 Aedeagal spatula only slightly longer than arms of aedeagus; genitalia fig.92 ....**soleatus** Walker
Cheshire, Devon, Dorset, Kent, Leics., Somerset, Yorks. v-vi

- Aedeagal spatula clearly longer than arms of aedeagus (fig.93,94)....4

4 Spatula end fluted ; genitalia fig.93..............**parvulus** Vaillant
Berks., Dorset, Hants, Leics., Norfolk, Suffolk, Surrey, Sussex. Ireland: Down. iv-vii

- Spatula end rounded ; genitalia fig.94..............**acuminatus** Szabo
Leics. (Arnesby). vii

5 Gonostyli incurved; retinacula along entire cercopod; genitalia fig.95..**maynei** Tonnoir
Norfolk (Upton and Wheatfen Broads). Cardigans. (Rhos Llawr Cwrt), Pembroke (Aber Mawr, Dowrog, Ritec, Cors Penally) Ireland: Westmeath (Scragh Bog) vi

- Gonostyli outcurved, retinacula at tip of cercopod.................6

6 Cercopod with at most 8 retinacula, gonapophyses without prominent basal structure; genitalia fig.97 ....**goetghebueri** Tonnoir
Devon, Kent, Norfolk. vi-vii

- Cercopod with at least 9 retinacula, gonopophysis with prominent basal structure...7

7 Basal structure of gonapophysis with smooth inner margin, genitalia fig.96...**notabilis** Eaton
Devon, Leics., Somerset. Pembroke. Ireland: Armagh vi-vii

- Basal structures of gonapophysis with indented margin (fig.98,99)...8

8 Sternal bridge bifurcated; genitalia fig.98.........**denticulatus** Krek
Norfolk, Somerset, Suffolk. Ireland: Kilkenny vi-vii

- Sternal bridge single; genitalia fig.99............**albifacies** Tonnoir
Devon, Derbys., Dorset, Herts., Leics., Norfolk, Somerset, Suffolk, Yorks. Ireland: Westmeath vi-viii

9 Scape elongate (4-5 times width).................................10

- Scape shorter (1-3 times width)..................................14

10 Antennal segment 5 with bulbous process bearing stiff bristles (fig.48)...11

\- Antennal segment 5 without such a process.........................13

11 Apical processes of aedeagus prominently outcurved, often at right angles to spatula (fig.100)........................ellisi Withers

Norfolk (Wheatfen Broad). Pembroke (Cwm Dewi). vi,viii-ix

\- Apical processes of aedeagus straight or only gently outcurved, usually in same plane as spatula (fig.101,102).........................12

12 Aedeagal processes shorter and slightly curved,barely twice as long as width of sternal bridge (fig.101)...........pseudolongicornis Wagner

Norfolk, Yorks. Pembroke. Ireland: Kerry, Wexford v-vii

\- Aedeagal processes longer,straight or curved, quite three times as long as width of sternal bridge (fig.102)............longicornis Tonnoir

Norfolk. Ireland: Kerry vi

13 Aedeagal spatula narrow, gonapophyses arrowhead-shaped; genitalia fig.103...consors Eaton

Somerset, Norfolk. Pembroke. vi-x

\- Aedeagal spatula wide, lower edges incurved, gonapophyses as in fig.104...vaillanti Withers

Norfolk (Wheatfen Broad), Yorks (Malham Tarn). vi-vii

14 Retinacula feathery or apically coronate (fig.34,35)...............15

\- Retinacula smooth, often with longitudinal grooves (fig.30).........19

15 Retinacula feathery (fig.35)......................................16

\- Retinacula apically expanded and coronate (fig.34).................18

16 Aedeagal spatula broad and flat, subgenital plate prominently bilobed, gonapophyses incurved (fig.176); all retinacula at least as long as cercopod...................................miksici (Krek)

Hants.(Leckford) vi

\- Aedeagal spatula laterally compressed, appearing thin (fig.105,106), gonapophyses outcurved; apical retinacula much shorter than cercopod..17

17 Gonapophyses hooked; ascoids leaf-shaped and curved (fig.45); genitalia fig.105 ....advenus Eaton

Bucks., Devon, Hants., Herts., Leics., Norfolk, Yorks. Ireland: Leitrim, Wicklow v-vii

\- Gonapophyses coiled; Ascoids digitate; genitalia fig.106.......... ....laurencei Freeman

Herts., Surrey v

18 Sternal bridge with abrupt medial thickening; genitalia fig.107
....**tristis** (Meigen)
Hants., Surrey. Ireland: Leitrim, Offaly vi-vii

\- Sternal bridge widened throughout; genitalia fig.108
....**rothschildi** Eaton
Cheshire, Devon, Hants., Herts., 'London'. Ireland: Wicklow v-viii

19 Margins of aedeagal spatula inrolled (fig.109,111)...20

\- Margins of aedeagal spatula straight (fig.110,112).....21

20 More than 10 retinacula; gonapophyses incurved, small hook-shaped and transparent (fig.109)...............................**ambiguus** Eaton
Anglesey, Devon, Hants., Kent, Norfolk, Somerset, Surrey. Caerns., Pembroke. Ireland: Down, Kilkenny. vi-vii

\- Less than 10 retinacula; gonapophyses long and outcurved (fig.111)
....**similis** Tonnoir
Kent (Fairfield). iii

21 Gonopophyses large, chitinised, dagger-shaped (fig.112)....**britteni** Tonnoir
Devon, Dorset, Norfolk, Staffs. vi-vii

\- Gonapophyses small and transparent (fig.110,113)..................22

23 Upper wing-fork base greatly thickened (fig.53); gonapophyses incurved (fig.113).....................................**labeculosus** Eaton
Devon, Norfolk, Yorks. Cardigans., Pembroke. vii

\- Upper wing-fork base normal, lower with slight posterior projection (fig.54); gonapophyses straight (fig.110)............**morulus** Eaton
Cornwall, Devon, Hants., Herts., Leics., Lincs., Norfolk, Somerset, Surrey, Sussex, Yorks. Scotland: Ayr. Ireland: Down. v-vii

Genus **Mormia** Enderlein

(Figs.16,26,27,114-120,124-129,177-178)

This genus includes nearly 30 Palaearctic species, treated by Vaillant (1971). As mentioned above, the recent revision by Jezek (1983a) is considered somewhat premature, and it is felt that the generic limits of Mormia do not require further subdivision at this time.

Males of the genus display remarkable diversity in the form of the ascoids, whilst the genitalia are exceptionally homogeneous.

The larvae of Mormia are found in a wide range of earthy substrates, often in the capillary film round particles. They are quoted by Vaillant (1971) as being particularly prevalent in woodland where water continually moistens soil by trickles. Because of the transient nature of this habitat, Mormia larvae are unusual in displaying considerable mobility; this is thought to be in response to varying moisture gradients.

1 Eye bridge clearly separated along entire width (fig.27); ascoids in form of single broad leaf (fig.125); genitalia fig.114......**eatoni** (Tonnoir)
Devon, Dorset, Hants., Norfolk. vi-vii

\- Eye bridge meeting in midline, at least posteriorly (fig.25,26).......2

2 Additional lobed structure (bulls-eye organ) on some basal antennal segments (fig.16); ascoids rake-like (fig.129).......................3

\- Bulls-eye organ absent; ascoids otherwise............................6

3 Bulls-eye organ present on segment 4; genitalia fig.177 ....**satchelli** (Jung)
Ireland: Kildare (Newbridge Fen) vi

\- Bulls-eye organ absent from segment 4................................4

4 Bulls-eye organ on segments 5,6 & 7; genitalia fig.115................ ....**caliginosa** (Eaton)
Devon, Dorset, Somerset. v

\- Bulls-eye organ on segments 5 & 6 only...............................5

5 Antennal pedicel eccentric (fig.16); genitalia fig.116..**furva** (Tonnoir)
Herts. vi

\- Antennal pedicel spherical; genitalia fig.117.........**palposa** (Tonnoir)
Westmorland. vi

6 Eye bridge meeting in midline; ascoids bifid, digitate and reticulate (fig.124); genitalia fig.118.......................**revisenda** (Eaton)
Somerset, Yorks. vi

\- Eye bridge only touching posteriorly (fig.26), ascoids two basally fused leaves (fig.126,127)..7

7 Basal antennal segments all of similar size; fore tibia dilated, carrying numerous dark scales (fig.40); genitalia fig.119 ....**andrenipes** (Strobl)
Cheshire (Cotteril Clough) v

\- Basal antennal segments elongate (fig.126); genitalia fig.120........ ....**incerta** (Eaton)
Devon, Dorset, Leics., Somerset. v-viii

Genus Paramormia Enderlein

(Figs.25,39,121-123,128,180)

This genus includes 10 Palaearctic species, dealt with by Vaillant (1971) as Duckhousiella. Males are distinctive by virtue of the numerous unbranched ascoids on each antennal segment - in certain European species these are racquet-shaped structures, but in all British species these are simple and digitate. Some also have prominent ventral spines on the fore femur.

The larvae of Paramormia display no clear ecological preferences. Those of P. decipiens are a prominent feature of lime-rich waters, and the larvae are often lime-encrusted. P. ustulata larvae are among the most catholic of all psychodids, having been reared from tufa slumps and eel-grass in marine localities, but have also been found well inland around small meres and even farmyard ponds. They seem able to tolerate high aqueous nitrate levels. Larvae of P. polyascoidea have been reported from sandy river banks. The larva of P. fratercula is unknown.

1 Eye bridge clearly separated along entire width (fig.27)..............2

\- Eye bridge meeting in midline(fig.25).................................3

2 Fore femur with ventral row of spines (fig.39); genitalia fig.123 ....**fratercula** (Eaton)

Devon, Somerset. viii

\- Fore femur without ventral row of spines; genitalia fig.179 ....**polyascoidea** (Krek)

Hants. (New Forest) vi

3 Cercopod long, elbowed; wing clear; genitalia fig.122 ......**decipiens** (Eaton)

Cumbria, Devon. Ireland: Kildare vi-vii

\- Cercopod short and squat; tips of veins darkened; fore femur with ventral row of spines (fig.39); genitalia fig.121...........**ustulata** (Walker)

Anglesey, Devon, Dorset, Essex, Herts.,Leics., Norfolk, Somerset, Wilts, Yorks. Cardigans., Pembroke. Ireland: Cork, Kildare, Wicklow v-viii

Genus Psychoda Latreille
(Figs 1,28,32,132-175)

This genus contains indisputably the most familiar of the mothflies. Most species are probably widespread and many are evidently nocturnal - at least 6 species have occurred to the author around domestic lights. They are known to breed in a wide variety of materials,in part summarised by Satchell (1947), but his records are by no means exhaustive. For example, although he was correct in stating that Psychoda alternata larvae are found in sewage beds, drains and urinals, I have seen material bred from a squirrel's drey and have myself reared it from a coot's nest. No Psychoda larva is truly aquatic, and the genus is considered the most advanced for this reason.

Despite the abundance of members of the genus, it has received surprisingly little attention from many recent students of psychodids. The genus was in urgent need of revision, and good figures of critical parts of both sexes were needed; there appear to be a number of synonyms among the North American fauna, for instance. Withers (1988a) represents a preliminary statement: a number of hitherto unrecognised synonyms and a new species result in a current British fauna of 15 species.

With the possible exception of P. brevicornis, which has remarkably atypical larvae (for which Vaillant has proposed the genus Copropsychoda), further subdivision of the genus is perhaps unwise in the present incomplete state of knowledge. It is probable that the species detailed in this Handguide represent an incomplete picture, so care is needed when recording and identifying members of this genus. In particular, note the female (species A) which keys to couplet 18. This species was discussed in the paper cited above, under Psychoda setigera, but I decline to name it at present in the absence of more and better material, especially without associated males.

1 Males..2
\- Females..16
2 One or (normally) both wing forks basally incomplete (fig 7).........3
\- Both wing forks basally complete...................................5

3 Interocular space no greater than one facet width; gonostylus abruptly narrowed before tip (fig.132); antennae fig.168.....**setigera** Tonnoir
Devon, Hants., Hunts., Norfolk, Suffolk, Yorks. Cardigans. Ireland: Armagh, Wicklow v-viii,x

- Interocular space at least two facet widths..........................4

4 Second facet row 3 facets wide ; genitalia fig 133; antennae fig.164 ....**brevicornis** Tonnoir
Essex, Herts., Leics., Suffolk, Surrey. v-vi, viii-ix

- Second facet row 4 facets wide; genitalia fig.134; antennae fig.173 ....**trinodulosa** Tonnoir
Cornwall, Hunts., Norfolk, Suffolk, Yorks. Cardigans., Pembroke. Scotland: Sutherland v-ix

5 Dark marks at apex of wing veins; ascoids reduced; genitalia fig. 135; antennae fig.163 ....**alternata** Say
Cheshire, Leics., Norfolk, Suffolk, Sussex, Wilts, Yorks. Cardigans., Pembroke. vi-ix

- Dark marks absent; ascoids normal....................................6

6 Cercopod shorter or equal to 9th sternite, never basally bulbous (eg fig.140)..7

- Cercopod much longer than 9th sternite, often basally bulbous (eg fig.138)..9

7 Aedeagal base spatulate (eg.fig.137)................................8

- Aedeagal base narrow, cercopod with obvious narrowing prior to retinaculum; genitalia fig.136; antennae fig.165.......**cinerea** Banks
Berks., Dorset, Devon, Hants., Leics., Norfolk, Suffolk. Cardigans., Pembroke. Ireland: Wicklow iii-vii,ix-x.

