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A new member of the spider-parasitoid genus *Panops* Lamarck, 1804 (Diptera: Acroceridae) from Kangaroo Island

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Abstract

Panops (Diptera: Acroceridae: Panopinae) is a distinctive genus of "spider fly" previously known from eight species occurring in Australia, and one species from Indonesia. Herein, another species is described, *Panops infrequens* sp. nov., currently known from one female specimen collected near Seal Bay on Kangaroo Island (South Australia) in 2008. This is the first record of *Panops* from Kangaroo Island and the tenth species of the genus to be described. The biology of this species is unknown, however, extant members of *Panops* are thought to be endoparasitoids of Mygalomorphae.

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Introduction

Panops Lamarck, 1804 is the type genus for Acroceridae Leach, 1815, a brachyceran family of spider-parasitoid flies known as spider flies or small-headed flies. *Panops* was reviewed and revised by Winterton (2012) and a key provided to the constituent species. In that work, four new species were added to *Panops* which already contained two species. Additionally, the genera *Panocalda* Neboiss, 1971 and *Neopanops* Schlinger, 1959 were synonymised with *Panops,* adding a further three species, to recognise nine extant *Panops* spp. Eight of these species are Australian endemics with one species (*P. boharti* (Schlinger, 1959)) known from the Papua region of Indonesia (Winterton 2012).

Panops spp. are thought to be endoparasitoids of Mygalomorphae (a subfamily-level trait (Winterton 2012)) although no specific host relationships have been reported for *Panops*. Most species are known from only one or several specimens. Here, a tenth *Panops* sp. is described from Kangaroo Island, South Australia, and diagnosed against other described *Panops.*

Methods

Terminology follows Winterton (2012). The specimen was examined, measured and photographed using a Zeiss Stemi 508 stereo microscope combined with Zeiss "Axiocam 105 color camera" and Zeiss ZEN 2.3 (blue edition) imaging software. Final stacked images were

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composed of four to five composite photographs which were manually focused.

Abbreviations for collections where the specimen has been deposited are: SAMA: South Australian Museum, Adelaide, SA; RGKI: Richard Glatz Kangaroo Island Collection, MacGillivray, SA. Data available on Atlas of Living Australia.

Discussion

Members of *Panops* are not often collected; eight of the species are described from a small number of specimens despite the fact that these flies are readily seen when present and do not appear to conceal themselves or make use of camouflage. The exception is *P. baudini* Lamarck, 1804 which is widespread and more often collected (Winterton 2012). As mentioned in the etymology, sustained collecting across Kangaroo Island, including at the type location near Seal Bay, has yielded only one female specimen of *P. infrequens*. Collection methods included manual searching/sweep netting, use of malaise traps, pan traps, light attraction and litter extraction. Further, other researchers working with mygalomorph spiders from the island have not encountered *Panops*. This is reasonable evidence that this species does indeed occur on the island at low abundance and/or with a highly limited distribution. It may also occur elsewhere in Australia.

The apparent rarity of *P. infrequens* (and other *Panops* spp.) may indicate specificity to a small number of hosts and/or the hosts themselves being range-restricted. The putative hosts of *Panops* are mygalomorph spiders (Schlinger 1987; Winterton 2012), a group known for limited dispersal and short-range endemism (Harvey 2002; Mason *et al*. 2018). There are known examples of short-range endemic mygalomorph spiders on Kangaroo Island (e.g., Marsh *et al.* 2023), and others examples likely occur on the island. The degree of host-specificity of *Panops* is unknown but the low number of individuals encountered indicates they are likely highly host-specific, which is often the case for endoparasitoids. Many short-range endemics are likely endangered to varying degrees and along with their parasitoids, are of conservation significance (e.g., see Glatz *et al.* 2022).

This report brings the number of described *Panops* spp. to ten. The genus is likely to undergo further refinement through the discovery of new species and revision of the status of closely related genera.

Taxonomy

Diptera Linnaeus, 1758

Brachycera Macquart, 1834

Acroceridae Leach, 1815

Panopinae Schiner, 1868

Panops Lamarck, 1804

Panops infrequens Glatz, sp. nov.

