Beit. Ent.	Berlin	ISSN 0005-805X
45(1995)2	S. 251-259	24.07.1995

Inium, a new Australian genus of Platystomatidae (Diptera: Schizophora) apparently mimicking ants

With 5 figures and 1 table

DAVID K. MCALPINE[1]

Australian Museum, Sydney

Summary

Inium **gen. nov.** (Platystomatidae, Platystomatinae) is introduced for 2 newly described species of tropical Australia. The species apparently show different degrees of ant-mimicry.

Zusammenfassung

Inium **gen. nov.** (Platystomatidae, Platystomatinae) wird eingeführt für zwei neubeschriebene Arten vom tropischen Australien. Die beiden Arten zeigen anscheinend verschiedene Grade von Ameisenmimikry.

The insects here described have been known for some years, but work on them has been deferred because of the paucity of specimens and difficulty of taxonomic placement. The 2 available species are of markedly different appearance, and it has been a matter for careful consideration whether they should be accommodated in the one genus. As the type species is represented by one of each sex and the other species by 2 females, my morphological comparison of the 2 is not as complete as could be desired. In view of (1) the unusual morphology, particularly of the prelabrum (which appears to represent only a part of the true clypeus in the Schizophora); (2) apparent Batesian mimicry of ants; and (3) the restricted known distribution of the species, it is desirable that they be made known.

Terminology is that previously used for Platystomatidae (MCALPINE 1973).

[1]Anschrift des Verfassers: DAVID K. MCALPINE, Australian Museum, PO Box A285, Sydney South NSW 2000, Australia

DOI: 10.21248/contrib.entomol.45.2.251-259

Inium gen. nov.

Type species: *Inium mariae* spec. nov.

Postfrons with rather numerous proclinate setulae anteriorly; hypofacial slightly produced downwards on each side as a rounded lobe; occiput convex, without supracervical tubercle; eye very rounded, bare. Antennal segment 2 not cap-like, with deep dorsal fissure; arista bare, at least on a large distal part. Prelabrum not of usual arcuate type, very deep and somewhat bilaterally compressed, ventrally receding and much extended towards proboscis, sclerotized across full width; palpus short and rounded. Prothorax produced into a distinct dorsally membranous neck, supported by the lateral cervical sclerites, but pronotum not anteriorly produced (in contrast to Angitulinae); mesoscutum almost hemispherically convex; scutellum very short, broadly rounded, convex, setulose, without setiferous horns or tubercles; prosternum without precoxal bridges;metathorax without postcoxal bridge; at least the following thoracic bristles present (sometimes short): posterior notopleural, postalar, posterior intra-alar, one dorsocentral, mesopleural. Legs rather elongate, particularly the hind ones; fore coxa elongate; mid coxal prong reduced; fore femur without differentiated bristles; apical ventral spur of mid tibia weakly differentiated from adjacent setulae; tarsi elongate; hind basitarsus slender, longer than mid basitarsus. Wing variably narrowed basally, with markings restricted to brown costal band (sometimes covering only costal and subcostal cells) and more diffuse apical brown zone; vein 1 with setulae distributed somewhat irregularly from just beyond humeral crossvein to distal termination; veins 3 and 4 only slightly convergent apically; posterodistal angle of anal cell acute or subacute; alula variably narrowed, bare or largely so, except for marginal fringe; squama very narrow, not forming a lobe. Abdomen variably narrowed anteriorly; sternite 1 broad, with anterolateral angles produced, apparently articulating with metapleura.
The generic name is from the Greek inion, back of head or nape, in reference to its prominently convex condition. It is neuter.