8 9th sternite a large flat plate, cercopod not more than 2½ times length of retinaculum, and basally quite as wide; genitalia fig.137; antennae fig.167......................................**gemina** Eaton
Devon, Hants., Herts., Wilts, Yorks. Cardigans. Ireland: Armagh vi-vii,ix,xi

- 9th sternite not so obvious, cercopod at least 3 times length of retinaculum, nowhere as wide; genitalia fig.139; antennae fig.166..**erminea** Eaton
Devon, Norfolk, Suffolk. Cardigans., Pembroke. vi, viii-xii

9 Aedeagus bilaterally symmetrical (eg fig.140)......................10

- Aedeagus asymmetrical (eg fig.142).................................12

10 Gonocoxite squat, much shorter than gonostylus, which has a long prominent bristle on the outer face; genitalia fig.138; antennae fig.172..**surcoufi** Tonnoir
I. of Wight, Surrey, Yorks. iv, vii-viii
- Gonocoxite elongate, longer than gonostylus.........................11
11 Aedeagus parallel sided, with apical denticles (fig.140); antennae fig.169..**phalaenoides** L.
Anglesey, Berks., Bucks., Dorset, Essex, Hants., I. of Wight, Norfolk, Oxon., Salop., Surrey, Yorks. Caerns., Cardigans., Pembroke. Scotland: Dumfries, Sutherland. Ireland: Antrim, Kerry,Kilkenny, Offaly, Sligo, Westmeath, Wicklow. iii-vii,ix-x
- Aedeagus medially expanded, denticles absent (fig.141)......**crassipenis** Tonnoir
Cambs., Essex, Herts., Norfolk. Cardigans. v-vi, viii
12 9th sternite with two prominent lobes; genitalia fig.142; antennae fig. 170...**minuta** Banks
Devon, Kent, Herts., Leics., Norfolk, Yorks. Cardigans., Pembroke. iii-iv,vi-x
- 9th sternite unlobed..13
13 9th sternite squarish with small teeth at corners (fig.143)*; antennae fig.171..**grisescens** Eaton
Devon, Essex, I. of Man, I. of Wight, Leics., Norfolk, Oxon., Suffolk, Wilts, Yorks. Cardigans., Pembroke. Ireland: Laois, Wicklow iv-vi,viii-x
- 9th sternite otherwise..14
14 Base of aedeagus bulbous, internal processes subparallel (fig.144); antennae fig.174.............................**albipennis** Zetterstedt
Devon, Hants., I. of Man, I. of Wight, Kent, Leics., Norfolk, Oxon, Salop., Suffolk, Surrey, Yorks. Caerns., Cardigans., Pembroke. Scotland: Sutherland. Ireland: Laois, Wexford. iii-vii,ix-x
- Base of aedeagus same width as shaft, internal process curved........15
15 Aedeagal process gently curved, at angle to shaft (fig.146); antennae fig.175...**lobata** Tonnoir
Essex, Norfolk, Yorks. vi,ix
- Aedeagal process strongly recurved, in same plane as shaft (fig.145) ....**buxtoni** Withers
Kent (Tonbridge). ix

*Some Irish specimens seen have these teeth very reduced or absent

16 One or (normally) both wing forks basally incomplete.................17
- Both wing forks basally complete.....................................19
17 Subgenital plate heart-shaped, with tufted sensory organs at base (fig.147)..**setigera** Tonnoir
- Subgenital plate not so shaped.......................................18
18 Subgenital plate widest at base (fig.148)...........**brevicornis** Tonnoir
- Subgenital plate widest at middle (fig.149).........**trinodulosa** Tonnoir (also species A, fig 162, see p.37)
19 Subgenital plate V-shaped, deeply cleft, with no separate well defined median digit (fig.150); dark marks at apex of wing veins...**alternata** Say
- Subgenital plate not V-shaped, with well defined median digit........20
20 Median digit elongate, at least 5 times longer than wide (eg fig.151) 21
- Median digit short, never more than 2 times longer than wide (eg.fig.157)..26
21 Subgenital plate with two lobes surrounding digit; spermathecae reticulated (fig.151)...............................**erminea** Eaton
- Subgenital plate unlobed..22
22 Base of subgenital plate narrower than apex..........................23
- Base of subgenital plate wider than apex.............................24
23 Subgenital plate keeled, with median and apical denticles; tufted sensory organs at base, digit without setae (fig.152)........**surcoufi** Tonnoir
- Subgenital plate unkeeled, without denticles; characteristic basal notch to plate; digital seta(e) present (fig.153)......**lobata** Tonnoir
24 Shoulders of apex of subgenital plate sloping; apex of digit with fine setae, often difficult to detect (fig.154)................**cinerea** Banks
- Shoulders of apex of subgenital plate almost at right angles (figs.155,161)..25
25 Apex of digit somewhat bulbous, without setae(fig.155)..**phalaenoides** L. Two "subspecies" were described by Tonnoir in 1940 - *P. phalaenoides phalaenoides* with a short internal digit, and *P. phalaenoides elongata*, with an elongate digit. The validity of these requires further investigation.
- Apex of digit tapered, with at least 2 prominent setae (fig.161) ....**buxtoni** Withers
26 Apex of subgenital plate prominently U-shaped (fig.156)...**minuta** Banks
- Apex of subgenital plate otherwise..................................27

27 Shoulders of apex of subgenital plate gently sloping (eg figs.157,158) 28

- Shoulders of apex of subgenital plate more upright (eg figs.159,160) 29

28 Digit scarcely longer than wide, apex of plate rounded (fig.157) ....**grisescens** Eaton

- Digit clearly longer than wide, apex of plate more angular(fig.158) ....**gemina** Eaton

29 Upright portion of subgenital plate over half total length of plate; spermathecae as in fig.159....................**albipennis** Zetterstedt

- Upright portion of subgenital plate less than one third total length of plate; spermathecae as in fig.160................**crassipenis** Tonnoir

Genus **Feuerborniella** Vaillant

(Figs.8,33,130,131)

This genus was erected by Vaillant to house the single species in the Palaearctic which has generally been included in Psychoda. Unlike all Psychoda, F. obscura is distinct in not having peg-like teeth on the labium. The male genitalia are distinct, but I have found that the side-arms of the aedeagus are apparently movable, and occasionally present a quite different aspect. An alternative view is also figured.

The larvae are apparently found within the parenchyma of dead leaves by streams.

- Labium with 4-5 setae arising from swollen bases (fig.33), wing lanceolate, with upper fork very short, far in advance of lower fork (fig.8); male genitalia figs.130,131..................**obscura** (Tonnoir)
Devon, Kent, Norfolk. Cardigans., Pembroke. Ireland: Kildare vi, viii-ix.

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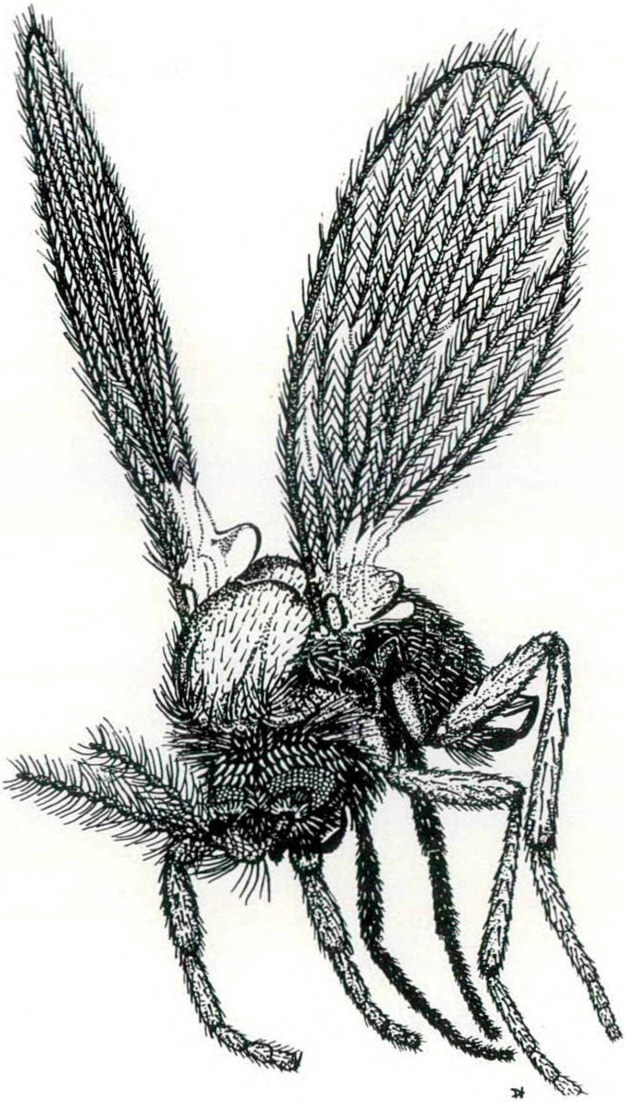
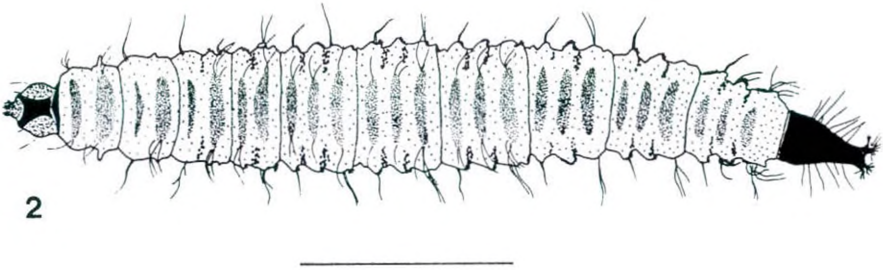
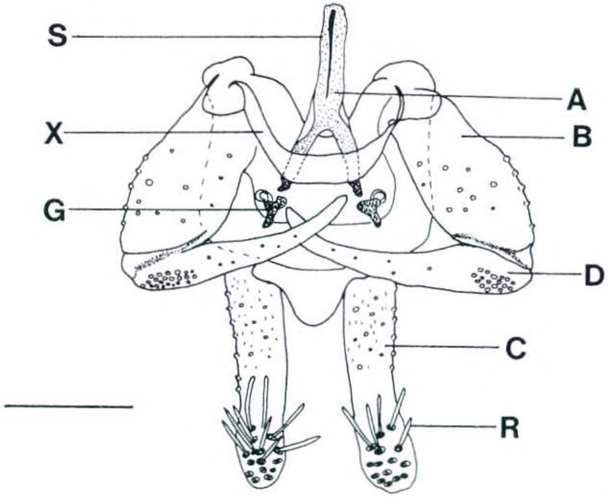


