THE MESOPSOCIDAE (INSECTA: PSOCOPTERA) OF AUSTRALIA

C.N. Smithers

Research Associate, Australian Museum, 6 College St., Sydney, NSW 2000

Summary

Species of Mesopsocidae appear to be very uncommon in Australia. Three species are now known, all in the genus *Mesopsocopsis* Badonnel and Lienhard, two of which, *M. occidentale* sp. n. and *M.setosa* sp. n., are described in this paper. A key to the males of the three species is given. Females of *Mesopsocopsis* have not yet been found. All species are from low rainfall areas in South or Western Australia.

INTRODUCTION

Members of the Mesopsocidae appear to be very uncommon in Australia. Extensive collecting from a wide variety of habitats over the past thirty years has produced only a few specimens, all of which are males. Only one specimen, the holotype of *Mesopsocus reticulatus* Smithers (Smithers 1984), has been recorded. A second male of the same species and two more specimens, each representing a new species of the same genus, have been collected. All come from low rainfall areas of South or Western Australia. South African species of several genera of the family (e.g. *Mesopsocus* Kolbe, *Hexacyrtoma* Enderlein, *Microtrichipsocus* Badonnel and Lienhard and *Rhinopsocus* Badonnel and Lienhard) are similarly known mainly from low rainfall areas. Some European species, however, are widespread in humid climates, where they sometimes occur as very dense populations.

Badonnel and Lienhard (1988) redefined the type genus, *Mesopsocus*, erected five new genera (*Newipsocus, Mesopsocidus, Psoculidus, Microtrichipsocus* and *Mesopsocopsis* (for *M. reticulatus*)) and synonymized *Labocoria* Enderlein with *Mesopsocus*.

This paper is effectively a summary of the meagre information available on this family in Australia providing descriptions of the two new Australian species, a new record for *M. reticulata* and a key to the three known species of *Mesopsocopsis.*

DESCRIPTIONS AND RECORDS OF AUSTRALIAN MESOPSOCIDAE

Mesopsocopsis Setosa sp. n.