Habitat and Geographic Distribution

Both species of *Inium* were collected in rainforests in the tropical zone of Queensland, but each inhabits a geographically quite separate rainforest zone. *I. simplum* inhabits the extensive tract of rainforest, now somewhat dissected, that extends from the Tully River to near Cooktown. The area supports a remarkably species-rich biota, particularly so for the Platystomatidae. *I. simplum* was collected in 2 different districts within this tract. On the Cape York Peninsula, to the north of the above area, rainforests are much more localised and isolated. *I. mariae* is only known from the northernmost of these peninsular rainforests, known as Lockerbie Scrub, and from one of the southernmost at McIlwraith Range. It has not been found in the better known intermediate rainforests at Iron Range (Claudie River).

Relationships

Inium shows a combination of characters which apparently place it in the platystomatid subfamily Platystomatinae, as delimited by McALPINE (1973). In the female, abdominal tergite

DOI: 10.21248/contrib.entomol.45.2.251-259

5 is large, but tergite 6 is vestigial; in the male, the postabdomen is strongly asymmetrical but the protandrial sclerites are reduced; the aedeagus has a well developed glans, and the paired terminal filaments are present, though short and highly modified. These characters alone might not preclude the placement of the genus in the Angitulinae, but *Inium* lacks the following distinctive apomorphies of that subfamily, viz. prominent, bristled supracervical tubercle present, pronotum elongate, postnotopleural ridge forming a prominent lamella (somewhat as in *Coelopa* spp., see MCALPINE, 1991:33), scutellum with pair of horn-like setiferous tubercles, membranous cleft of mesopleuron prolonged into sternopleuron, metathorax with sclerotized postcoxal bridge and diopsid-like articulation with base of abdomen. From these criteria, *Inium* could still be more closely related to the Angitulinae than to some genera placed in the Platystomatinae, particularly as the current subfamily classification may not be strictly cladistic. On the other hand the more elongate platystomatid types (e.g. representatives of the genera *Xenaspis* OSTEN SACKEN, *Antineura* OSTEN SACKEN, *Lamprophthalma* PORTSCHINSKY, some *Achias* spp., as well as the Angitulinae) clearly represent several derivations from stouter-bodied types, and characters associated with elongation must be used with due caution in determining relationships. Some of the convergence seen here is due to mimicry of Hymenoptera, and none of these taxa shows the modification of the prelabrum or the reduction of the mid-coxal prong seen in *Inium*.

In order to test (1) relationships of *Inium* to other genera of Platystomatinae, and (2) the monophyletic status of the genus, it is necessary to list those character states of *Inium* which are recognisably apomorphic in relation to the ground-plan of the Platystomatinae. In the following list I have drawn from my knowledge of the comparative morphology of the subfamily, though this is far from complete.

Characters of *Inium* representing apomorphies with respect to probable ground plan conditions of the Platystomatinae

1 Posterior surface of head above occipital foramen almost entirely strongly convex. Many platystomatines have the central and lower part of the occipital surface convex and the upper part flat or partly concave. This latter is probably a groundplan condition for the subfamily.

2 Prelabrum very deep, bilaterally compressed, ventrally much extended towards proboscis, sclerotized across full width. The precise condition is unique among platystomatids, but could be an extension of that in the genus *Loxonevra* MACQUART.

3 Palpus short and rounded.

4 Region of hypostomal (gular) bridge demarcated by deep groove on each side, and produced medially as a horizontal lobe below occipital foramen.

5 Prothorax produced into a dorsally membranous neck. This is only a slight extension of the condition present in, for example, the genera *Loxoneuroides* HENDEL and *Loxonevra*.

6 Mesoscutum almost evenly convex. In most other platystomatids, the mesoscutum in profile is strongly convex anteriorly but much less so near middle of length.

7 Scutellum very short, deep, and convex. This is a frequently derived condition of acalyptrates that mimic Hymenoptera, e.g. *Xenaspis* and an undescribed genus (both Platystomatinae), some Tephritidae and Pyrgotidae, most Conopidae.