Fig 1. Pericoma trivialis adult male





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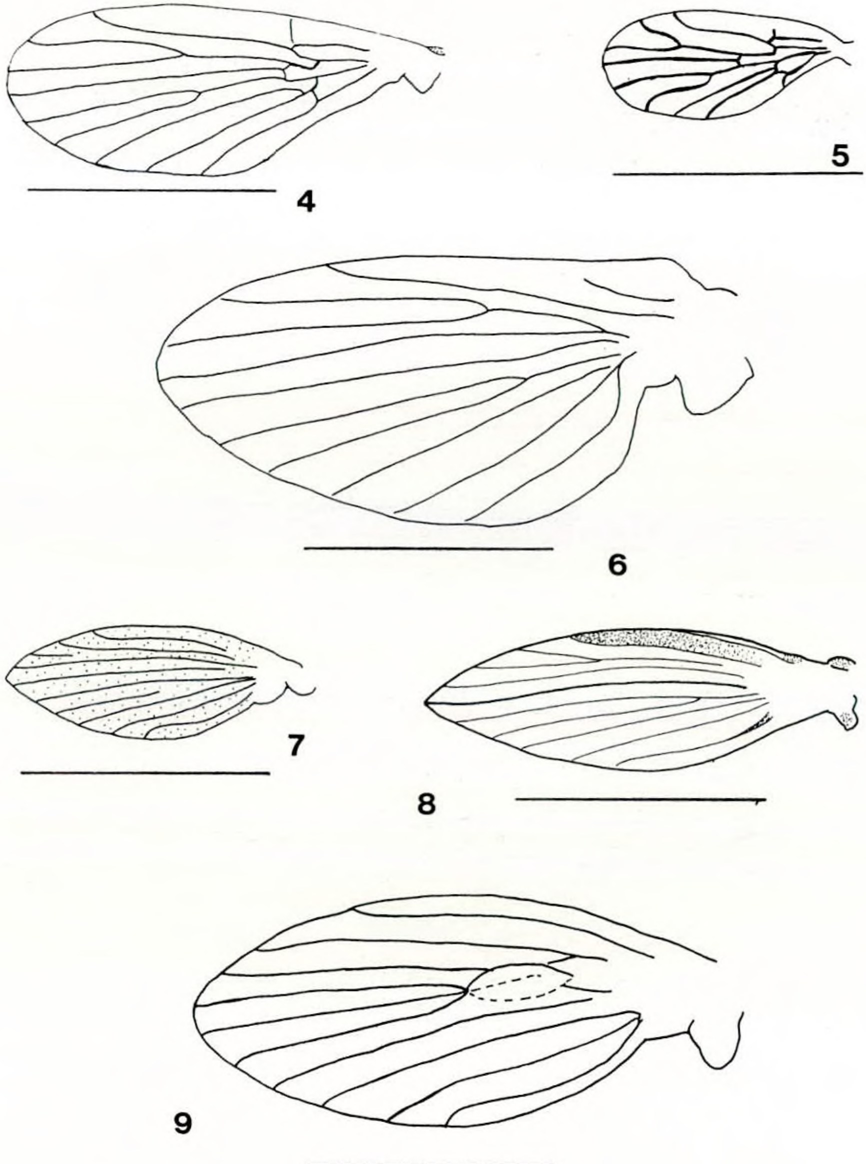
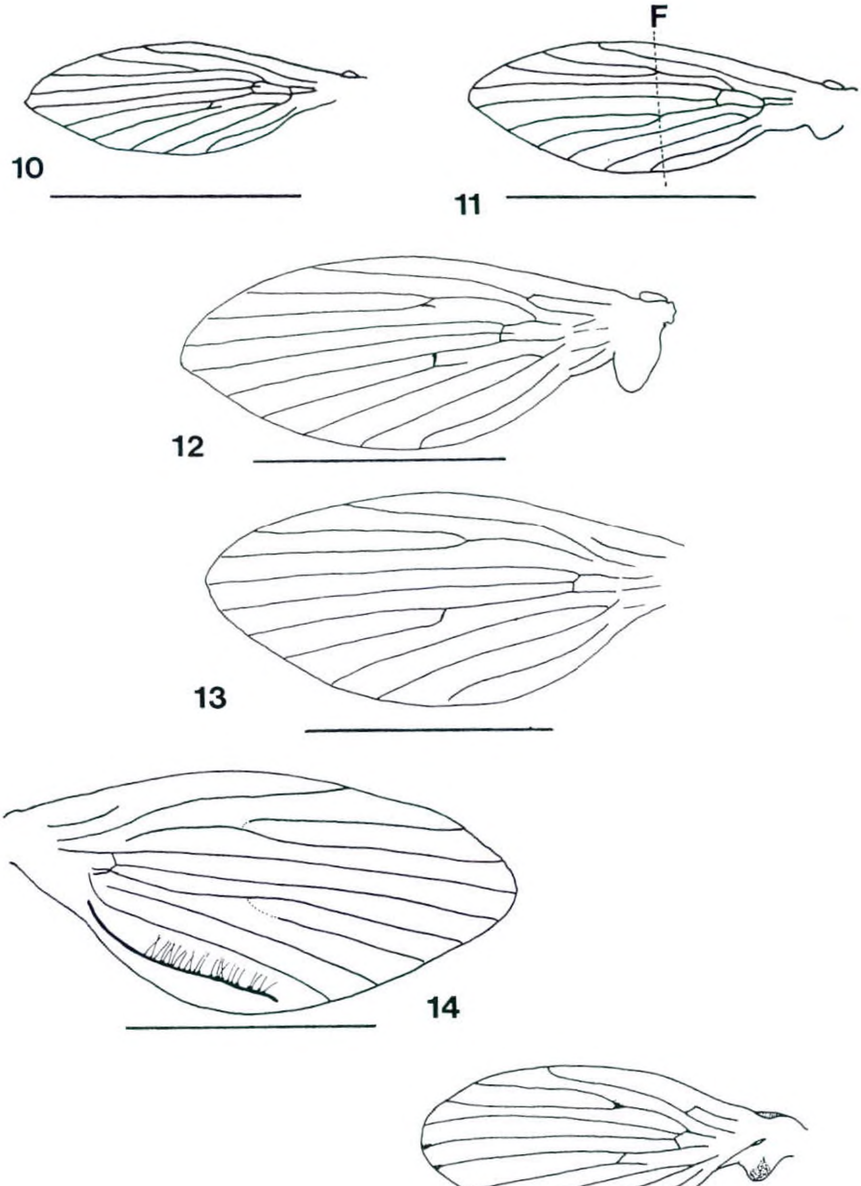
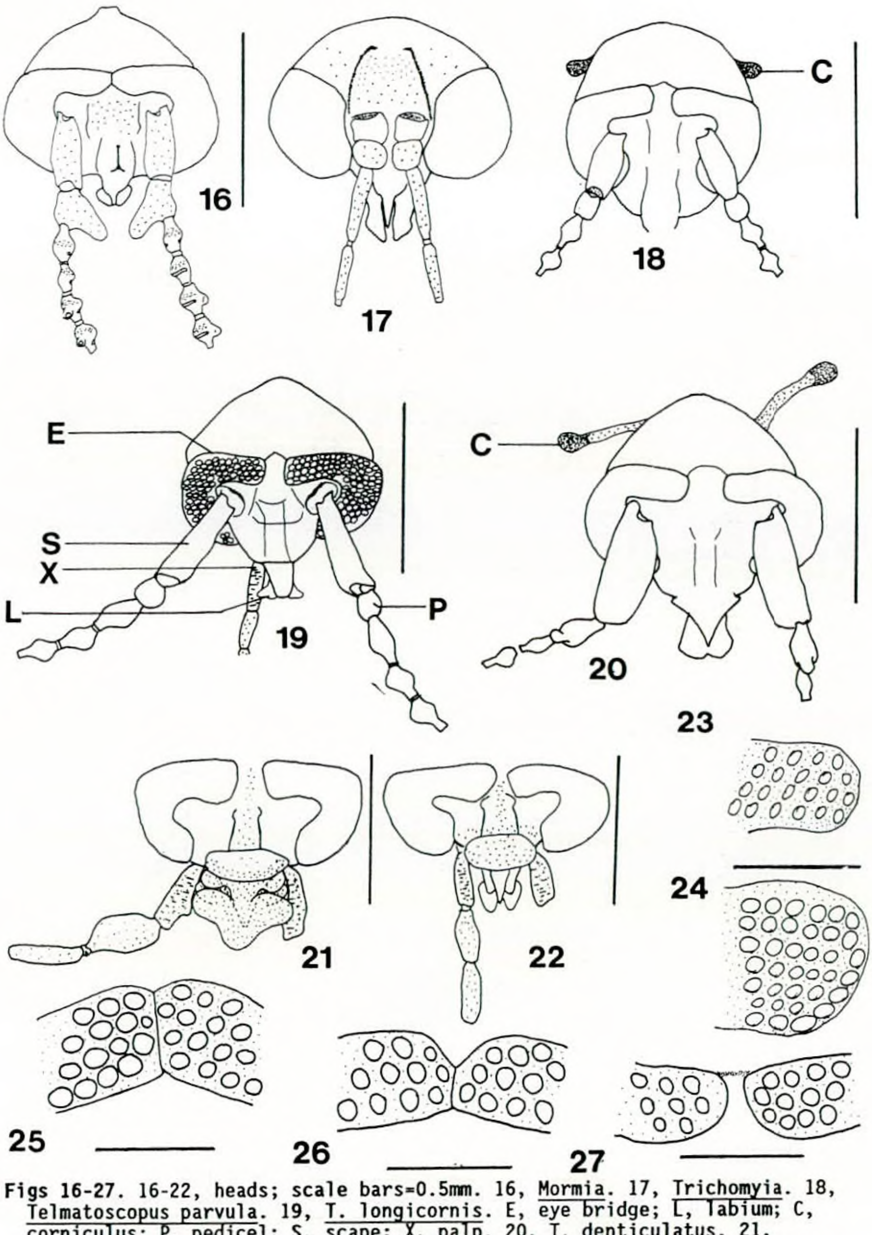
Figs 2-3. 2, Pericoma larva; scale bar=1mm. 3, Telmatoscopus consors, generalised genitalia; scale bar=0.1mm. A, aedeagus; B, gonocoxite; C, cercopod; D, gonostylus; G, gonapophysis; R, retinaculum; S, aedeagal spatula; X, sternal bridge.



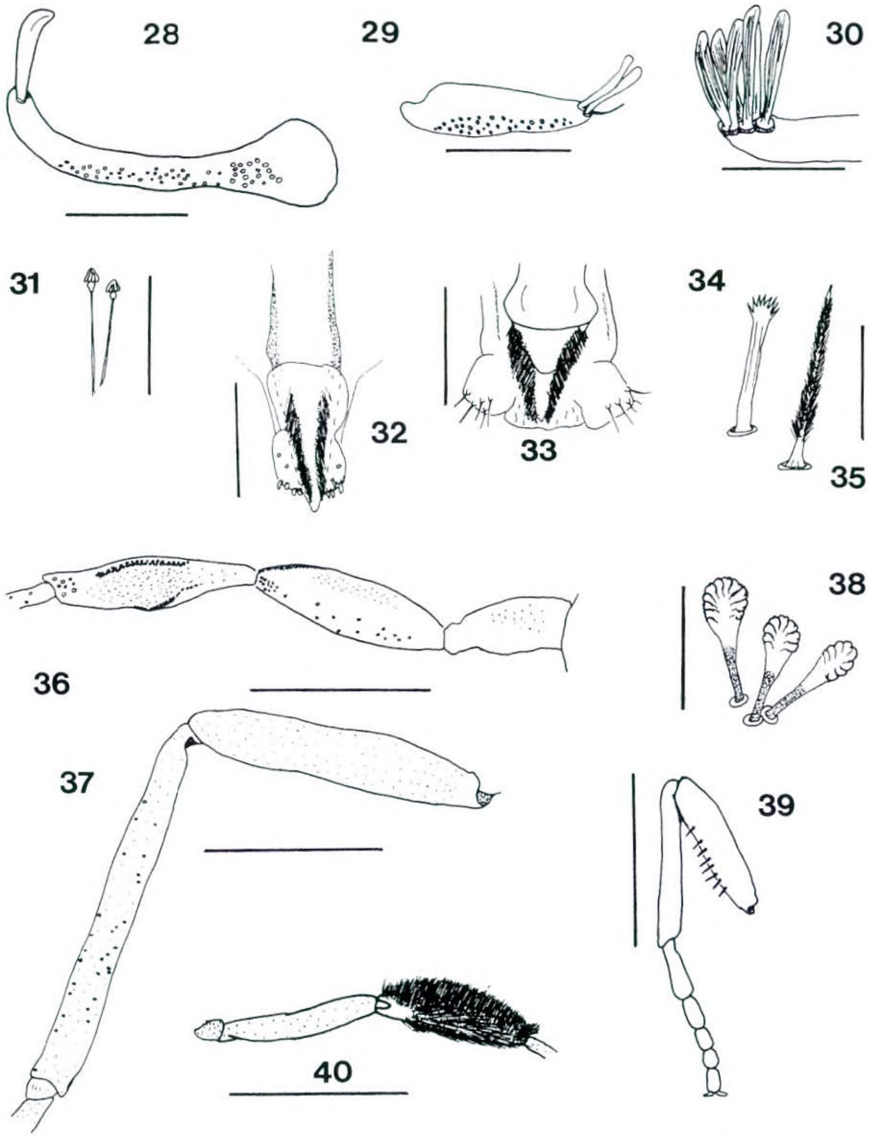
Figs 4-9. Wings; scale bars=1mm. 4, Trichomyia. 5, Sycorax. 6, Peripsychoda. 7, Trichopsychoda. 8, Feuerborniella. 9, Pericoma fuliginosa.



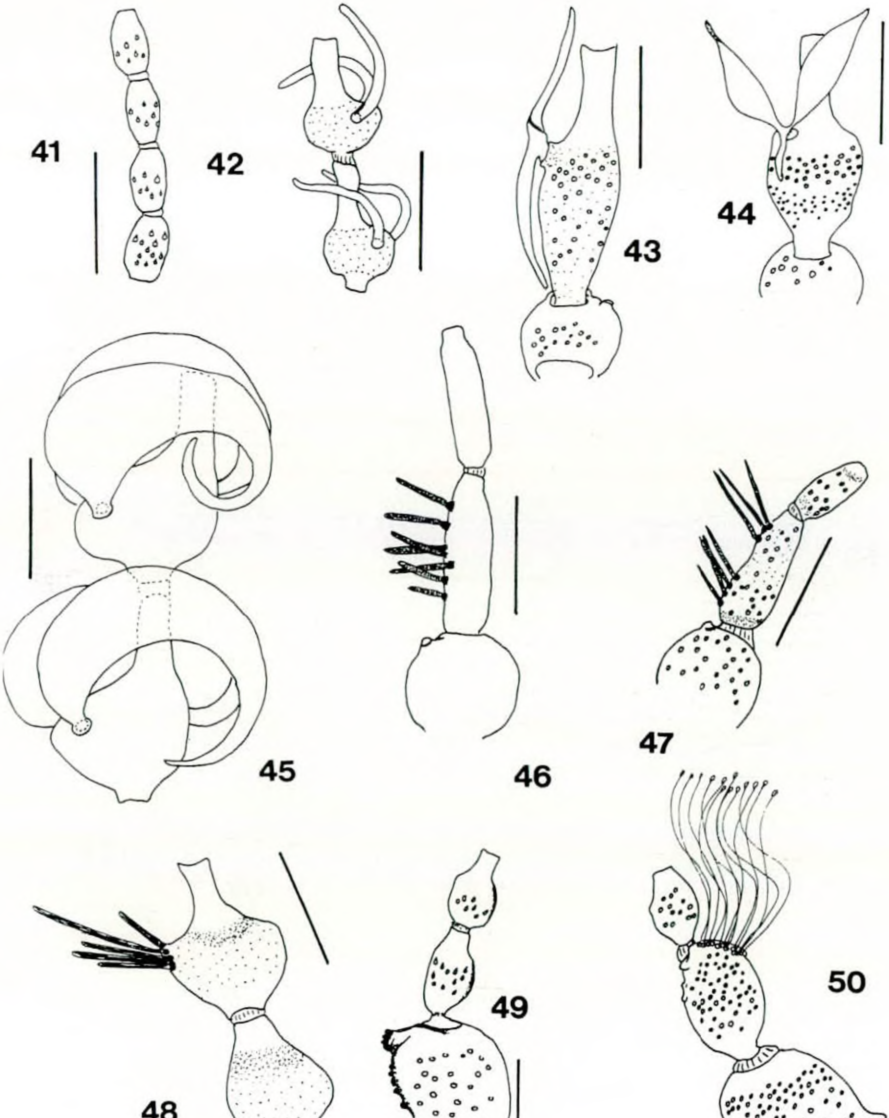
Figs 10-15. Wings; scale bars=1mm. 10, Tonnoiriella nigricauda. 11, T. pulchra; F, forkline. 12, Pericoma canescens. 13, P. palustris. 14, P. mutua. 15, Bazarella.