Figs 1-5

https://zoobank.org/NomenclaturalActs/135307C4-B543-4236-AD96-CEB3B6AEB2AA

Panops infrequens can be separated from other known *Panops* spp. as follows:

Panops baudini, *P. danielsi* Winterton, 2012, *P. boharti* and *P. grossi* (Neboiss, 1971) all have eyes that are at least partly pilose, whereas the eyes of *P. infrequens* are apilose. Winterton (2012) noted that some *P. baudini* individuals have minute eye pilosity that is easily overlooked, however, it has postpronotal lobes concolourous with the remainder of the associated pleuron whereas *P. infrequens* has yellow postpronotal lobes clearly contrasting with the dark pleuron (Figs 1-4). There are also clear differences in wing venation between *P. baudini* and *P. infrequens* such as the presence of a spur vein in *P. baudini.*

Panops infrequens can be separated from known *Panops* with apilose eyes as follows:

Panops schlingeri Winterton, 2012 has a metallic green dorsum, red-brown antennal flagella in both sexes, and a short proboscis whereas in *P. infrequens* the scutum is black suffused with blue tinge, the flagella are black (in females at least), and the proboscis is longer than the head (Figs 1-4). *Panops infrequens* can be separated from *P. jade* Winterton, 2012, *P. austrae* (Neboiss, 1971), *P. baudini* Lamarck, 1804, and *P. aurum* Winterton, 2012 by their dark (concolourous) postpronotal lobes, red-brown antennal flagella, andf the presence of a spur vein (except *P. aurum*). In addition, *P. austrae* and *P. aurum* have a bright metallic green-blue dorsum whereas *P. infrequens* does not.

Panops conspicuus (Brunetti, 1926) males are the most similar looking flies to *P. infrequens* females in general appearance and colour, however, apart from being different sexes, there are other differences such as male

P. conspicuus having brown flagella (contrasting with head colour) and a spur vein, whereas *P. infrequens* females have black flagella and no spur vein (Fig 1-5). Females of *P. conspicuus* are yellow and brown with a globose abdomen (Winterton 2012) and so look quite different to *P. infrequens* females which are generally black with blue irridescence and with the abdomen weakly dorsally compressed.

Size and colour (Figs 1-5): body length 8.5mm, wing length 7.3mm, antennae 1.2mm (from base), proboscis 1.7mm. Head black with dark blue iridescence. Antennae with scape and pedicel mainly shiny red-brown; flagellum black. Ocelli orange. Proboscis yellow, pedicel brown. Postpronotal lobes yellow. Scutum, scutellum and pleuron black with dark blue iridescence; red-brown carina along the anterior margin of the scutel-

Figure 1. *Panops infrequens* sp. nov. holotype female; dorsal view.

lum. Setal pile on thorax white laterally but becoming gold-brown in the central two-thirds of the thoracic dorsum. Wings hyaline with slight brown infusion in the radial sector and costal region. Calypter white with brown margin, semi-transparent. Coxae dark brown with blue iridescence, yellow dorsally in apical half; femora dark brown with dark blue iridescence, tibiae light brown, both segments off-white near the joint. Spines of the outside surface of tibial apex light brown with a darker point. Tarsi with basal four tarsal segments light brown, fifth segment darker brown, claws black, pulvilli and empodium yellow. Haltere generally yellow with ventral surface tending brown. Abdomen mainly dark brown with dark blue iridescence; lighter brown (without iridescence) on the posterior margin of the tergites. Setal pile on dorsal surface of the abdomen mainly gold-brown and becoming white laterally.

Head (Figs 1-4): Eyes apilose; ocellar tubercule granulate and extending posterior of the ocellar triangle, three ocelli present, almost vertical. Entire occiput densely punctate, with pile. Antennal flagella almost cylindrical, weakly outcurved, tapering (mainly in the distal half) to a dull point, and approximately as long as the distance from the antennal sockets to the pronotum. Scape and pedicel subequal. Antennal sockets bound by a carina which is complete and evenly rounded anteriorly, extending posteriorly lateral to the sockets along the inner margin of the eyes almost to the ocellar triangle. Edge of oral cavity carinate. Proboscis exceeding height of the head by about one fifth its length (Fig 4).