8 Fore femur without bristles. Most platystomatids have seriate dorsal and posteroventral bristles on the fore femur.

DOI: 10.21248/contrib.entomol.45.2.251-259

9 Mid-coxal prong reduced.
10 Fore femur somewhat attenuated basally and with basal anterior velvety-pubescent zone not defined. The basal velvety pubescent zone on the fore femur occurs in many platystomatids, but is quite variably developed. There is need for a good comparative study with the electron microscope.
11 Mid tibia with apical ventral spur scarcely differentiated. Most platystomatines have one or two stout apical ventral spurs.
12 Costa with humeral break inconspicuous. The Platystomatidae generally have the costa with visible weakening or break in the sclerotisation just beyond the humeral cross vein. This is less noticeable than usual in *Inium simplum* and its presence can hardly be demonstrated in *I. mariae*.
13 Anal cell acute or forming almost a right angle posterodistally.
14 Base of wing, including alula, narrowed.
15 Abdomen narrowed anteriorly. Although the abdomen is markedly petiolate in *Inium mariae*, in *I. simplum* it is no more so than in several other platystomatine genera and notably less narrowed than in the wasp-mimicking *Xenaspis*.

The closest approach to the specialised condition of the prelabrum in *Inium* that I have seen in other platystomatid genera is in the Oriental genus *Loxonevra* and to a lesser extent in the African *Mezona* SPEISER. These also resemble *Inium* in the shortened palpus, slightly developed prothoracic neck, and the presence of scapular bristles (very short in *Loxonevra*). In both these genera the prelabrum is broader and less bilaterally compressed than in *Inium*, and they differ from *Inium* in appearance because of their vertically elongate head, broad abdomen, and variegated wings. *Loxonevra* and *Mezona* are also unlike *Inium* in having the mid coxal prong unreduced and the fore femur with spinescent posteroventral bristles. *Loxonevra*, but not *Mezona*, resembles *Inium* in the long fore coxa, the horizontal, ventrally facing surface of the hypostomal bridge (though it is not produced into a lobe), and in its reduced apical ventral spur on mid tibia; also its anal cell is rather like that of *Inium mariae*.
I infer from the distrubution of characters discussed above that *Loxonevra* and *Mezona* are closely related genera, but they may not be far removed phylogenetically from some other African platystomatine genera. The points of resemblance between *Inium* and these genera (particularly *Loxonevra*) seem, at present, to be the best evidence we have for indicating probable relationships of *Inium*. I suggest that *Mezona, Loxonevra*, and *Inium* may form a monophyletic group, perhaps not widely isolated phylogenetically from some other African genera (e.g. *Palpomya* ROBINEAU-DESVOIDY). No evidence has been found of particular relationship between *Inium* and any other Australasian genus.
Despite notable difference between the 2 species, monophyly of the genus *Inium* is apparently indicated by apomorphic characters 1, 2 (part), 4 (part), 5 (part), 7, 8, 9, 10, 12, 14, 15 in the above list. Additional evidence of higher level relationship between the species is provided by characters shared with *Loxonevra* as indicated above.

Specific characters

Because of the large number of specific characters separating the 2 species, the more significant ones are set forth in table 1 instead of the usual key. In possibly all these characters the

DOI: 10.21248/contrib.entomol.45.2.251-259

plesiomorphic state is that occurring in *I. simplum*. In *I. mariae*, the modifications in the shape of head, prothorax, and abdomen are elements in a convincing example of antmimicry. The general appearance of *I. mariae* suggests specific Batesian mimicry of the weaver or green tree ant, *Oecophylla smaragdina* (FABRICIUS), in which coloration varies geographically in the Australian tropics. *O. smaragdina* is an abundant and aggressive inhabitant of forests on Cape York Peninsula. Possible modifications for mimicry are less strongly developed in *I. simplum*, but as in some other small acalyptrate flies (discussed by MCALPINE 1988), there could be general mimicry of small black dolichoderine ants.