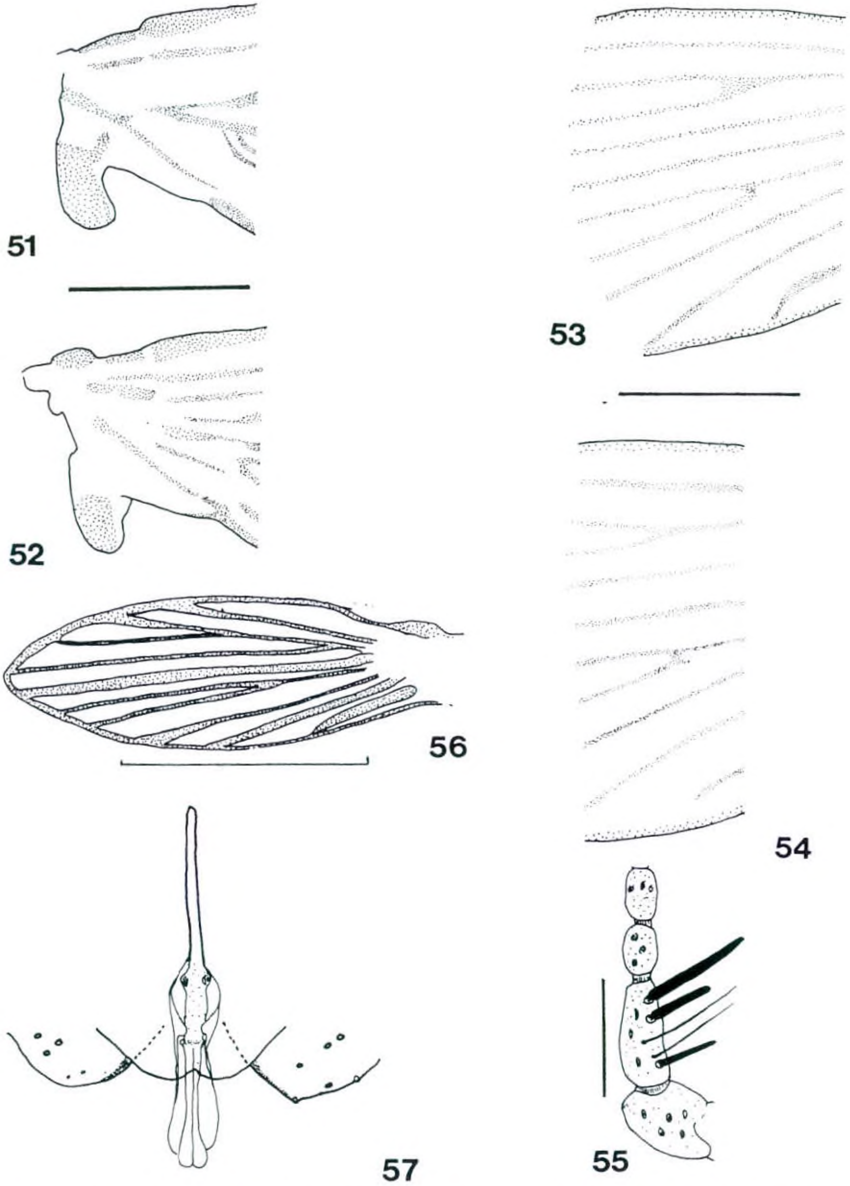
Figs 16-27. 16-22, heads; scale bars=0.5mm. 16, Mormia. 17, Trichomyia. 18, Telmatoscopus parvula. 19, T. longicornis. E, eye bridge; L, labium; C, corniculus; P, pedicel; S, scape; X, palp. 20, T. denticulatus. 21, Pericoma nubila. 22, P. trivialis. 23-27, eye bridges; scale bars=0.1mm. 23, Pericoma fallax. 24, P. nubila. 25, Paramormia fratercula. 26, Mormia furva. 27, M. eatoni.



Figs 28-40. 28-29, cercopods; scale bars=0.1mm. 28, Psychoda. 29, Szaboiella. 30, Pericoma, apex of cercopod; scale bar=0.1mm. 31, Trichopsychoda, retinacula; scale bar=0.1mm. 32-33, labium; scale bars=0.1mm. 32, Psychoda. 33, Feuerborniella. 34-35, retinaculum; scale bars=0.1mm. 34, Telmatoscopus rothschildi. 35, T. advenus. 36-37, 39-40, foreleg; scale bars=0.5mm. 36, Pericoma nubila. 37, P. trivialis. 39, Paramormia. 40, Mormia andrenipes. 38, Atrichobrunettia, retinacula; scale bar=0.1mm.

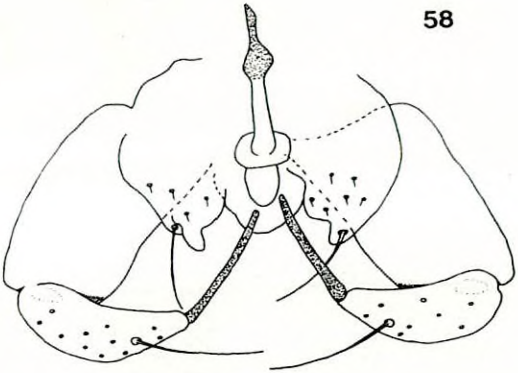


Figs 41-50. Antennae; scale bars=0.1mm. 41, Pericoma. 42, Telmatoscopus parvulus. 43, Threticus. 44, Philosepedon. 45, Telmatoscopus advenus. 46, Pericoma fuliginosa. 47, P. cognata. 48, Telmatoscopus pseudolongicornis. 49, T. maynei. 50, Boreoclytocerus.



Figs 51-57. 51-52, alula of wing; scale bars=0.5mm. 51, Boreoclytocerus rivularis. 52, B. ocellaris. 53-54, venation of mid-wing; scale bars=0.5mm. 53, Telmatoscopus labeculosus. 54, T. morulus. 55, Bazarella, antennal base; scale bar=0.1mm. 56, Atrichobrunettia, wing; scale bar=0.5mm. 57, Pericoma blandula, male genitalia; scale bar=0.1mm

58



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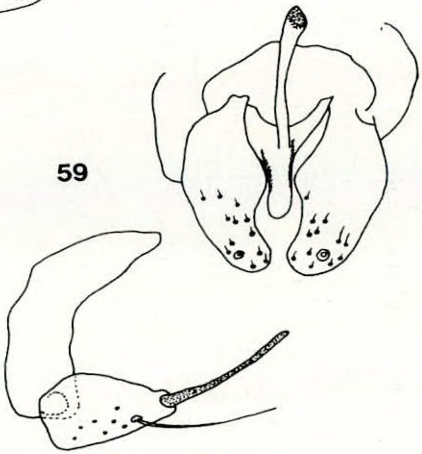

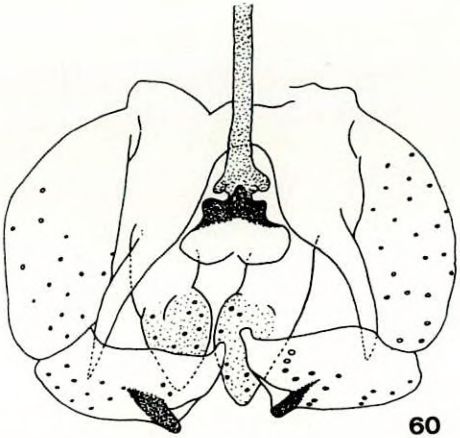

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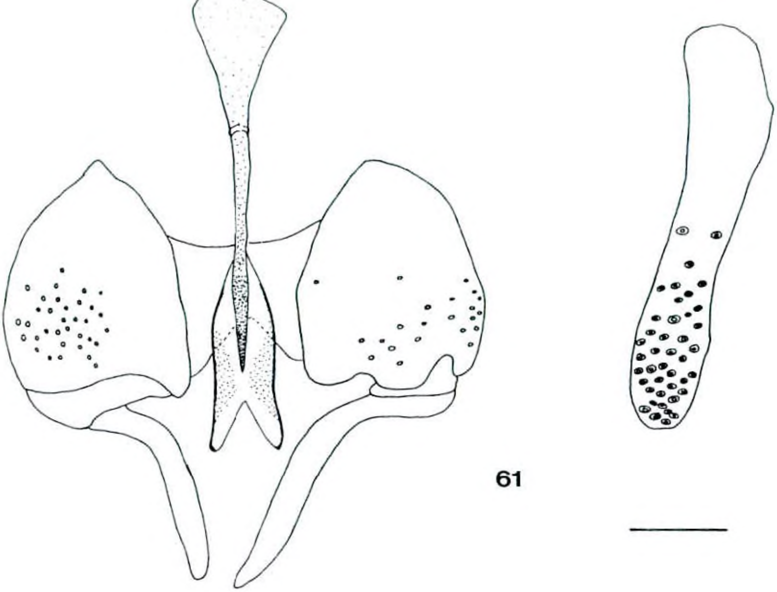
Figs 58-60. Male genitalia; scale bars=0.1mm. 58, <u>Sycorax similis</u>. 59, <u>S. silacea</u>. 60, <u>Trichomyia urbica</u>.



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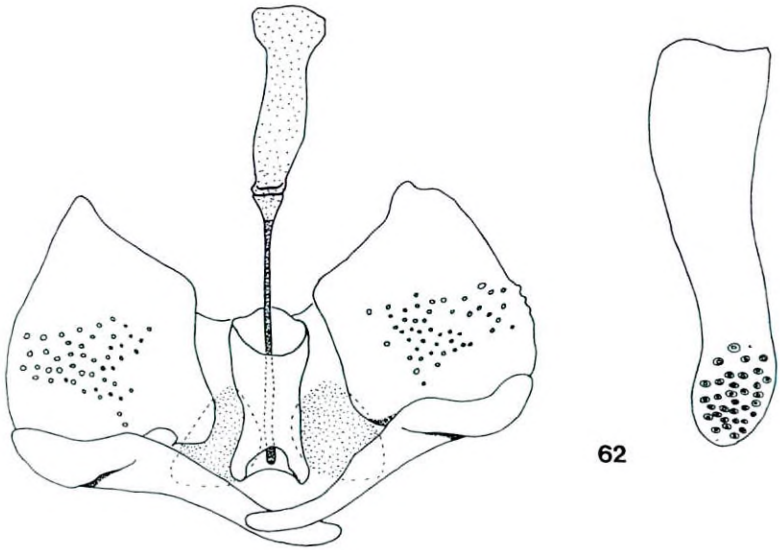

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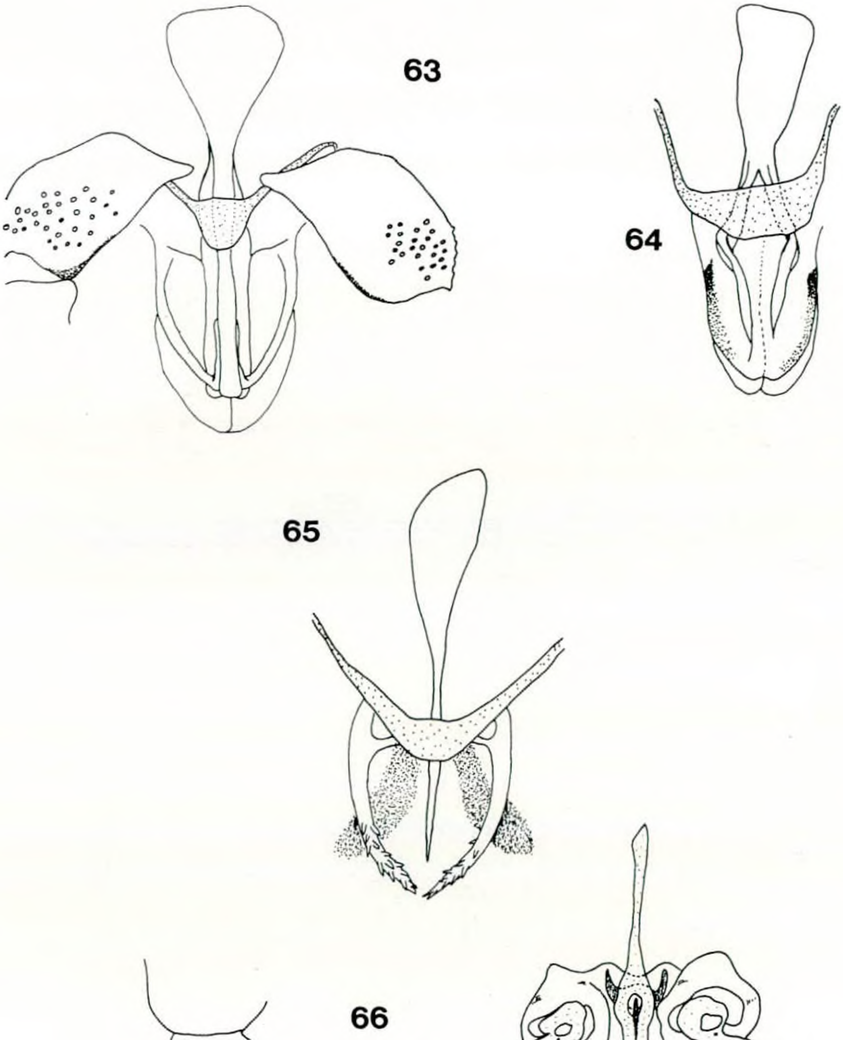
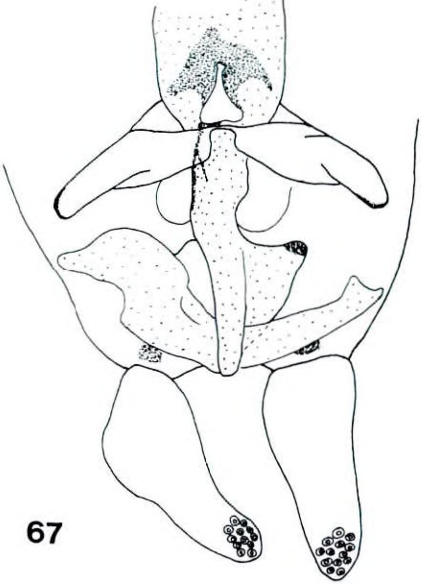
Figs 61-62. Male genitalia; scale bars=0.1mm. 61, Peripsychoda fusca. 62, P. auriculata.



Figs 63-66. Male genitalia; scale bars=0.1mm. 63, <u>Boreoclytocerus ocellaris</u>. 64, <u>B. dalii</u>. 65, <u>B. rivosus</u>. 66, <u>Bazarella neglecta</u>.



