

Australasian endemic no more: four new species of *Miropotes* Nixon (Hymenoptera, Braconidae, Microgastrinae), with the first record from the Oriental region

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Four new species of *Miropotes* Nixon (Hymenoptera, Braconidae, Microgastrinae) are described: *Miropotes orientalis* Fernández-Triana & van Achterberg, from Thailand and Vietnam, and three species from Australia, *M. austini*, *M. neglectus*, and *M. lordhowensis* (all authored by Fernández-Triana and Whitfield). A key to all known 14 species of the genus is provided, as well as brief, software-generated descriptions (Lucid 3.5.4). *Miropotes* is distributed mostly within the Australasian region, although it is here reported for the first time for the Oriental region. The relationships with other genera of Microgastrinae are briefly discussed.

Keywords: *Miropotes*, Microgastrinae, Oriental, Australasian.

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Introduction

The microgastrine braconid wasp genus *Miropotes* was described by Nixon (1965) to accommodate an “extremely aberrant” species from Australia. Since then, it has been considered as an endemic genus of Microgastrinae from the Australasian region (Austin 1990). *Miropotes* currently comprises ten species distributed throughout mainland Australia, Tasmania, New Caledonia, New Hebrides, and Papua New Guinea (Austin 1990, Austin & Dangerfield 1992). The genus can be distinguished by the strongly convergent eyes (in females), elongate and delicate body shape, wing venation, shape and sculpture of the medial part of tergites 1 and 2, shape of hypopygium, and ovipositor sheaths (Figs 1–24), among other features (Austin 1990).

As a result of studies being carried out by the authors on the world fauna of Microgastrinae a new species of *Miropotes* from the Oriental region has been discovered – which is described here, together with three additional new species from Australia, increasing the number of known species in the genus to 14.

Methods

This study is based on the examination of material housed in the Canadian National Collection of Insects (CNC), Ottawa, Canada; Naturalis Biodiversity Center (RMNH), Leiden, the Netherlands; Institute of Ecology & Biological Resources (IEBR), Vietnamese Academy of Science & Technology, Hanoi, Vietnam; and material collected during the TIGER

project (Thailand Inventory Group for Entomological Research, <http://sharkeylab.org/tiger/>), on temporary loan to the CNC but to be deposited in the Queen Sirikit Botanic Gardens, Entomology Section, Chiang Mai, Thailand.

Morphological terms and measurements of structures are mostly as used by Mason (1981), Huber & Sharkey (1993), Whitfield (1997), and Karlsson & Ronquist (2012). “Body length” refers to the anatomical line that extends medially between the anteriormost point of the head and the posteriormost point of the metasoma (excluding ovipositor and ovipositor sheaths); and “fore wing length” refers to the anatomical line that extends between the proximal margin of the first axillary sclerite and the distal-most point of the wing blade. Throughout the keys the acronyms T1 and T2 are used for morphological terms mediotergite 1, and mediotergite 2.

Geographical distribution is also provided in the key between brackets, and is intended as supplementary information that can help with identification. The new species descriptions are based on the holotype female, with other specimens studied (when available) for intraspecific variation.

Lucid 3.5.4 (<http://www.lucidcentral.com/>) software was used to generate automatic descriptions of the *Miropotes* species and to prepare Lucid identification keys. A dataset of 14 characters and 77 character-states was used to provide uniform descriptions for all species treated. Description format includes one sentence per character, with the character mentioned first and the character-state following after a colon, e.g., “Body length: 2.1–2.2 mm”. Whenever a species was scored for more than one character-state, the description included all of the pertaining character-states separated by “or”. Whenever a character-state was coded as uncertain due to poor condition of the specimen(s), the description includes the details of the character-state as best assessed, followed by a question mark “(?)”.

Photos were taken with a Keyence VHX-1000 Digital Microscope, using a lens with a range of 13–130×. Multiple images through the focal plane were taken of a structure and these were combined, using the software associated with the Keyence System to produce a single, focused image.

For *Miropotes* species previously described we only provide brief descriptions (as generated by Lucid), and comments when related to the new species being described in this paper. Five previously described species were represented in the CNC by at least one specimen (in most cases paratypes from Austin’s work); and in those cases we provide color photos to complement Austin’s (1990) drawings and SEM figures. However, for comprehensive descriptions and illustrations of those species, especially the five for

which we could not study any specimens, the reader is advised to consult Austin (1990).