Thorax (Figs 1-4): Scutum with a narrow medial band of reduced pilosity. Pleura generally densely punctate and pilose except for apilose, non-punctate, weakly rugose patches on the lower, posterior half of the mesopleuron, the anterior margin of the pteropleuron, and the

Figure 2. *Panops infrequens* sp. nov. holotype female; oblique dorsolateral view.

lower half of the sternopleuron. Pteropleuron rugose along upper margin. Hypopleuron with smaller punctures and reduced pilosity. Anterior spiracle elongate and almost ovate but with parallel sides. Short carinate ridge running from upper margin of anterior spiracle to posterior margin of postpronotal lobes. Laterotergite protruding, bulbous. Calypter textured (reducing transparency), pilose, with strongly ribbed margin.

Wings (Fig 5): Vein R|$_{v}$4$_{v}$| without spur vein. R|$_{v}$4$_{v}$| and R|$_{v}$5$_{v}$| forming an almost rectangular cell with R|$_{v}$4$_{v}$| weakly diverging anteriorly towards wing apex. Vein A|$_{v}$2$_{v}$| very weak and short, extending beyond alula by less than alula length. Crossvein 2r-m approximately half length of stem R|$_{v}$4+5$_{v}$|. Wings weakly rugose, most obviously along posterior margin of cell bm and along veins CuA|$_{v}$2$_{v}$| and R|$_{v}$4+5$_{v}$|.

Legs (Figs 1-4): All legs punctate and pilose, with stout apical spine on outer surface. Pulvilli and empodium both present, lobed and subequal. Claws simple and apilose.

Abdomen (Figs 1-3): Width equal to widest part of thorax. Tergites subequal in length, with setal pile erect anteriorly and laterally but lying almost flat centrally and posteriorly. Tergites and sternites punctate.

Holotype: ♀, 35.989783°S 137.321317°E, SA, S Kangaroo Island, heathlands ≈1.5km E Seal Bay visitor centre, 03-Mar-2008, D.A. Young (SAMA 29-004869); formerly RGKI-11298). Specimen with right middle leg missing last two tarsal segments and claws, and right rear leg missing last four tarsal segments and claws.

Remarks.

This new species has been placed in Panopinae based on having the postpronotal lobes well separated; the antennae with elongate, almost cylindrical flagella without terminal setae; four radial veins present in the wings; wing cells bm, d, m|$_{v}$3$_{v}$| and basal r|$_{v}$4+5$_{v}$| present; all tibiae with a robust apical spine on the exterior margin.

Further, it has been placed into *Panops* based on the eyes being apilose; the antennal flagella being thickened to the apex; wings hyaline; crossvein (2r-m) joining stem vein R|$_{v}$4+5$_{v}$|.

Using the key to *Panops* spp. in Winterton (2012), *P. infrequens* keys to *P. conspicuus.* As stated in the diag-

Figure 3. *Panops infrequens* sp. nov. holotype female; right anterolateral (top) and lateral (bottom) views.

nosis *P. infrequens* differs from *P. conspicuus* by having no spur vein and black antennal flagella. In addition the overall colour and habitus of *P. conspicuus* females differs markedly from those of *P. infrequens*.

A complicating factor regarding a designation of *Panops* is that there is some question over the boundary between *Panops* and closely related *Mesophysa* (e.g., see Gillung & Winterton 2019), which has previously been considered synonymous with *Panops* by some authors (most recently by Paramanov 1957). In particular, males of *Panops* and *Mesophysa* are very similar and a male specimen of *P. infrequens* would be required to best assess the morphological similarity with *Mesophysa*. The current diagnosis of *Mesophysa* (from Winterton 2012) includes the presence of a stem vein in the wing, whereas this is absent in *P. infrequens* (and may be present or absent in other *Panops*). Given the lack of further comparative evidence, the new species should at this time be placed in *Panops*. Further, if *Panops* and *Mesophysa* are subsequently synonymised, *Panops* is the senior synonym and so *P. infrequens* would not require a new combination.

Distribution & habitat.

This species is known from one location near Seal Bay on Kangaroo Island. The habitat for this location consists of sub-coastal mallee heath, in which the holotype was caught with an insect net whilst in flight.