Figures 1–4

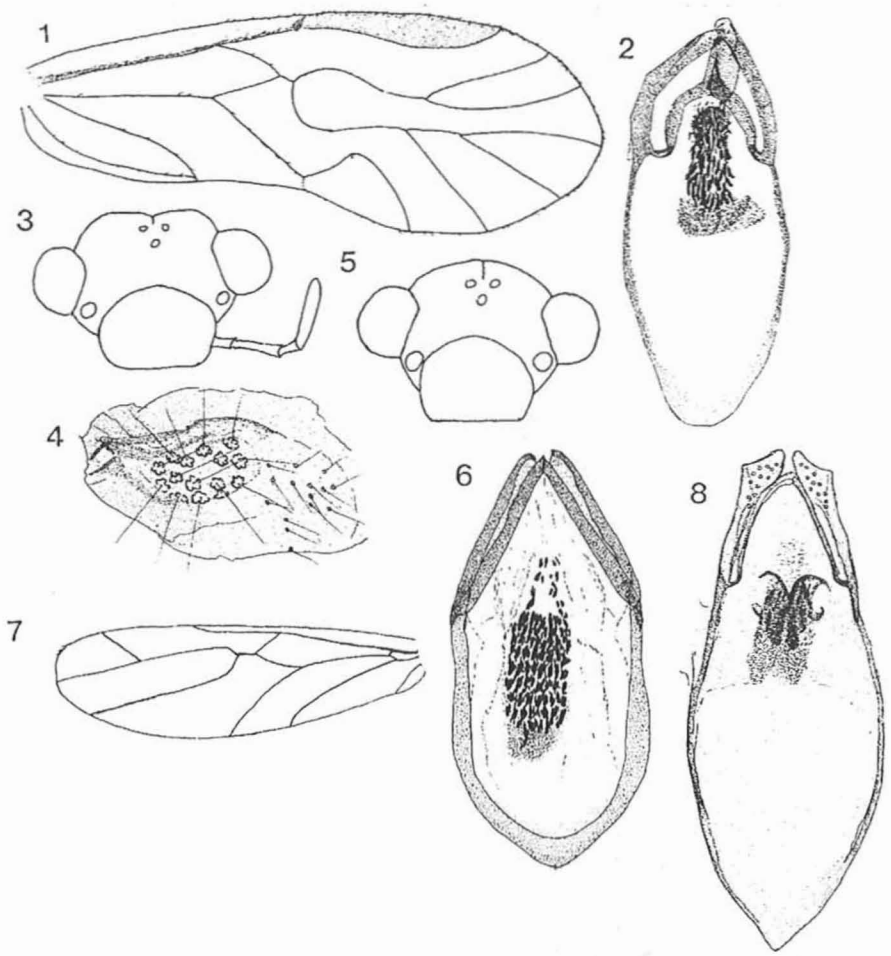
Male

Coloration (in alcohol). Head brown with slightly darker band across top of head. Postclypeus and patch anterior to ocellar tubercle similar. Antennae, thorax and legs brown. Maxillary palps very dark brown, almost black. Eyes black. Abdomen pale, terminal structures brown. Fore wings (figure 1) hyaline, pterostigma tinged with pale brown. Veins pale brown. Hind wings hyaline, veins pale brown.

Morphology. Length of body: 2.1 mm. Vertex well above upper margin of eyes, transverse in median part, not smoothly rounded or dome-shaped above (figure 3), cuticle with reticulated pattern of fine ridges. Median epicranial suture very distinct as far forward as ocellar tubercle. Antennae incomplete in holotype, probably much shorter than fore wing length. First and fourth flagellar segments each with placoid sensillum; segments 6–11 lost. Eyes fairly small, not reaching level of vertex. Ocelli well developed, anterior ocellus smaller than lateral ocelli.

Maxillary palps very long, especially fourth segment (figure 3). Great palpal length obvious even at low magnification. Length of palpal segments: mp1: 0.05 mm.; mp2: 0.087 mm.; mp3: 0.062 mm.; mp4: 0.138. Measurements of hind leg: F: 0.51 mm.; T: 1.08 mm.; t1: 0.23 mm.; t2: 0.05 mm.; t3: 0.081 mm.; rt: 4.6:1:1.6; ct: 10,0,0. Claws with fine, tapering pulvillus. Fore wing length: 3.7 mm.; width: 1.4 mm. Fore wings (figure 1) with pterostigma shallow, R1 sinuous. Rs and M fused for a short length. Areola postica arched. Fine, short setae present as follows: Margin with setae from a little basad of stigmapophysis, around wing to nodulus, becoming sparse basad of Cu1a. Veins R and stem of fork glabrous. Other veins in basal three quarters of wing sparsely setose. Hind wing length: 2.7.mm.; width: 0.95 mm. IA short, slightly sinuous. R and M+Cu arising separately at wing base. A few small setae on anterior wing margin between end of R1 and R2+3 as well as a few between R2+3 and R4+5.

Epiproct simple, trapezoidal, setose. Paraproct (figure 4) well sclerotised, without cone on posterior margin, with large trichobothrial field, sclerotised bars and a small prong adjacent to trichobothrial field. Hypandrium simple. Phallosome (figure 2) with distinctive sclerification of penial bulb. External parameres broad. Internal parameres strongly arched and extended posteriorly into a median projection beyond their distal fusion. Projection bears a strong dorsal tangential flange, visible in figure (figure 2) owing to slight pressure on the specimen which tilts the flange to one side. Flange not visible from below in normal position.



Figures 1–4. *Mesopsocopsis setosa* sp. n. Male. 1. Fore wing. 2. Phallosome. 3. Head. 4. Paraproct.
Figures 5–7. *Mesopsocopsis occidentale* sp. n. 5. Head. 6. Phallosome. 7. Hind wing.
Figure 8. *Mesopsocopsis reticulata*. Phallosome.