Results

Until now, *Miropotes* had been only found in Australasia (Mason 1981), and it was considered the only true endemic genus of Microgastrinae from that region (Austin 1990). Our finding of a new species in the Oriental region (Thailand and Vietnam) changes that situation. For Australasia, two recently described genera – *Kiwigaster* Fernández-Triana, Whitfield & Ward (2011) and *Shireplitis* Fernández-Triana & Ward (2013), both from New Zealand – remain as the only true regional endemics at present, although that situation might change in the future. In fact, several genera of Microgastrinae (e.g. *Austrocotesia* Austin and Dangerfield, *Bulukka* de Saeger, *Nyzeria* Mason, *Parapanteles* Ashmead, *Paroplitis* Mason, *Philoplitis* Mason, and *Wilkinsonellus* Mason) were considered at some point to be endemics from a particular biogeographical region, but further collecting and study changed that situation by expanding their known distribution. The topic of regional richness of Microgastrinae genera will be explored in a future paper.

It is likely that more species of *Miropotes* will be found when more collections of the Oriental region are studied. However, based in the known distribution of the described species, the center of speciation of the genus seems to be Australia, reaching the Oriental region just marginally (Table 1). Most of the specimens have been collected in rainforests, but others have been collected in dry rainforest/woodlands, or in cool temperate rainforests (for detailed distribution of species within Australasia see Austin 1990).

Table 1. Diversity of *Miropotes* by biogeographical regions, countries and areas of Australia.

Region	Number of known species of <i>Miropotes</i>
Oriental (Vietnam and Thailand)	1
Australasia (Australia, New Caledonia, Papua New Guinea, Vanuatu)	13
Australasia, but not in Australia (only known from New Caledonia, Papua New Guinea, and/or Vanuatu)	1
Papua New Guinea	3
Australia (including Tasmania and Lord Howe Island)	12
Widespread in Australia	4
Australia southeast (including Tasmania and Lord Howe Island)	4
Australia northeast (Queensland)	3

Based on the available specimens in collections, some species would seem to have a disjunct distribution (e.g., *M. lordhowensis*, *M. neglectus* and *M. orientalis*). We believe that is likely to be a sampling artifact, and more collecting will be necessary before concluding on this topic.

It is also still not clear what role the unusual ovipositor plays in parasitism of their (likely concealed) hosts. The only known host record (from *M. chookolis* Austin) is from the pyraustine crambid *Samea multiplicalis* Guenee, introduced in 1981 from South America into Australia for control of the water weed *Salvinia molesta* Mitchell (Semple & Forno 1987). Since the moths were introduced with careful screening, and there is no indication (at least yet) of *Miropotes* in South America, presumably the true host of *M. chookolis* is another caterpillar, possibly another crambid (Austin 1990).

The relationships of *Miropotes* to other genera of Microgastrinae

Mason (1981) considered *Miropotes* to be taxonomically isolated, but likely related to the South African genus *Exulonyx*, and placed both relatively basally in the tribe Apantelini, as part of his proposed intuitive phylogeny of Microgastrinae. Austin (1990) discussed several shortcomings of Mason's system of tribes, but found support (based on a reassessment of characters of the female hypopygium and ovipositor) for a clade comprising most of the genera included by Mason in his tribes Apantelini and Microgastrini. Austin also mentioned that the position of *Miropotes* within Microgastrinae was unclear, but considered that, for the time being, it was better to leave it within Apantelini (e.g., Fig. 5 in Austin 1990). A taxonomically and morphologically less detailed but phylogenetically more rigorous study by Walker et al. (1990) found two competing hypotheses of relationships within genera of microgastrines, with one of those hypotheses having *Miropotes* (and *Exulonyx*) as the sister group of all other Microgastrinae. However, Walker et al. (1990) emphasized that Mason's tribes were (at least on the basis of his presented characters) unsupported and should not be used, an advice that has since been followed by most taxonomists.