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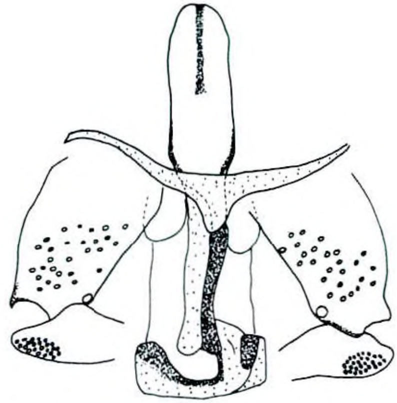

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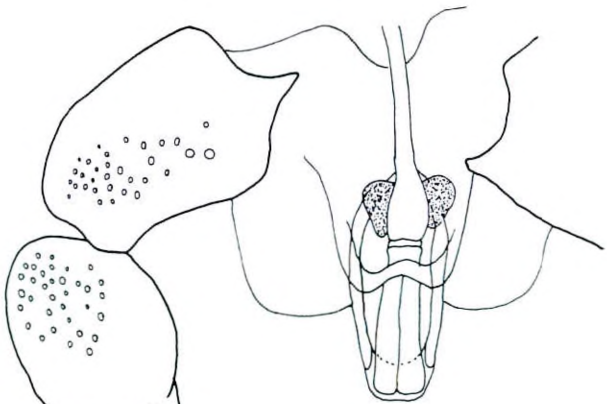

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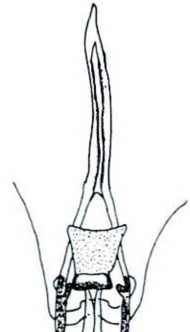

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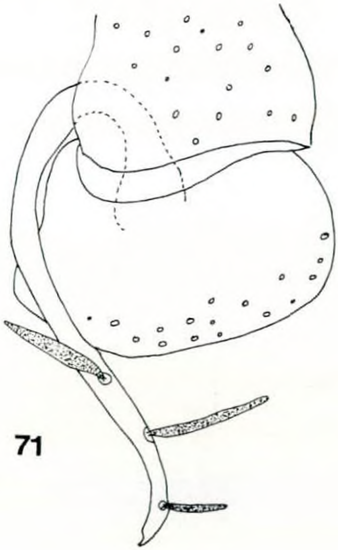
Figs 67-70. Male genitalia; scale bars=0.1mm. 67, Tonnoiriella pulchra. 68, T. nigricauda. 69, Pericoma fuliginosa. 70, P. cognata



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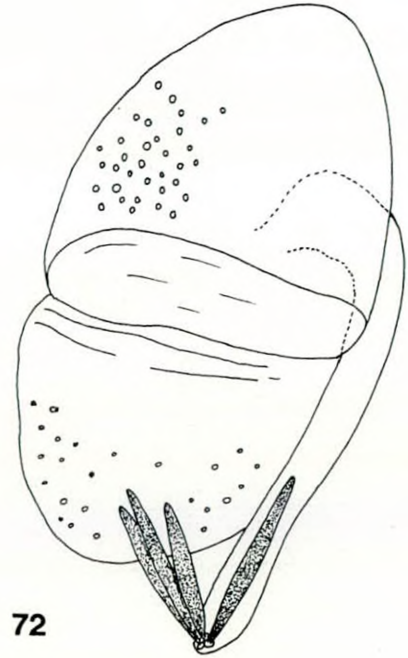

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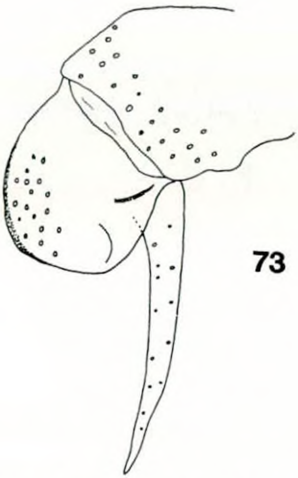

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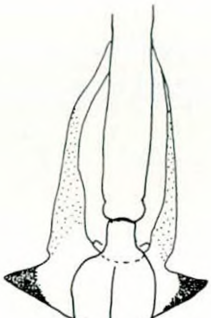

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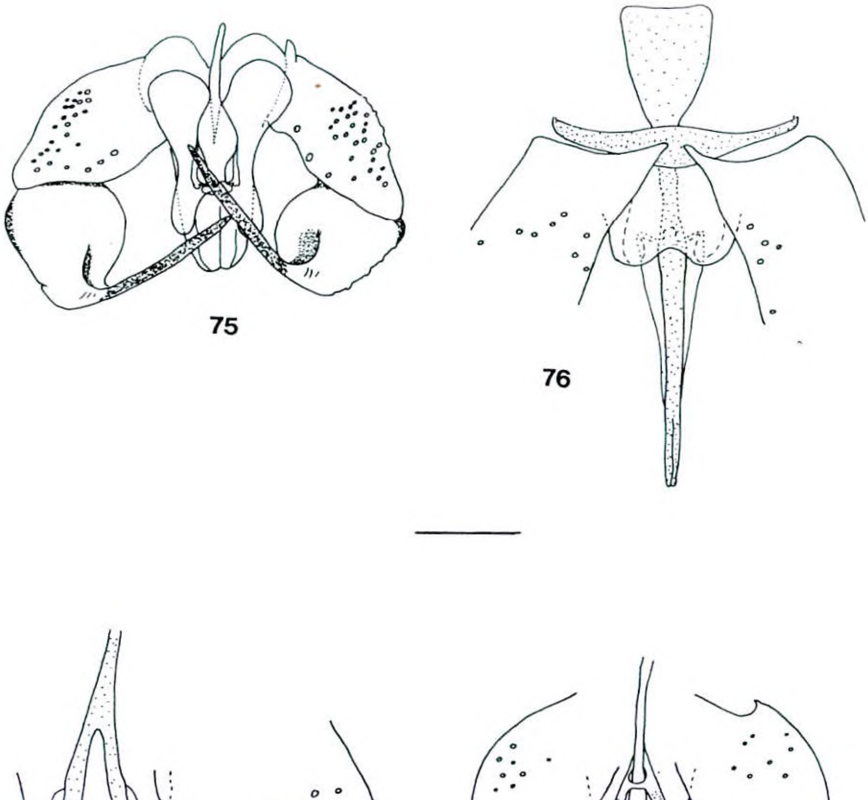
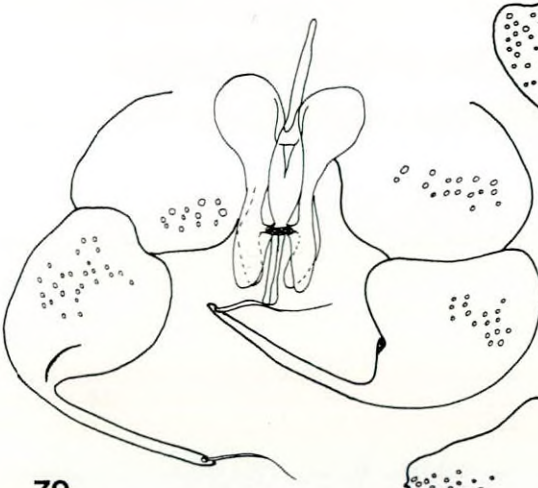
Figs 71-74. Male genitalia; scale bars=0.1mm. 71, Pericoma pilularia. 72, P. compta. 73, P. extricata. 74, P. mutua.



Figs 75-78. Male genitalia; scale bars=0.1mm. 75, Pericoma tonnoiri. 76, P. canescens. 77, P. crispi. 78, P. trifasciata.



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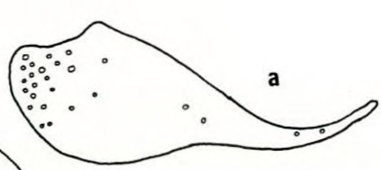

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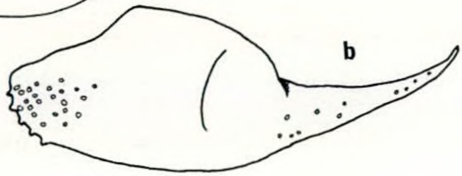

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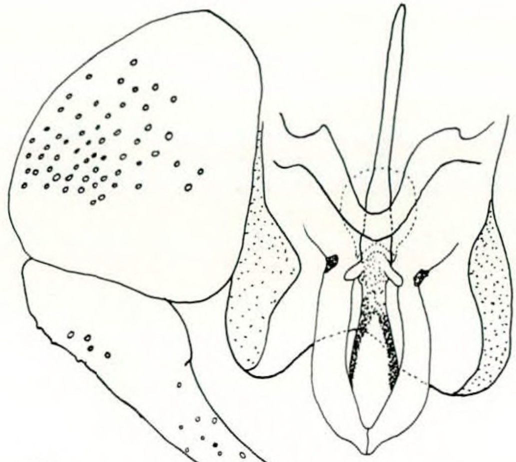

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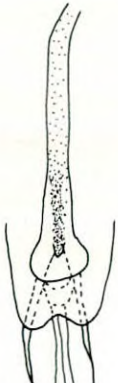
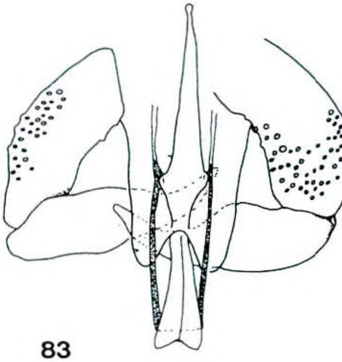


82

Figs 79-82. Figs 79, 81-82 Male genitalia; scale bars=0.1mm. 79, *Pericoma calcilega*. 81, *P. rivularis*. 82, *P. palustris/gracilis*. Fig 80a-80b, gonostylus; scale bars=0.1mm. 80a, *P. pseudoexquisita*. 80b, *P. blandula*.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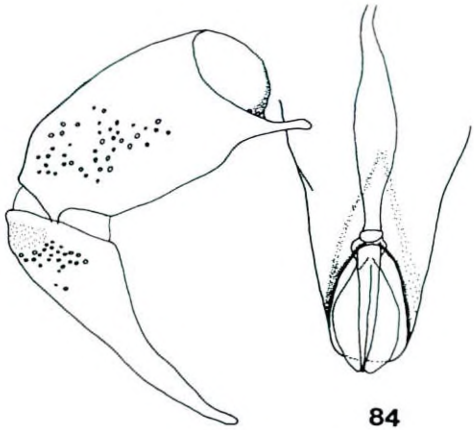
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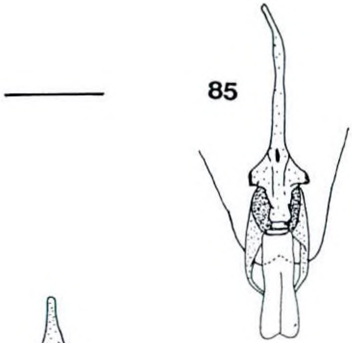
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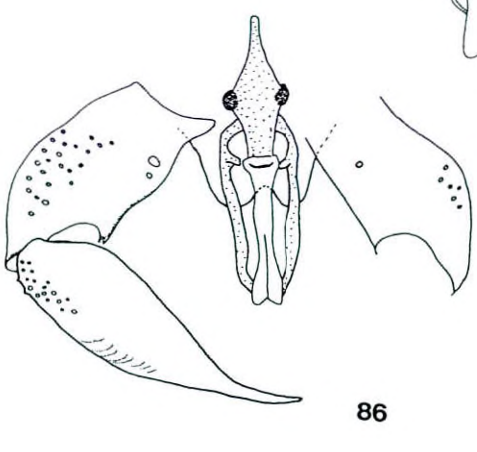
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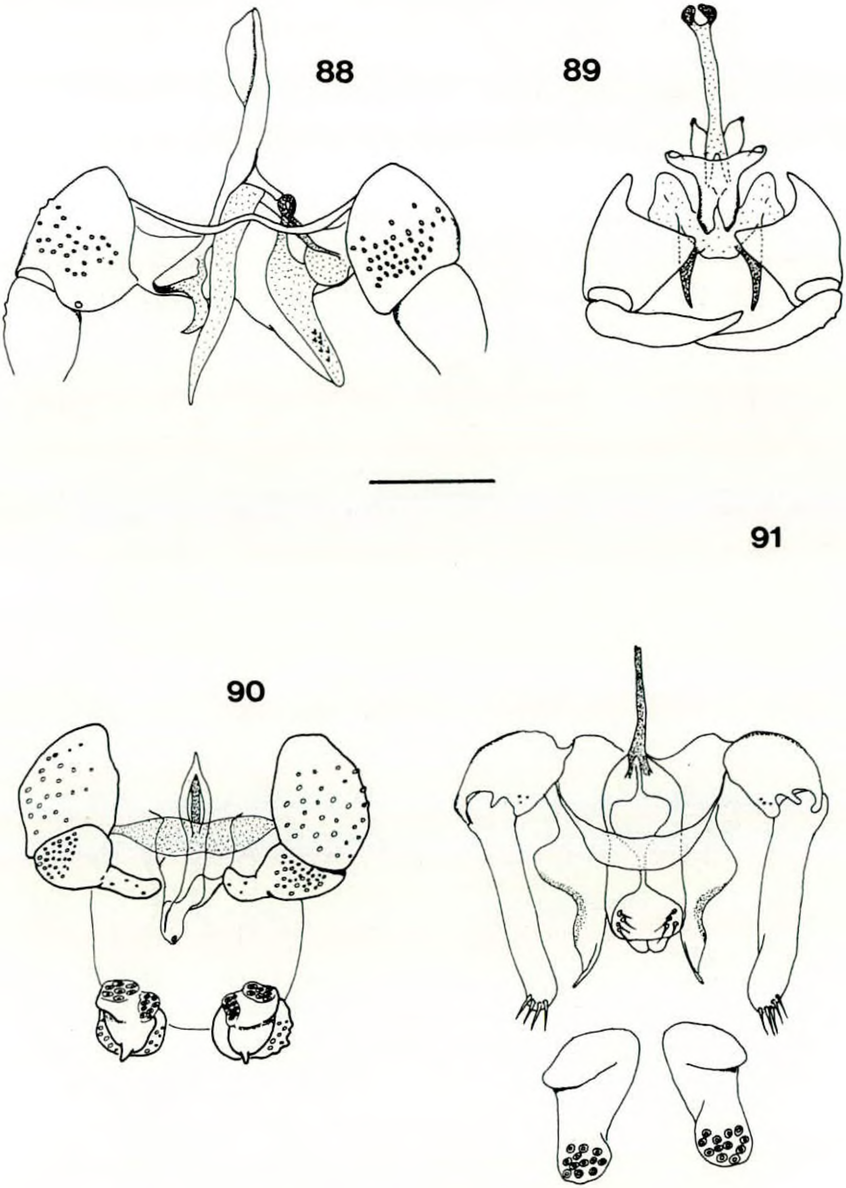
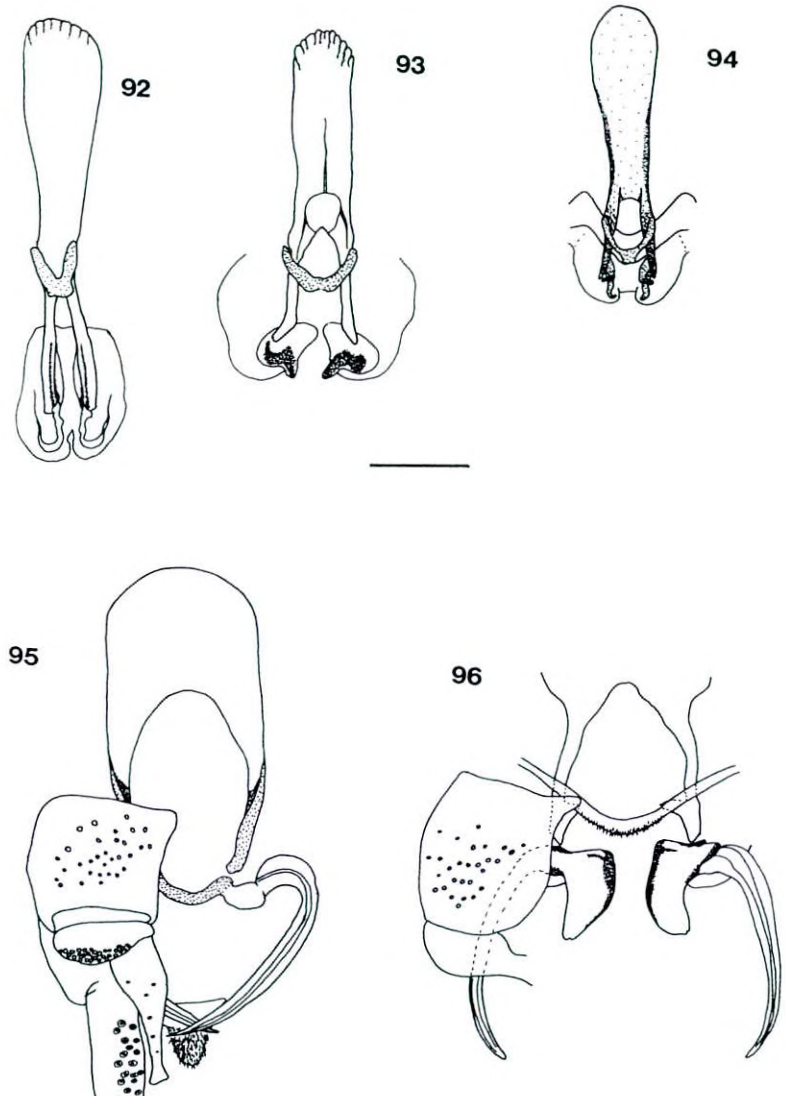
87

