First record of *Stimulopalpus distinctus* Smithers, 1995 (Psocodea: Amphientomidae) from mainland Australia

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ABSTRACT

Stimulopalpus distinctus (Psocodea: Amphientomidae) is recorded from near Cairns, Queensland, Australia. This is the first record of this species (originally described from Christmas Island) from mainland Australia, and the first record of Amphientomidae from Queensland. The live appearance of this species is illustrated for the first time. Critical comments are provided on the taxonomic identity of this species, and its status as part of the Australian fauna.

The Amphientomidae are among the most distinctive families of Psocodea (barklice), with fore wings bearing a dense covering of scales that give them a superficially moth-like appearance. However, reports of Amphientomidae from Australia have been rare. Smithers described two species, *Hemiseopsis alettae* Smithers, 1989 from New South Wales and *Seopsis incisa* Smithers, 1989 from Western Australia. New described a third species from Western Australia, *Seopsis humphreysi* New, 1994. *Seopsis humphreysi* was redescribed by Taylor (2013) who also transferred it and (provisionally) *S. incisa* to the genus *Lithoseopsis* Mockford, 1993. New (1994) also referred to collection(s) of Amphientomidae from Victoria that remain undescribed to date.

In mid-2023, one of the authors (P. Yeeles) observed a small population of Amphientomidae around rocks in his backyard near Cairns, Queensland. Upon examining the specimens, it was established that they represented a new species for mainland Australia. *Lithoseopsis* is one of a group of genera with the lateral ocelli widely separated and closer to the compound eyes than to each other (Taylor 2013). In the specimens collected by Yeeles, the ocelli were close together near the centre of the face. The median ocellus was absent, a character recorded for few species of Amphientomidae. The specimens could confidently be identified as *Stimulopalpus distinctus* Smithers, 1995, originally described from Christmas Island.

METHODS

Specimens were collected by hand, stored in 100% ethanol and examined using a Leica MZ6 stereo-microscope. Specimens collected for this study will be deposited in the Queensland Museum, Brisbane (QM). Type specimens were loaned from the Australian Museum, Sydney (AM).

SYSTEMATICS

Stimulopalpus distinctus Smithers, 1995

Smithers (1995): 535–537, Figs 10–16.

Paratypes examined: CHRISTMAS ISLAND: 2 females, Lily Beach Road, 10.28°S 105.42°E, 15–28 April 1989, J. C. Cardale, pantraps (AM K.639006).

Material examined: AUSTRALIA: 3 females, Stratford, Queensland, 13 July 2023, P. Yeeles, around the base of rocks (QM).