Table 1 - Specific characters in *Inium*

I. mariae	*I. simplum*
Head very elongate	Head subglobose
Face with saddle-like carina	Face without carina
Prelabrum and face sclerotically fused	Prelabrum and face separated by sharply defined membranous zone
Head without differentiated bristles except for short inner verticals	Head with long inner and outer vertical, ocellar, and front-orbital bristles
Thorax almost entirely pruinescent, dull	Thorax predominantly smooth, shining between macrotrichia
Thorax without anterior notopleural, scapular, and scutellar bristles	Anterior notopleural scapular, and scutellar bristles present
Other thoracic bristles short	Most thoracic bristles long
Mid-coxal prong absent	Mid-coxal prong reduced, membranous
Wing with second basal cell and large zone in submarginal cell bare	Submarginal and second basal cells entirely microtrichose
Anal crossvein with slightly concave curvature	Anal crossvein with slightly convex curvature
Axillary lobe (upper calypter) with few short hairs	Axillary lobe with a series of numerous long hairs
Abdomen anteriorly with slender petiole	Abdomen not petiolate

Inium simplum **spec. nov.** (fig. 1,2)

Female

Coloration generally brown-black, shining on many parts; major bristles black. Postfrons deep tawny brown, with orbital plate and frontal triangle shining brown-black; face shining brown-black; antenna including arista, brownish tawny. Mesopleuron with vertical stripe of dense grey-white pruinescence along posterior border, extending on to sternopleuron. Wing largely clear; first and second costal and subcostal cells brown; a large, rather diffuse brown apical spot extending from apex of vein 2 to vein 4, becoming paler towards latter. Haltere pale cream.

Head. Height very slightly greater than length; height of cheek, with hypofacial, c. 0.19 of height of eye; parafacial narrow; face slightly concave in profile, but with median line slightly raised and epistomal margin slightly prominent; occipital surface strongly convex, but not prolonged; inner and outer vertical bristles long, transversely aligned; postvertical bristle

DOI: 10.21248/contrib.entomol.45.2.251-259

scarcely differentiated; the one fronto-orbital bristle proclinate; cheek region with a series of peristomial setulae. Antenna with segment 3 oval, rounded apically; arista (segments 5 and 6) apparently quite bare.
Prelabrum well separated from face by extensive membranous zone; with small ventromedian pruinescent zone; palpus slightly shorter than labella.

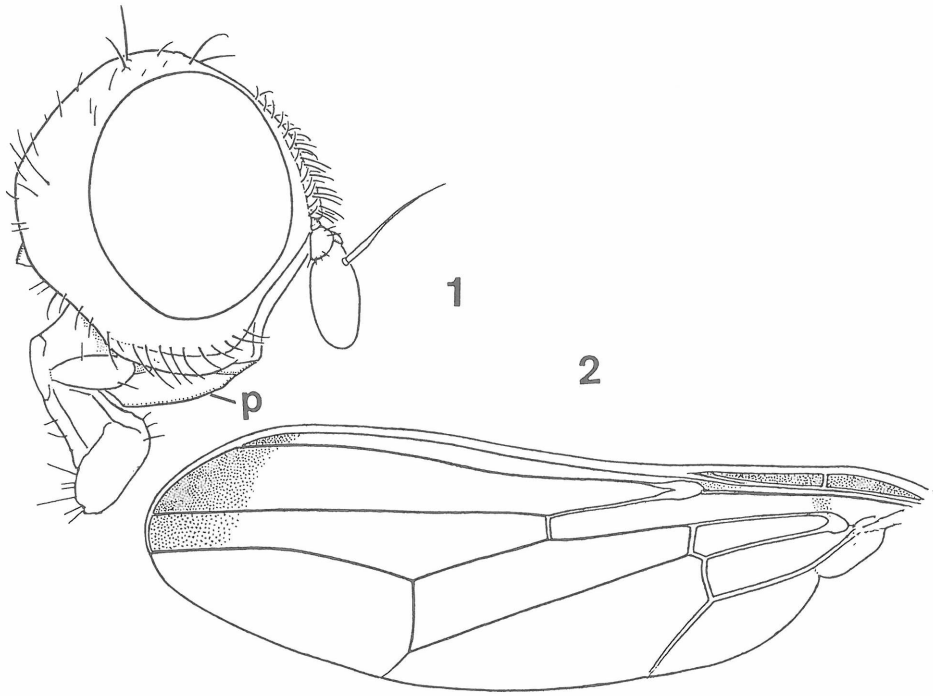


Fig. 1, 2. *Inium simplum*: **Fig. 1,** head; **Fig. 2,** wing. p, prelabrum.