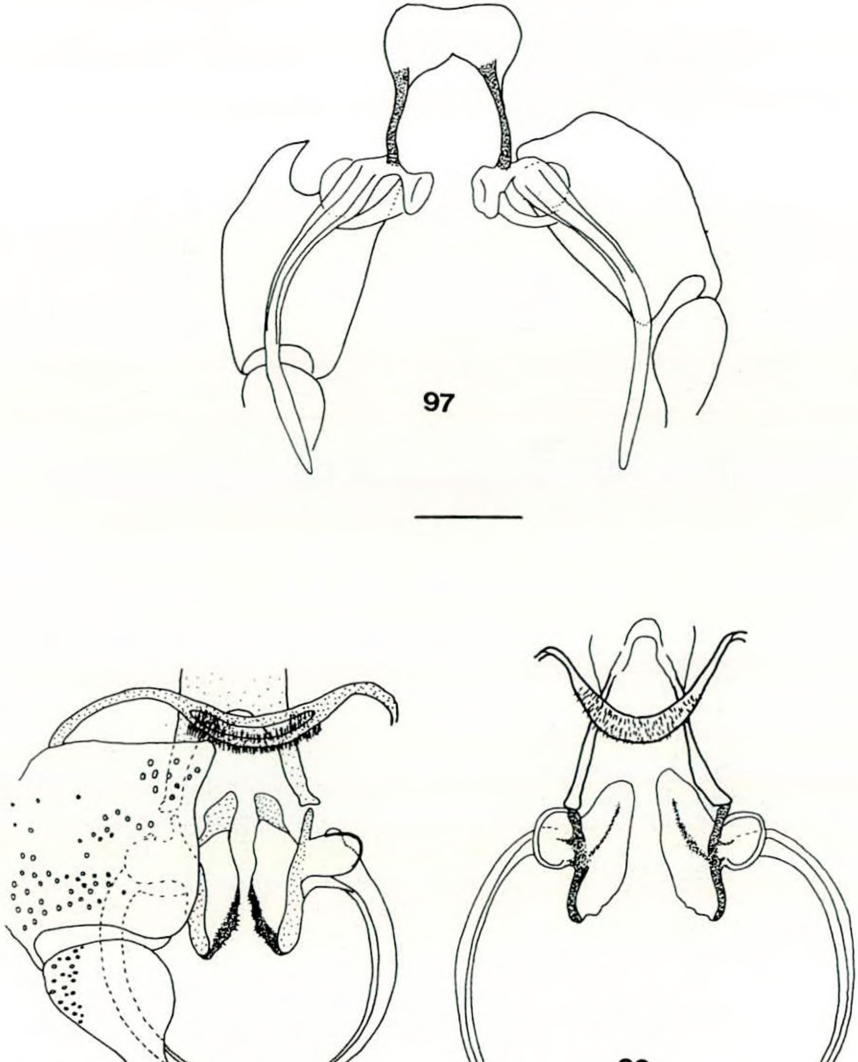
Figs 83-87. Male genitalia; scale bars=0.1mm. 83, Pericoma exquisita. 84, P. trivialis/nubila. 85, P. fallax. 86, P. diversa. 87, P. pseudoexquisita.



Figs 88-91. Male genitalia; scale bars=0.1mm. 88, Threticus lucifugus. 89, Philosepedon humeralis. 90, Trichopsychoda hirtella. 91, Atrichobrunettia angustipennis.



Figs 92-96. Male genitalia; scale bars=0.1mm. 92, *Telmatoscopus soleatus*. 93, *T. parvulus*. 94, *T. acuminatus*.(after Vaillant, 1971) 95, *T. maynei*. 96, *T. notabilis*.



Figs 97-99. Male genitalia; scale bars=0.1mm. 97, Telmatoscopus goetghebueri. 98, T. denticulatus. 99, T. albifacies.

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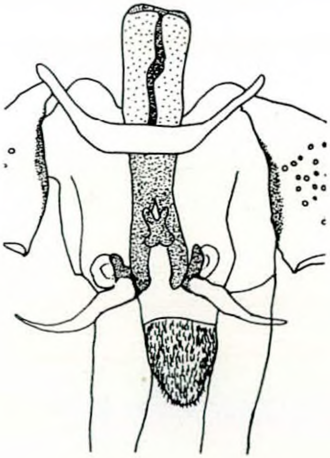

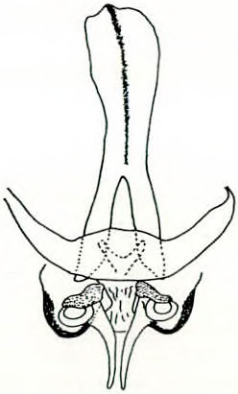

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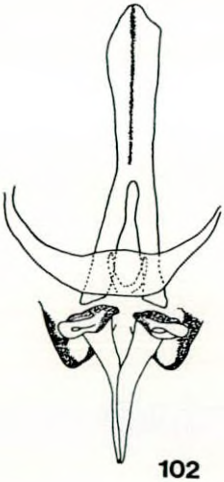

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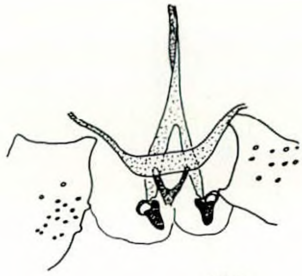

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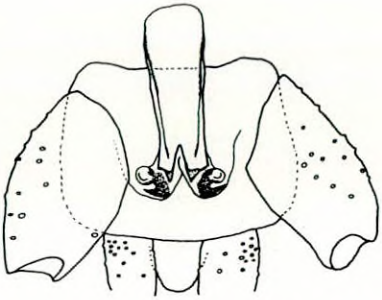
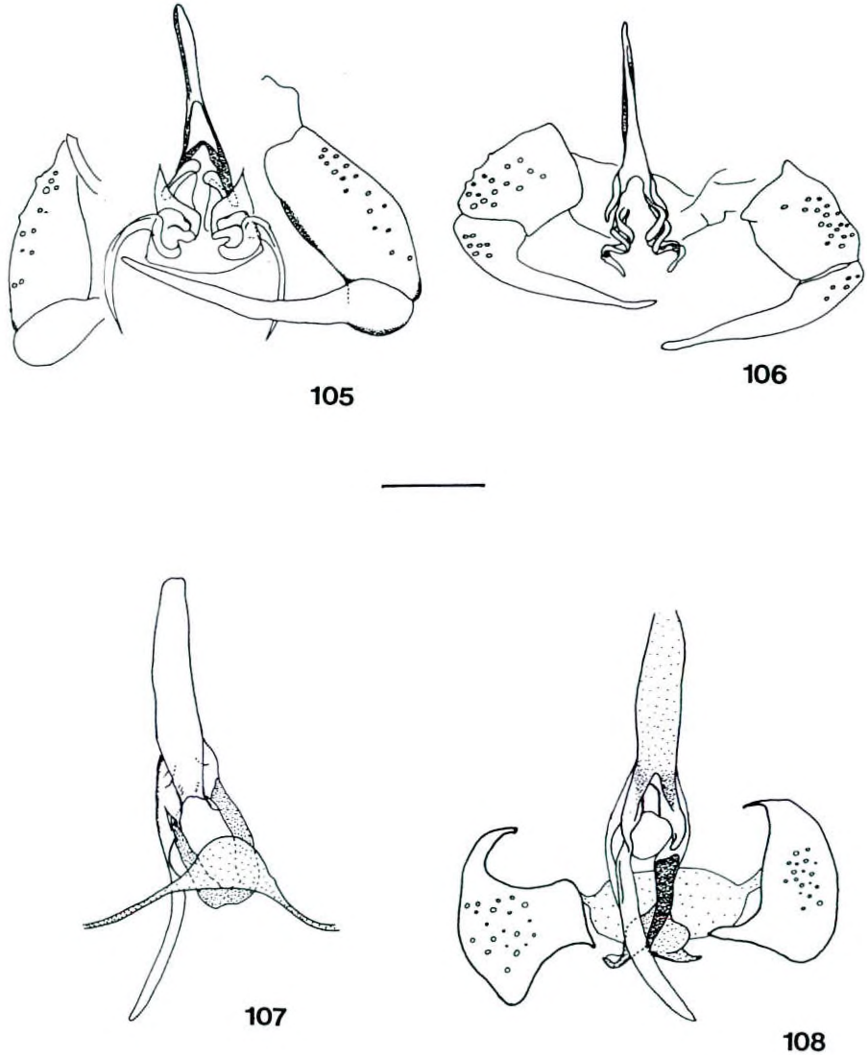
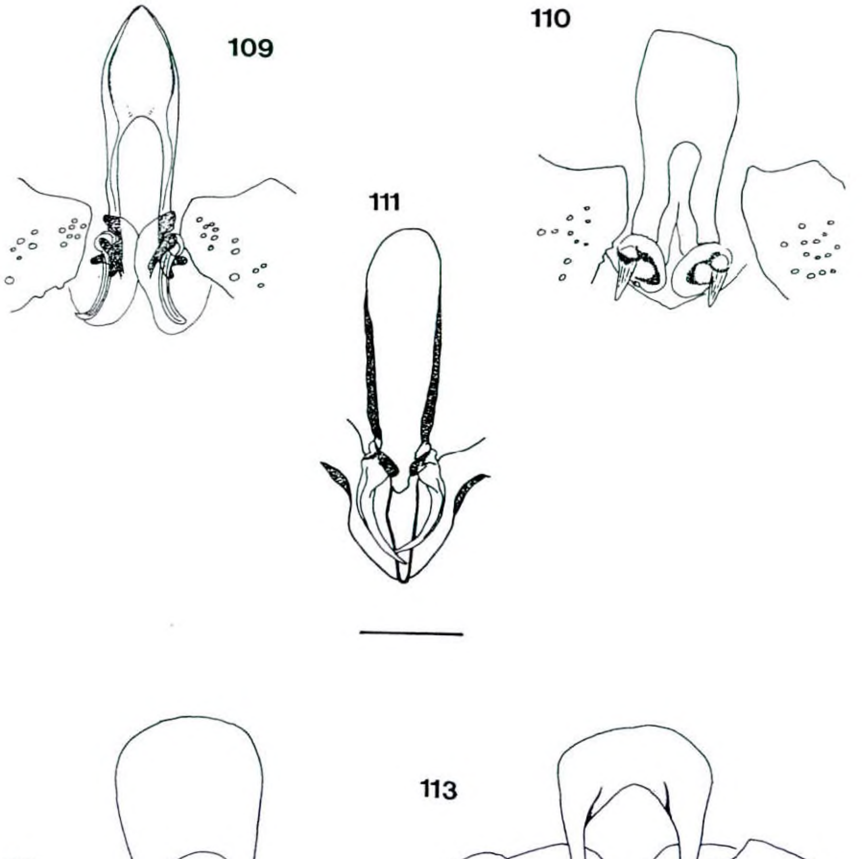


104

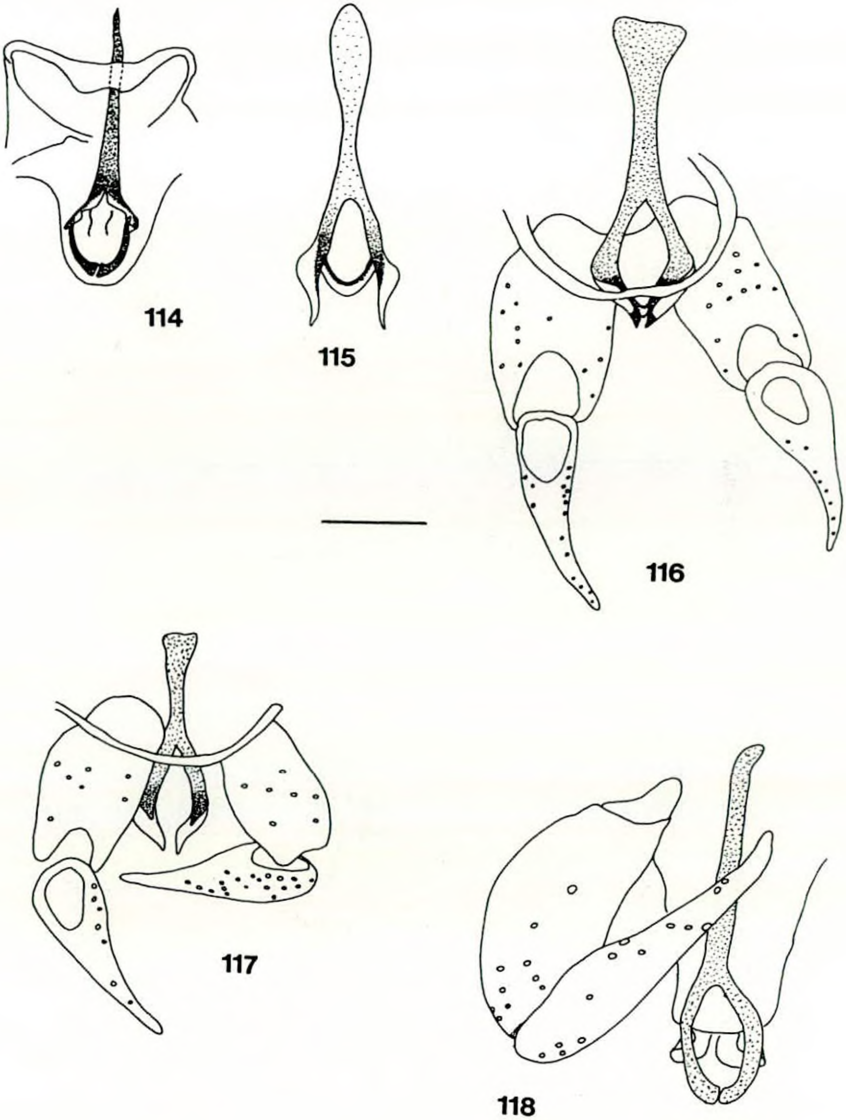
Figs 100-104. Male genitalia; scale bars=0.1mm. 100, Telmatoscopus ellisi. 101, T. pseudolongicornis. 102, T. longicornis. 103, T. consors. 104, T. vaillanti.