Female. Unknown.

Material examined. 1 male (holotype), 70 km north east of Wubin, Western Australia, 28.viii.1981, G.A. Holloway. Holotype in Australian Museum.

Discussion. Only one species of the Mesopsocidae has been recorded from Australia, namely *Mesopsocopsis reticulata*, from South Australia. *Mesopsocopsis setosa* agrees in most characters with those given in the definition of the genus based on *M. reticulata*. The vertex is finely reticulate, the antennae are probably shorter than the fore wings, vein IA in the hind wing is short and R and M+Cu arise separately. The penial bulb has strong sclerifications. The main features in which it differs from the type species are the short, fine but fairly numerous setae on the fore wing margin and veins, the shape of the end of the external parameres, details of the form of the penial bulb sclerifications and the rounded anterior end of the phallosome. The vertex is not smoothly rounded or dome shaped but is somewhat flattened adjacent to the epicranial suture. In the hind wing there are a few more setae on the anterior margin near the distal end than is the case in both *M. reticulata* and *M. occidentale* (described below). Other differences between *M. setosa* and *M. occidentale* include details of the sclerification of the penial bulb and the presence of many fine setae on the margin and veins of the fore wing in *M. setosa*. *M. setosa* may be more appropriately placed in a new genus but female material is necessary before such a step could be considered.

Mesopsocopsis occidentale sp. n.

Figures 5–7

Male

The only available specimen is in poor condition, apparently having been allowed to dry before being placed in alcohol and hence very brittle. Both fore

wings are damaged, one antenna and one maxillary palp are missing and of the second antenna only the scape, pedicel and first flagellar segment remain.

Coloration (in alcohol). Head brown, without any pattern of spots but with a broad, darker drown band across back of vertex, the band narrowed at median epicranial suture. Antenna (first flagellar segment only present) apparently a little darker than head. Eyes black. Body and legs brown. Fore wings hyaline, pterostigma tinged with pale brown. Veins pale brown. Hind wings hyaline, veins pale brown.

Morphology. Length of body not measurable owing to collapsed state of abdomen. Median epicranial suture very distinct as far forward as ocellar tubercle. Top of head dome-shaped (figure 5) with eyes placed laterally well below level of vertex. Vertex, frons and postclypeus with reticulate pattern of fine integumentary ridges. First flagellar segment: 0.24 mm. Judging by the short first flagellar segment the antennae are probably much shorter than the fore wings. Eyes moderately large. IO/D: 1.7; PO: 0.71. Ocelli large, on fairly conspicuous tubercle.

Measurements of hind leg: F: 0.32 mm.; T: 0.8 mm.; t1: 0.16 mm.; t2: 0.04 mm.; t3: 0.06 mm.; rt: 4:1:1.5; ct: 7,0,0. Pulvillus narrow, curved, terminating in slightly expanded tip. Claw with strong preapical tooth. Fore wing similar to that of *M. setosa* Smithers (described above) but glabrous. Fore wing length: 3.37 mm.; width: 1.16 mm. Pterostigma narrow, as usual in the family. R1 sinuous. Rs and M fused for a short length. Areola postica tall, arched as in *M. setosa*. M3 arises distal to radial fork. Hind wing length: 2.3 mm.; width: 0.79 mm. R and M+Cu arising separately at base of wing (figure 7). A few very small, fine marginal setae between ends of R2+3 and R4+5, visible only at high magnification on slide-mounted specimen. Vein IA short, slightly sinuous.

Epiproct and hypandrium damaged in preparation. Paraproct with large circular field of trichobothria, without posterior marginal cone. Phallosome (figure 6) rounded anteriorly. Internal parameres meeting posteriorly at an acute angle, carrying a vertical, circular plate where they meet, visible only from the side (not visible in figure 6). External parameres apically rounded, narrow when seen from above, thicker when seen from the side. Penial bulb with distinct and characteristic sclerification.