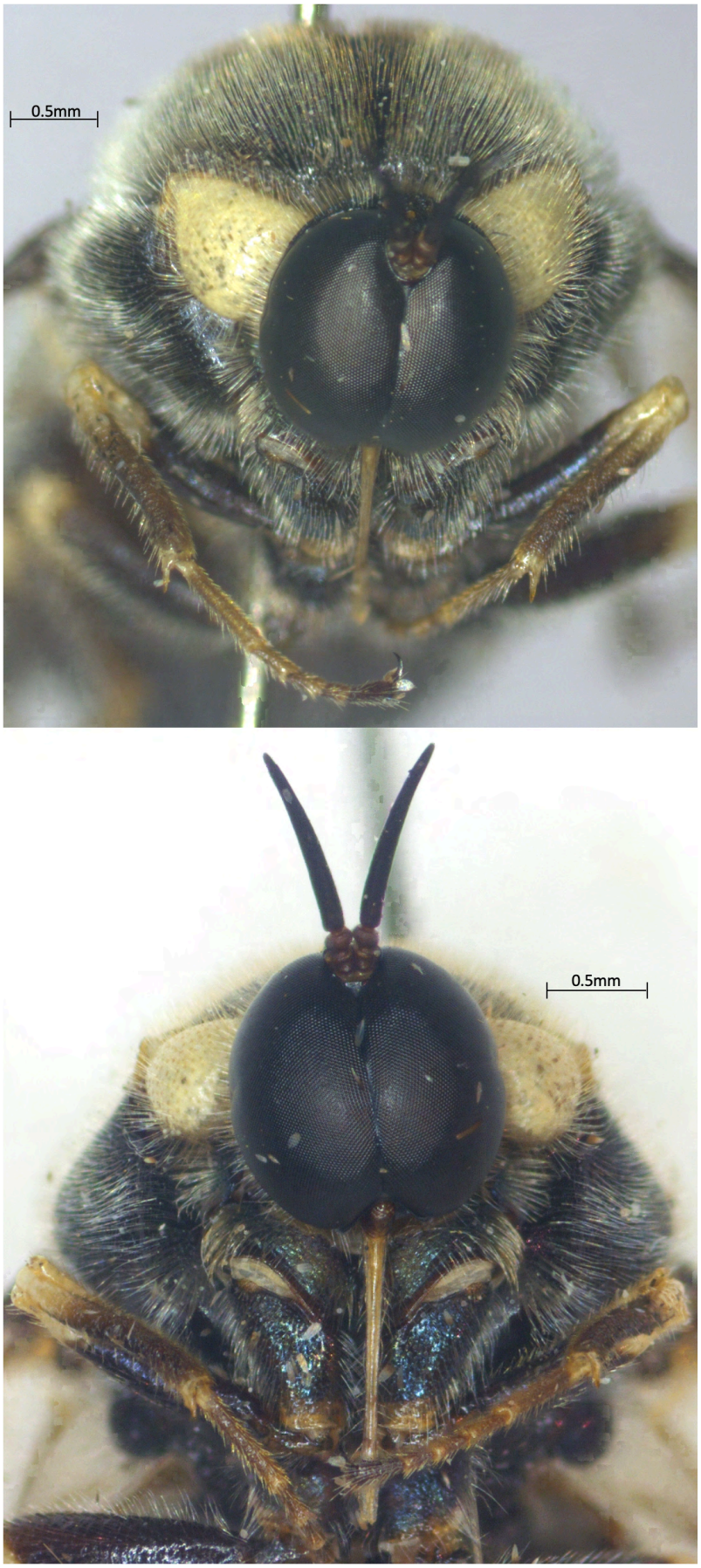

Figure 4. *Panops infrequens* sp. nov. holotype female; anterior view (top) and head (bottom).

Figure 5. *Panops infrequens* sp. nov. holotype female; left wing.

Conservation status.

It is difficult to comment on the conservation status of *P. infrequens* due to the paucity of knowledge about its hosts and broader distribution. If it is a Kangaroo Island endemic then it would likely be considered threatened due its limited distribution. If the potentially limited distribution matches that of a specific host, then both species are likely threatened and there may be a risk of co-extinction of *P. infrequens*.

Etymology.

In 25 years of sustained collecting across Kangaroo Island, including at the type location near Seal Bay, this *Panops* has been seen only once, hence the specific epithet *infrequens.*

Disclosures

This research was self-funded. There are no conflicts of interest.

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