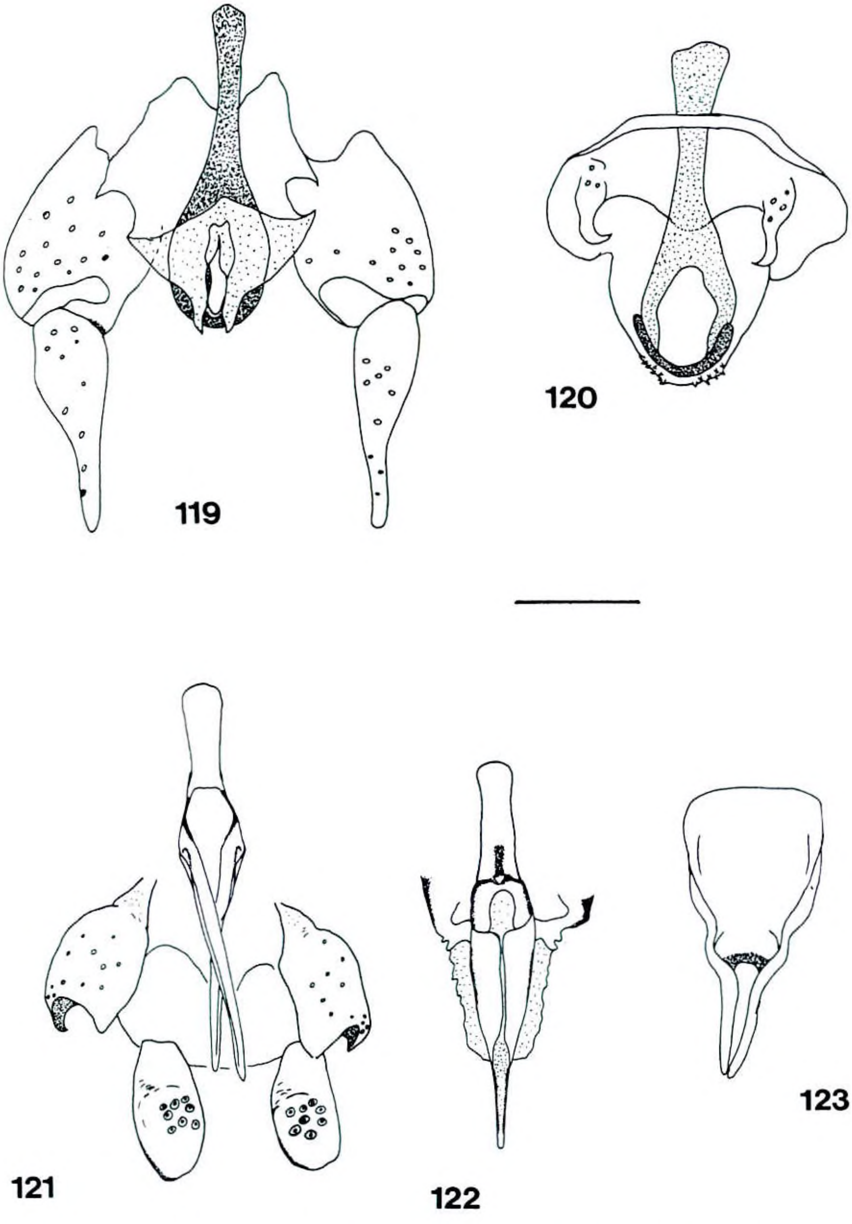
Figs 105-108. Male genitalia; scale bars=0.1mm. 105, <u>Telmatoscopus advenus</u>. 106, <u>T. laurencei</u>. 107, <u>T. tristis</u>. 108, <u>T. rothschildi</u>.



Figs 109-113. Male genitalia; scale bars=0.1mm. 109, _Telmatoscopus ambiguus_. 110, _T. morulus_. 111, _T. similis_. 112, _T. britteni_. 113, _T. labeculosus_.



Figs 114-118. Male genitalia; scale bars=0.1mm. 114, Mormia eatoni. 115, M. caliginosa. 116, M. furva. 117, M. palposa. 118, M. revisenda



Figs 119-123. Male genitalia; scale bars=0.1mm. 119, Mormia andrenipes. 120, M. incerta. 121, Paramormia ustulata. 122, P. decipiens. 123, P. fratercula.

124

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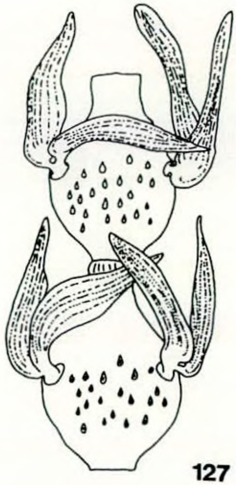

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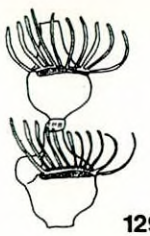
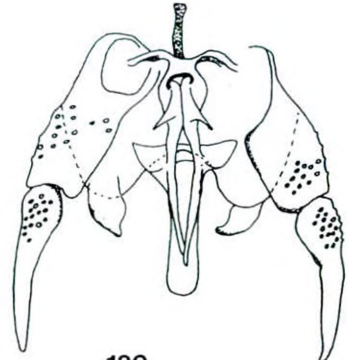


129

Figs 124-129. Antennal ascoids; scale bars=0.1mm. 124, Mormia revisenda. 125, M. eatoni. 126, M. incerta. 127, M. andrenipes. 128, Paramormia. 129, Mormia furva.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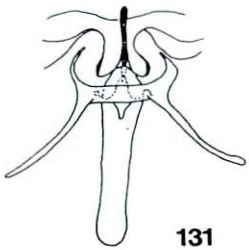
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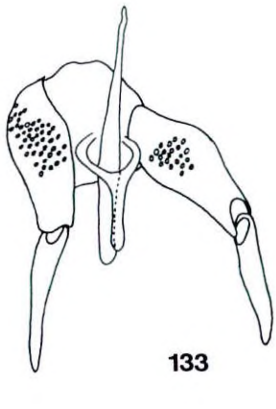
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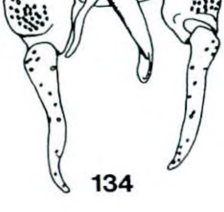
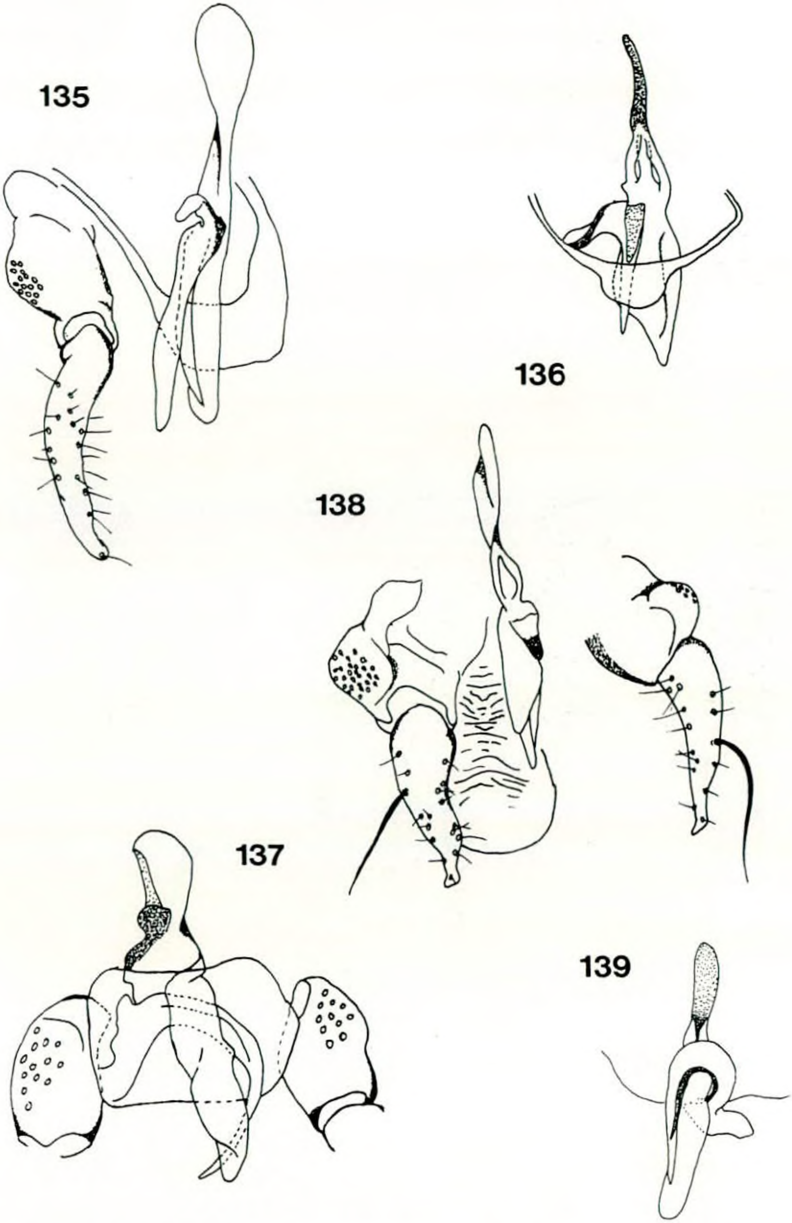
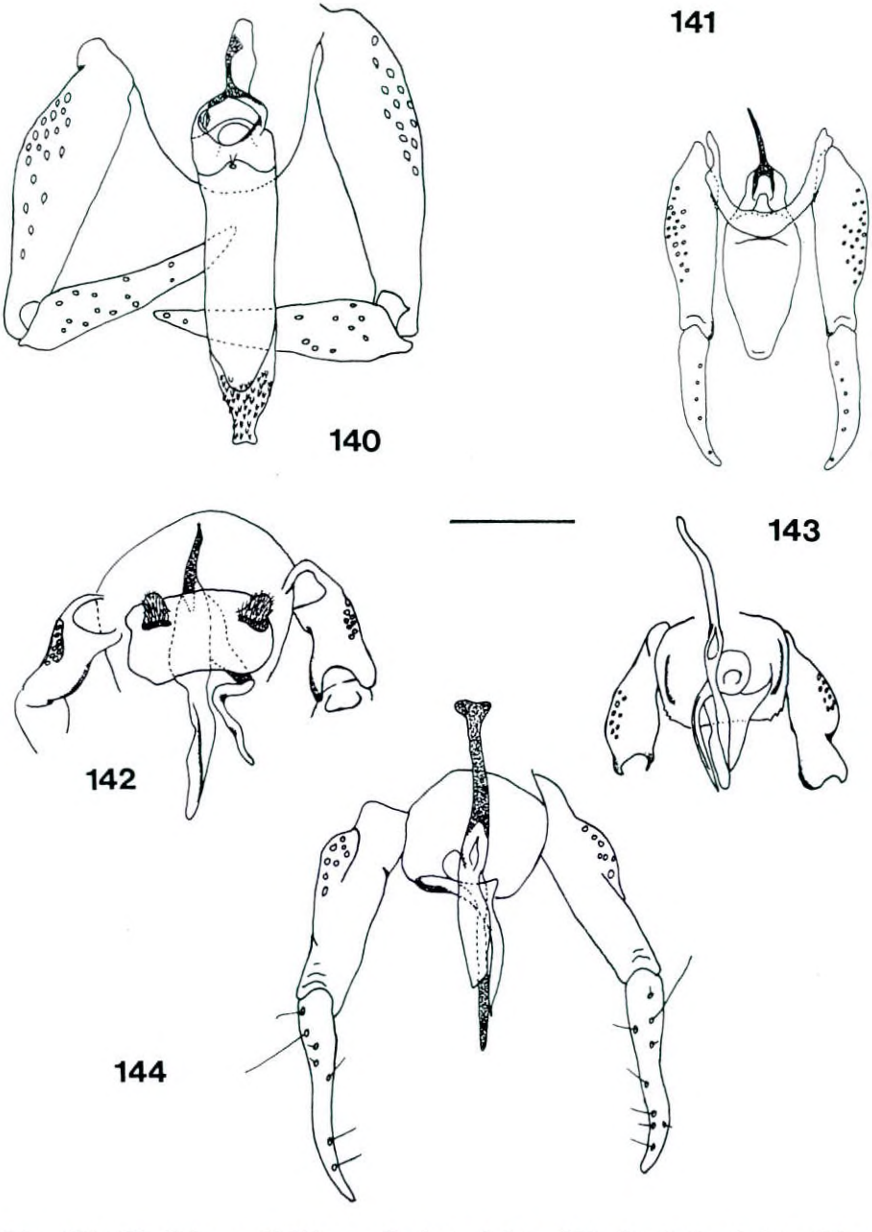