Female. Unknown.

Material examined. 1 male (holotype), Mount Singleton, 15.vii.1963, Western Australia, R.V. Williamson. Holotype in Australian Museum.

Discussion. Mesopsocopsis occidentale possesses most of those generic characters given by Badonnel and Lienhard (1988) which can be seen on the unique specimen. Presence of some characters cannot be confirmed owing to the poor condition of the specimen.

The most significant feature, which confirms its position in *Mesopsocopsis*, is the presence of distinctive sclerifications of the penial bulb, *Mesopsocopsis* being the only genus in the family to have them well developed. *M. occidentale* also agrees with the type species of *Mesopsocopsis* in having a finely reticulate vertex and short antennae. In the hind wing vein IA is short and R and M+Cu are separate at their origins. There are a few fine, short, setae on the margin between R2+3 and R4+5. The paraprocts lack a marginal cone.

Features mentioned in the generic definition but not found in *M. occidentale* include an acuminate anterior end to the phallosome (it is more rounded) and truncate external parameres with a concave 'shoulder' (they are apically rounded). Badonnel and Lienhard (1988) illustrate three states of relationship between the eyes and the vertex in the Mesopsocidae. That of *M. occidentale* does not conform to any of them as the vertex is curved and raised between the eyes (figure 5), as in *M. reticulata*.

Despite the differences between *M. reticulata* and *M. occidentale* they are clearly closely related and can be regarded as being congeneric in terms of the definition of *Mesopsocopsis* given by Badonnel and Lienhard (1988).

***Mesopsocopsis reticulata* (Smithers)**

Figure 8

Mesopsocus reticulatus Smithers, 1984. *Rec. S. Aust. Mus.* 18(2):468, figures 26–29.

Mesopsocopsis reticulata (Smithers). Badonnel and Lienhard, 1988. *Bull. Mus. Natl. Hist. nat. Paris* (4)10(A)(2):380, figures 16, 17.

An illustration of the phallosome of this species is provided (figure 8) for comparison with those of *M. setosa* and *M. occidentale*.

Material examined. 1 male, 5 km north of Yunta, 7.v.1995, South Australia, A.S. Smithers. The only other locality from which this species is known is the type locality, Germein Gorge, Flinders Range, South Australia.

Key to species of *Mesopsocopsis*
(Males only known)

1. Fore wings with small, fine, marginal setae and widely spaced similar setae on veins, including Cu2 (figure 1). Vertex well above level of eyes but flattened adjacent to the median epicranial suture (figure 3).....*setosa*

   Fore wings glabrous. Vertex rounded, curved smoothly above between compound eyes (figure 5) 2

2. External parameres distally broad and obliquely truncate. Anterior margin of phallosome bluntly pointed (figure 8), M3 arises basad of radial fork ..... *reticulata*

   External parameres narrower with rounded ends. Anterior margin of phallosome less obviously pointed (figure 6), M3 arises distal to radial fork ..... *occidentale*

Comments on Australian Mesopsocidae

Badonnel and Lienhard (1988) satisfactorily established the probable monophyly of the genera at present included in the Mesopsocidae, discussed their relationships and possible geographical origins and provided a cladogram to illustrate their conclusions. Many of their conclusions depend on information provided by females. As females of *Mesopsocopsis* are not known there is some doubt about the likely phylogenetic position of this genus, a problem which can only be reasonably considered further when females become available. At present it can only be pointed out that the genus appears to be endemic to Australia. It is possible that *M. setosa* might require generic separation but this, too, is a matter which must await the capture of females.

If *Mesopsocopsis* females follow the general pattern for the family they are likely to be of much more robust form than the males, with a rotund abdomen, without wings or with the wings reduced to small rudiments and they would have large heads. This would give them a nymphoid appearance which would bear little resemblance to the slender, fully winged males. *Mesopsocus* is the only genus of the family in which both sexes are winged and similar in general appearance.

REFERENCES

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