Thorax. Prothoracic neck relatively short; mesoscutum extensively haired, smooth between hairs medially, densely pubescent-pruinescent laterally; following thoracic bristles relatively long: scapular, anterior and posterior notopleural, dorsocentral, posterior intra-alar, postalar, one pair of scutellars; mesopleural bristle small and thin. Fore coxa smooth, almost without pruinescence; fore tarsus slightly bilaterally compressed; other tarsi almost cylindrical. Wing (Fig. 2) with membrane almost uniformly microtrichose, except on parts of second basal and anal cells and alula; fringe on posterior margin remarkably long; anal cell with posterodistal angle not acute; anal crossvein transverse, slightly convexly curved.
Abdomen not much attenuated basally; tergite 1+2 longer than in *Rivellia* **spp.**, somewhat narrowed anteriorly; segment 7 not very large, apparently cylindrical (Mount Lewis specimen); aculeus not clearly visible.

DOI: 10.21248/contrib.entomol.45.2.251-259

Dimensions. Total length 2.8-3.6 mm; length of thorax 1.2-1.3 mm; length of wing 3.7-4 mm.
Types. Holotype female, Queensland: Lake Barrine, near Yungaburra, 3.I.1967, D.K. McAlpine and G.A. Holloway. Paratype female, Queensland: 25 km along Mt Lewis Road, SW from Mossman, 8.I.1977, M.S. and B.J. Moulds. Both in Australian Museum, Sydney.

Inium mariae spec. nov. (figs. 3-5)

Male and female

Coloration. generally pale to mid brown, largely pruinescent and not shining; some bristles and setulae black, but those on head largely pale. Legs tawny; tarsi darker brown distally. Wing with brown costal band covering first and second costal, subcostal, marginal, and, diffusely, distal part of submarginal cells; haltere buff-yellow.

Head c. 1.8. times as long as high; height of cheek c. 0.27 of height of eye; parafacial broad, particularly so where it merges with postfrons; face bilaterally compressed, forming strongly raised, almost flat-topped, saddle-like carina; occipital surface of head extremely convex (somewhat as in the angituline genus *Giraffomyia* SHARP); supracervical area explanate, bare; no cephalic bristles present, except for outer vertical (poorly differentiated in male), the few longer setulae otherwise not identifiable as homologues of those bristles listed for *I. simplum*; peristomial setulae minute and irregular. Antennal segment 3 c. 2.5 times as long as wide on medial exposure; arista largely bare, pubescent towards base of segment 6. Prelabrum smooth, shining, sclerotically continuous with face, without visible line of demarcation; palpus very small, with several long setulae.

Thorax. Prothoracic neck more prominent than in *I. simplum*; mesoscutum with numerous very short hairs or setulae, entirely pruinescent; following thoracic bristles present (all small): posterior notopleural, postalar, dorsocentral, mesopleural (last almost indistinguishable in female). All coxae largely pruinescent; mix coxal prong absent without trace; tarsi slightly depressed; hind tarsus, and particularly hind basitarsus, longer than mid tarsus and basitarsus, respectively. Wing with first basal, second basal, anal, and basal half of submarginal cells largely bare; alula much narrowed.

Abdomen conspicuously petiolate basally, with part behind tergite 2 broadly oval; tergite 1 with node-like dorsal gibbosity; tergite 2 quite narrow anteriorly, longer than adjacent tergites; tergite 5 as long as tergite 4 (male) or slightly shorter (female); sternites 1 and 2 of moderate size; sternites 3 and 4 large.