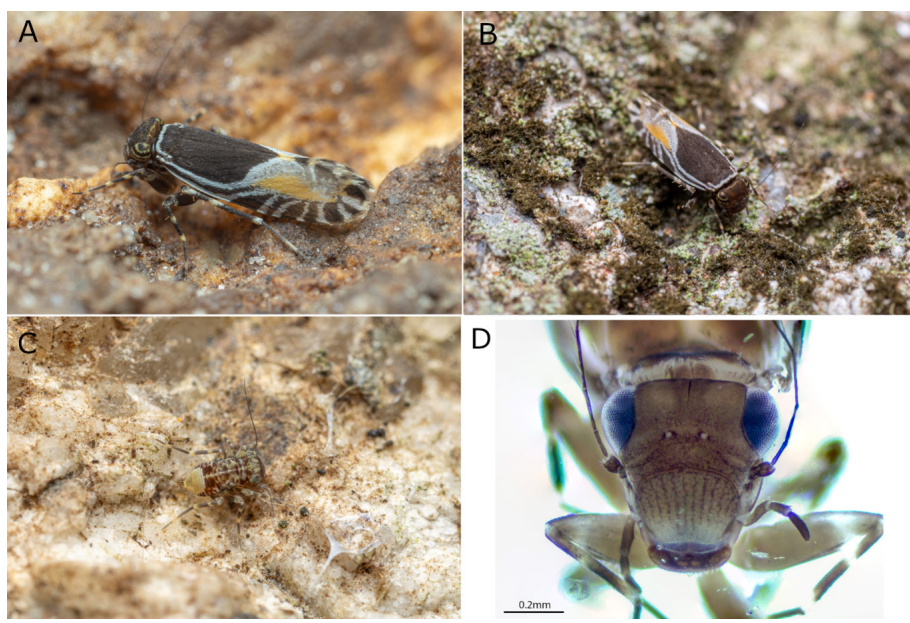

Figure 1. A, B Live adults of *Stimulopalpus distinctus*; **C** associated nymph presumed to be the same species; **D** frontal view of head.

Comments: Specimens examined closely matched Smithers' (1995) original description of *Stimulopalpus distinctus*, and their identity was confirmed through comparison with paratypes from the Australian Museum. Banding was visible on the compound eyes of the Queensland specimens despite being specified as absent by Smithers (1995). However, this banding was more visible in live photos than in the preserved specimens, suggesting that its apparent absence in the type material might represent an artefact of preservation. Coloration of live specimens is shown in Fig. 1: head mostly dark brown; mesonotum mostly dark brown with silvery-white stripe around anterior margin; wings basally dark brown with silvery-white costal stripe, distally silvery-white with seven radiating dark brown patches around anterior and distal margin and diffuse yellow patch medially. The male of *S. distinctus* remains undescribed.

A key to genera of Amphientomidae was provided by Taylor (2013). However, classification of the family requires further criticism. Taxa are primarily distinguished on utilitarian grounds with little consideration of evolutionary significance. Li recognised a new genus *Biocellientomia* Li, 2002, for species with just two ocelli placed distant from the compound eyes, hind wing vein R_1 ending blindly in the wing membrane, and a single subapical tooth on the tarsal claws. *Stimulopalpus distinctus* would be among the species covered by this definition. However, absence of the median ocellus is the only characteristic distinguishing *Biocellientomia* from *Stimulopalpus* Enderlein, 1906, and the significance of this feature is open to question. Species with only two ocelli were previously included in *Stimulopalpus* by Badonnel (1949) and Smithers (1995). *Stimulopalpus brunneus* (New, 1975) was described as having three ocelli by New but only two ocelli by Vaughan et al. (1989) and Smithers (1995), raising the question whether the presence of the median ocellus is variable in this species. Conversely, the two species included in *Biocellientomia* by Li (2002) are markedly distinct. Other than the number of ocelli, *B. bitrigata* Li, 2002 is potentially more similar to *Cornutientomus chinensis* (Li, 1993), having a similarly patterned head, flattened vertex and acutely pointed fore wings, than to *B. diplosticta* Li, 2002. Until the status of these genera is more firmly established, we maintain *S. distinctus* as a species of *Stimulopalpus*.

Stimulopalpus distinctus may be distinguished from Australian *Lithoseopsis* species by its closely placed lateral ocelli and lack of a median ocellus. It differs from other species of Amphientomidae with two ocelli in the following characters: species of *Nephax* Pearman, 1935 have the ocelli placed closer to the compound eyes than to each other. *Biocellientomia bitrigata* has the ends of the fore wings produced and narrowly acute. *Biocellientomia diplosticta*, *Stimulopalpus brunneus* and *S. biocellatus* Badonnel, 1949 have the membrane of the fore wings more extensively darkened with dark coloration in these three species at least approaching the junction of R_1 with the wing margin. *Biocellientomia diplosticta* and *S. biocellatus* each exhibit dark markings on the gena that are not found in *S. distinctus*.