134

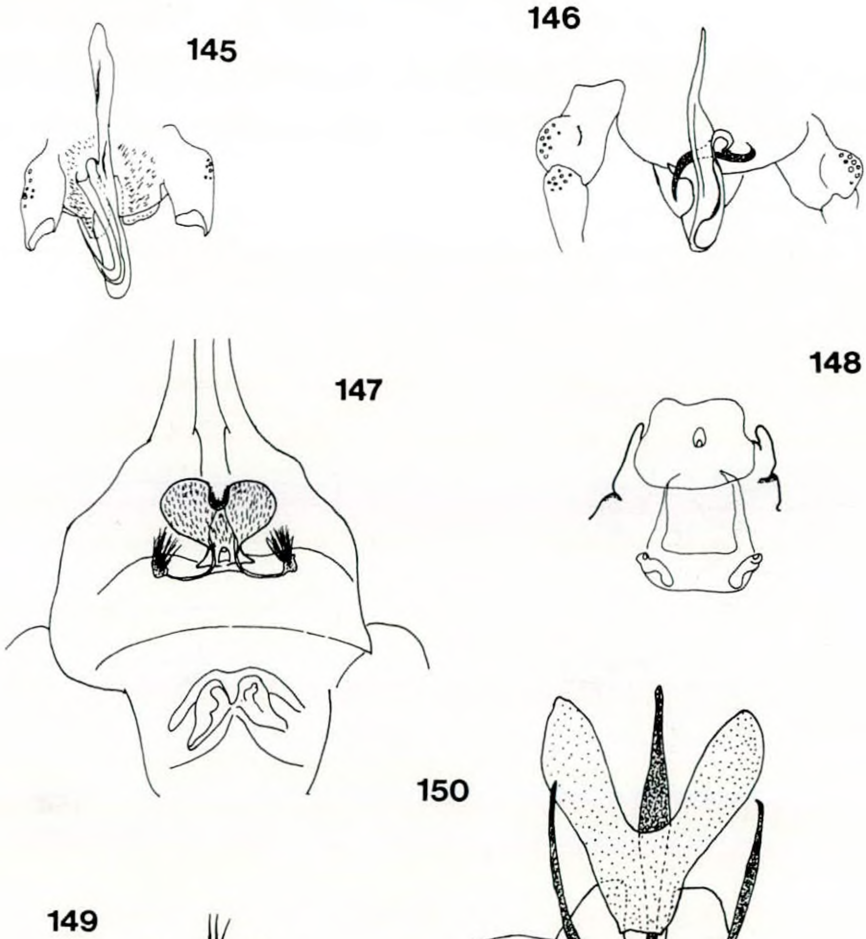
Figs 130-134. Male genitalia; scale bars=0.1mm. 130, Feuerborniella obscura. 131, F. obscura - alternative aspect. 132, Psychoda setigera. 133, P. brevicornis. 134, P. trinodulosa.



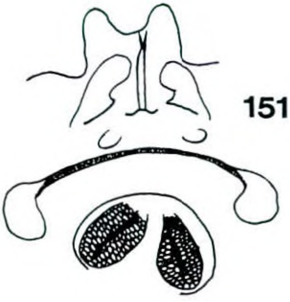
Figs 135-139. Male genitalia; scale bars=0.1mm. 135, Psychoda alternata. 136, P. cinerea. 137, P. gemina. 138, P. surcoufi. 139, P. erminea.



Figs 140-144. Male genitalia; scale bars=0.1mm. 140, Psychoda phalaenoides. 141, P. crassipenis. 142, P. minuta. 143, P. grisescens. 144, P. albipennis.

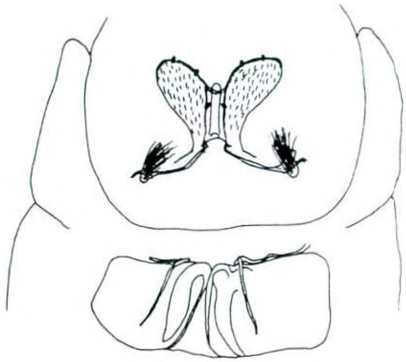


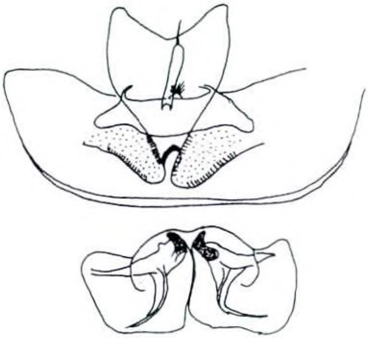
Figs 145-150. 145-146 Male genitalia, 147-150 Female genitalia; scale bars=0.1mm. 145, <u>Psychoda buxtoni</u>. 146, <u>P. lobata</u>. 147, <u>P. setigera</u>. 148, <u>P. brevicornis</u>. 149, <u>P. trinodulosa</u>. 150, <u>P. alternata</u>.

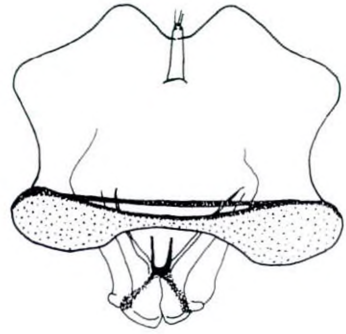


151

152







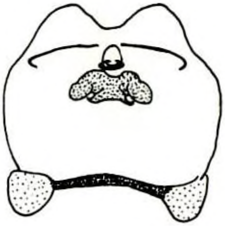
153

154

155

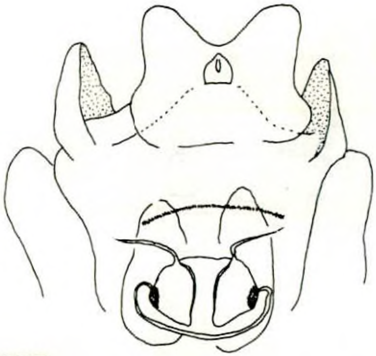
156

Figs 151-156. Female genitalia; scale bars=0.1mm. 151, Psychoda erminea. 152, P. surcoufi. 153, P. lobata. 154, P. cinerea. 155, P. phalaenoides. 156, P. minuta.



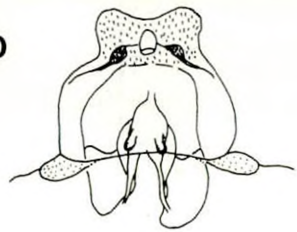
157

158

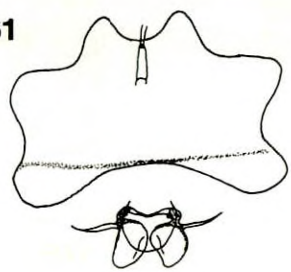


159

160

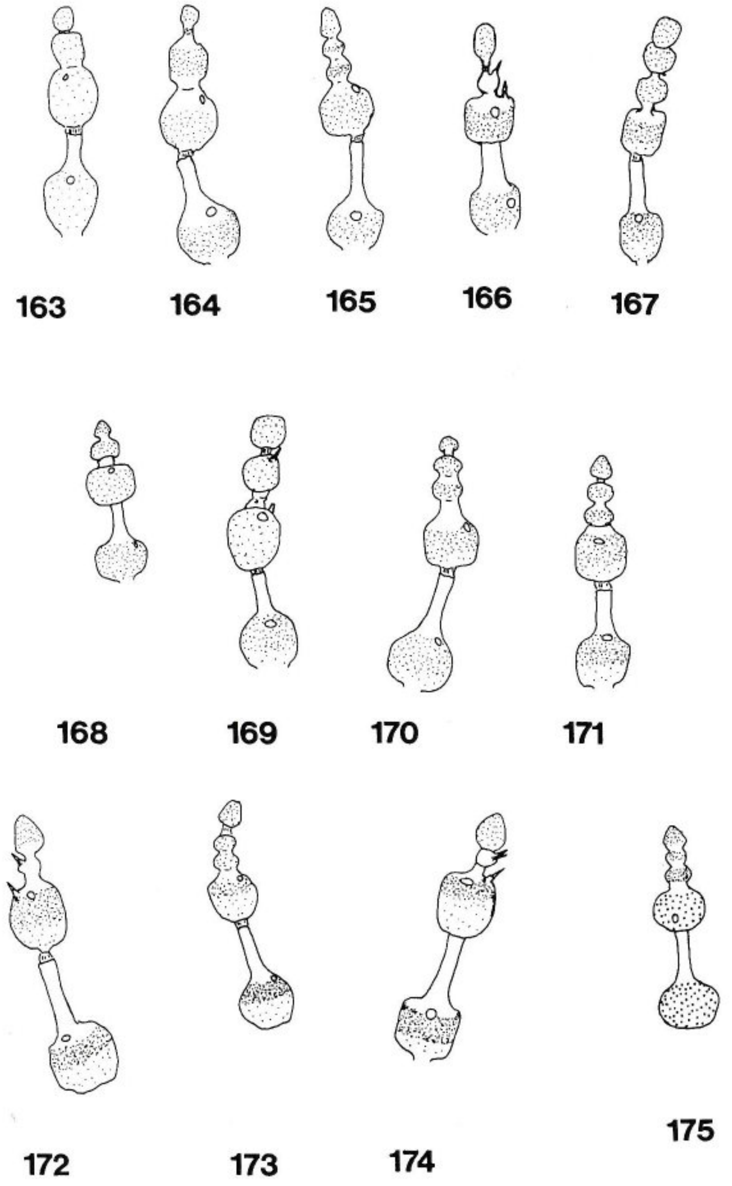


161

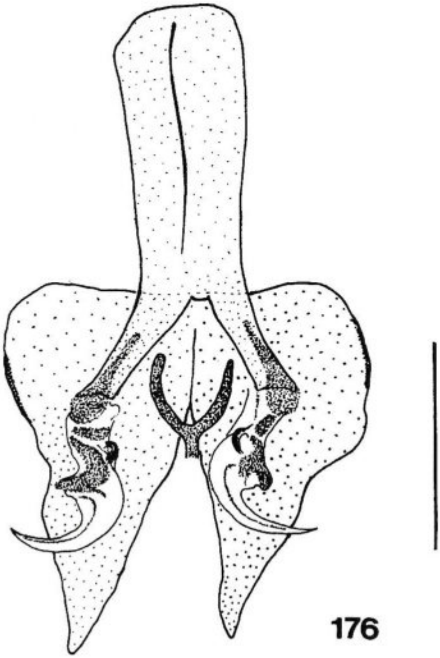


162

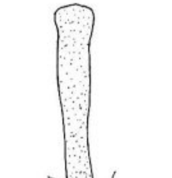
Figs 157-162. Female genitalia; scale bars=0.1mm. 157, *Psychoda grisescens*. 158, *P. gemina*. 159, *P. albipennis*. 160, *P. crassipenis*. 161, *P. buxtoni*. 162, *P. "species A"*.



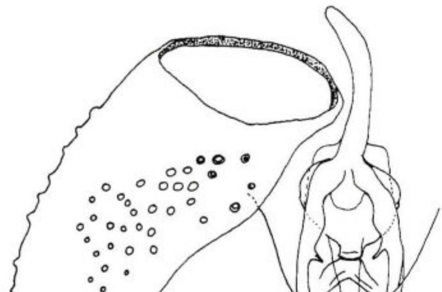
Figs 163-175. Antennal tip; scale bars=0.1mm. 163, Psychoda alternata. 164, P. brevicornis. 165, P. cinerea. 166, P. erminea. 167, P. gemina. 168, P. setigera. 169, P. phalaenoides. 170, P. minuta. 171, P. grisescens. 172, P. surcoufi. 173, P. trinodulosa. 174, P. albipennis. 175, P. lobata.



176



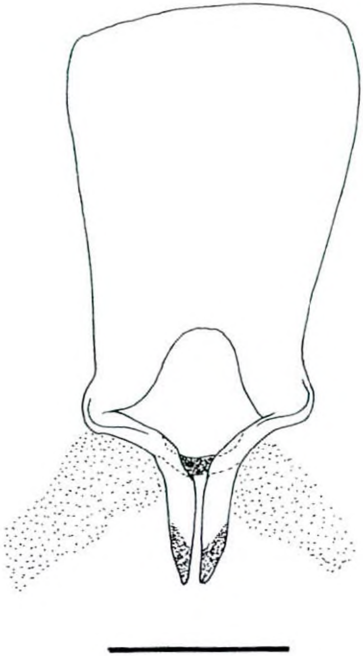
177

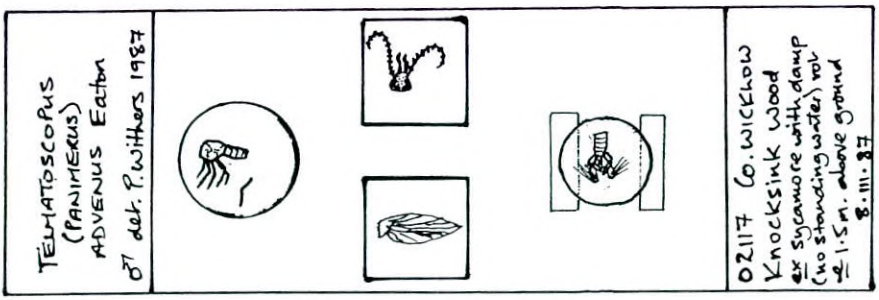


178

Figs 176-178. 176, <u>Telmatoscopus miksici</u>, male genitalia; scale bar=0.2mm. 177, <u>Mormia satchelli</u>, male genitalia; scale bar=0.1mm. 178, <u>Szaboiella hibernica</u>, male genitalia; scale bar=0.1mm.

179





180

Figs 179-180. 179, Paramormia polyascoidea, male genitalia; scale bar=0.1mm; 180, schematic dissection of a moth fly.

INDEX

Names of genera and species only are included.
Page numbers in bold refer to main entry in key.

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