Male postabdomen. Sternite 5 broad, but shorter, with shallow median notch in posterior margin; spiracles 4 and 5 just below middle of lateral margins of tergites; spiracle 3 apparently similar. Epandrium short and rounded; surstylus not examined; stipe of aedeagus glabrous, supported by pair of thick, sclerotized longitudinal ribs; preglans not differentiated from stipe; glans narrowed basally, simple; bulb elongate, more than twice as long as glans, with subterminal bifid lobe on each side; each of 2 hollow terminal filaments small, tapering, with series of apically diminishing disc-like transverse lobes; cerci short, apparently separate.

Female postabdomen. Spiracle 5 apparently below midlateral margin of tergite; tergite 6 vestigial; sternite 6 distinct, very short; segment 7 rather broad, depressed (much as in *Rivellia*); aculeus small, depressedly avoid, narrowed basally, rounded apically, with apparently one pair of setulae.

Dimensions: Total length, ♂ 7.8 mm, ♀ 8.4 mm; length of thorax, ♂ 2.6 mm, ♀ 2.8 mm; length of wing, ♂ 7.1 mm, ♀ 7.5 mm; length of glans of aedeagus 0.50 mm.

DOI: 10.21248/contrib.entomol.45.2.251-259

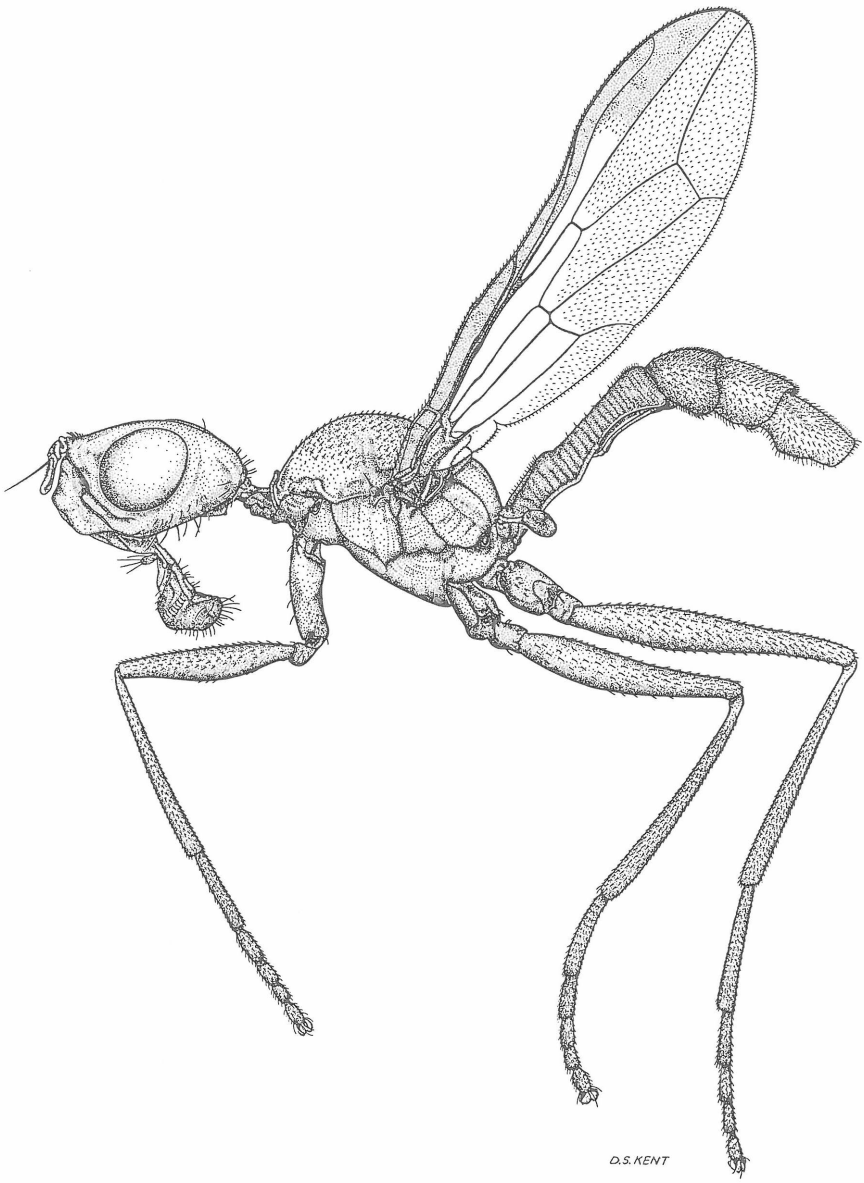
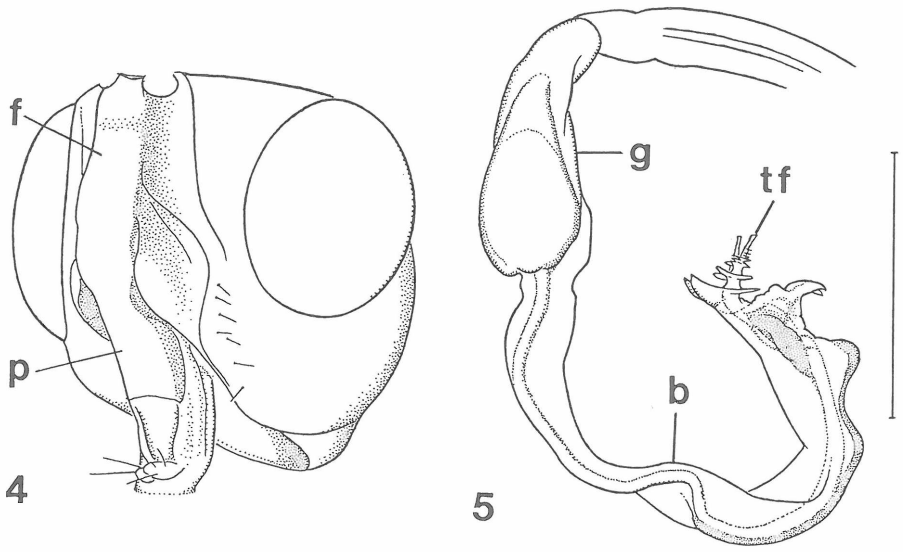