The identity of *Hemiseopsis alettae* Smithers, 1989, described from Falbrook in New South Wales, is currently uncertain. The genus *Hemiseopsis* is otherwise known from Africa, and has lateral ocelli placed close to the eyes and vein R_1 reaching the wing margin in the hind wing (Taylor 2013). Smithers (1989) described the lateral ocelli of *H. alettae* as 'situated about a third of distance from eye to median epicranial suture', which may be more consistent with an assignment to *Stimulopalpus*. The presence or absence of a median ocellus was not specified. The holotype slide of *H. alettae* (AM K77992) was examined in an attempt to clarify its relationships. Unfortunately, because of how the slide was prepared, the ocelli can no longer be confidently identified, and the hind wings and terminalia are not preserved. At present, *H. alettae* may not be confidently distinguished from *S. distinctus*, but resolution of their relative status requires examination of fresher material from the former's type locality.

Because the scales become readily detached from the wings when preserved in ethanol, the live appearance has not been described for many Amphientomidae. Notable exceptions may be found in the work of Enderlein (1903, 1906). Enderlein (1903) described a species from Malaysia with similar patterning on the wings to that observed in *Stimulopalpus distinctus* as *Stigmatopathus*

horvathi Enderlein, 1903. As described by Enderlein (1903), *S. horvathi* may be distinguished from *S. distinctus* by its complete lack of ocelli, as well as the presence of the distal section of Sc in the fore wing. However, the position of the distal section of Sc illustrated by Enderlein (1903), closely appressed to R_1, is highly unusual and raises suspicions of an error. Unfortunately, the current location of the holotype of *S. horvathi* is unknown. It is not currently in the collection of the Hungarian Natural History Museum (V. Szőke, personal communication), but may have been destroyed in 1956 when much of the museum's collection was lost in a fire (Papp 2016).

DISCUSSION

This species being originally described from outside mainland Australia, with its first mainland Australia record described from a suburban garden, raises the question whether it represents a native or invasive species for Queensland. The fauna of Psocodea for Australia remains poorly studied, with many species yet to be identified (Smithers 1996). Free-living Psocodea are often highly vagile, with many species exhibiting wide distributions. Individuals are readily dispersed by the wind, with specimens captured in suction traps on ships many hundreds of kilometres from land (Thornton 1964, Thornton & Harrell 1965). Other species of Psocodea known from northern Australia exhibit a pantropical or Indo-Australian distribution, such as *Ectopsocus maindroni* Badonnel, 1935 and *Archipsocopsis fernandi* (Pearman, 1934) (Smithers 1996). Several cosmopolitan species are likely to have been introduced into Australia by human activity, notably in the families Trogiidae and Liposcelididae (Smithers 1996). However, these species are typically associated with domestic habitats whereas Amphientomidae are not. Without evidence to the contrary, it seems likely that *Stimulopalpus distinctus* has a naturally Indo-Australian distribution. Resolution of the identity of *Hemiseopsis alettae* from New South Wales may further inform this question.

Photographs of Amphientomidae with a very similar live appearance to *Stimulopalpus distinctus* have been uploaded to iNaturalist from Hawaii, Indonesia (Southeast Sulawesi Province) and Taiwan (https://www.inaturalist.org/taxa/1266006-Stigmatopathus-horvathi; accessed 14 May 2024). These individuals have been attributed to *Stigmatopathus horvathi*, based on comparison with Enderlein's (1903) figures. However, ocelli are visible in individuals from Hawaii (https://www.inaturalist.org/observations/208747856 and https://www.inaturalist.org/observations/69781612; accessed 10 February 2025). The identity of Amphientomidae from these locations deserves further investigation. It is possible that *S. distinctus* is even more widespread across the Indo-Oceanian realm than currently recognised.

Many species of free-living Psocodea are associated with vegetation and they are often collected by beating or aspiration from leaves and branches (Lienhard 1998). However, Amphientomidae are more often found at or near ground level, often among rocks surrounded by xerophytic vegetation (Lienhard & Baz 2011, pers. obs.). The small colony of individuals from which P. Yeeles collected specimens declined and eventually disappeared towards the end of the dry season (November/December 2023), before reappearing again as the wet season established (around February 2024). It is possible that the apparent rarity of Amphientomidae in the Australian fauna reflects their association with a micro-habitat that has been inadequately surveyed for Psocodea, and further studies will demonstrate them to be more widespread.

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