Fig. 3. *Inium mariae*, holotype male.

Types. Holotype male, Queensland: Lockerbie Scrub, northern Cape York Peninsula, 7.-14.IV.1977, M. Walford-Huggins. Australian Museum, Sydney. Paratype female, Queensland: McIlwraith Range, 8 km NE of Coen, 13.I.1994, G. Daniels. University of Queensland Entomology Collection, Brisbane.

DOI: 10.21248/contrib.entomol.45.2.251-259



Figs. 4, 5. *Inium mariae*: **Fig. 4,** head, facial oblique view - antennae, distal part of proboscis, and many setulae omitted; **Fig. 5,** distal part of aedeagus. Scale = 0.5 mm. b, bulb; f, face; g, glans; p, prelabrum, tf, terminal filament.

Acknowledgements

I thank MARIA BOGG (formerly M. Walford-Huggins), GREG DANIELS, and BARBARA and MAXWELL MOULDS for material here described. DEBORAH KENT produced the whole-insect illustration.

References

MCALPINE, D.K. 1973: The Australian Platystomatidae (Diptera, Schizophora) with a revision of five genera. - Mem. Aust. Mus. **15**: 256 pp.

MCALPINE, D.K. 1988: Studies in upside-down flies (Diptera: Neurochaetidae). Part II. Biology, adaptations, and specific mating mechanisms. - Proc. Linn. Soc. N.S.W. **110**: 59-82.

MCALPINE, D.K. 1991: Review of the Australian kelp flies (Diptera: Coelopidae). - Syst. Ent. **16**: 29-84.

DOI: 10.21248/contrib.entomol.45.2.251-259