While studying the male genitalia of Microgastrinae, Maetô (1996) also found support for most of the Apantelini + Microgastrini clade, but stated that *Miropotes* (and a few other genera) lacked the defining autapomorphy. Whitfield et al. (2002) included not only a more explicit and realistically coded version of Mason's (1981) morphological data, but also data from three genes (COI, 16S, and 28S) to study phylogenetic relationships among genera of Micro-

gastrinae. Datasets were analyzed independently and combined. The results recovered *Miropotes* as the sister group of all other genera of Microgastrinae in both the morphological analysis only (bootstrap value: 100, Bremer support 10), and in the combined analysis of the three gene markers plus morphology (bootstrap value: 99). The analysis of only the 28S dataset recovered *Miropotes* as the sister group of all Microgastrinae (bootstrap value: 100, Bremer support 1) minus the Microplitini clade – which includes the genera *Alloplitis*, *Microplitis*, *Philoplitis* and *Snellenius*. However, the molecular analysis of the 16S or COI datasets independently, and the analysis of the three genes combined did not provide any clear support for *Miropotes* as an independent lineage. Later studies incorporating more genes (Banks & Whitfield 2006, Murphy et al. 2008) were not able to include additional data from *Miropotes*.

In a paper about DNA barcoding of microgastrine wasps, Smith et al. (2012, Appendix S2, page 160) provided a Neighbor Joining Tree (K2P) of over 17 500 sequences with more than 500 base pairs from specimens worldwide. The only available sequence of *Miropotes* (then only identified as “Microgastrinae”, with voucher code CNCH2114, described below under the new species *M. orientalis*) was 15% different (i.e., almost 100 base pairs of difference) than the closest Microgastrinae sequence available. This provides additional support to the uniqueness of the genus as discussed by previous authors, although data from one relatively fast-evolving gene such as COI does not necessarily reflect deeper phylogenetic relationships among genera.

Miropotes does seem to possess a number of unique morphological characters which have not yet been evaluated when studying the relationships between genera of Microgastrinae. Examples include the shape of the ovipositor sheaths and ovipositor (which, in most species of *Miropotes* is strongly bent); the enlarged and strongly convergent eyes (with totally to almost totally obliterated malar space); the small size of the metacoxa; and the short length of the metatibial spurs (the last two features shared by the putatively distantly related Microplitini clade).

Another interesting feature, apparently overlooked by previous authors, is the presence of a light (white or yellow) spot on the gena, next to the mandible base and lower margin of eye (e.g., Fig. 1). White spots on the lower part of the gena are rather uncommon in Microgastrinae. They are present in all known species of the genus *Alphomelon*, and have been occasionally found in very few species of other genera such as *Apanteles*, *Cotesia*, *Dolichogenidea* and an undescribed genus from New Zealand (e.g., Mason 1981, Deans et al. 2003, Fernández-Triana unpublished data).

The combination of the characters mentioned above, altogether with the data discussed by Austin (1990), Walker et al. (1990), Maetô (1996) and Whitfield et al. (2002), seems to suggest that *Miropotes* diverged early from the rest of Microgastrinae. More phylogenetic research will be needed, especially incorporating more genes, morphological data, and some recently described new genera, before the relationships within Microgastrinae, and the position of *Miropotes* within it, can be better resolved.

Key to female specimens of *Miropotes*

(Modified from Austin (1990) to include the new species)

1. Margin of pronotum dorso-medially with deep notch (Fig. 18) 2
 - Margin of pronotum straight dorso-medially (Figs 5, 23, 30, 32) 3
2. Propodeum mostly sculptured, with strong transverse rugae on area above areola and within area enclosed by areola (Figs 15, 17); face relatively narrow, width below antennal sockets 0.44× head width in anterior view (Fig. 16); metacoxa and ovipositor sheath dark brown (Figs 13, 15); body length 3.5 mm [Papua New Guinea; Vanuatu] *M. neglectus* sp. n.
 - Propodeum with area above areola smooth, and area enclosed by areola mostly smooth with few transverse rugae; face relatively less narrow, width below antennal sockets 0.54× head width in anterior view; metacoxa and ovipositor sheath black; body length 2.7–3.4 mm [Australia: Queensland] *M. chookolis*
3. Tip of ovipositor strongly bent at 50°–80° (as in Figs 24, 25, 27); distal end of ovipositor sheaths almost always broadened to accommodate shape of ovipositor (as in Figs 6, 25, 27) 4
 - Tip of ovipositor straight (as in Figs 35, 37) or gently curved (as in Figs 12, 38, 41); distal end of ovipositor sheaths straight or slightly curved, not broadened distally (as in Figs 12, 13, 35, 38, 41) 10
4. Areolet in fore wing reduced to a small spot with virtually no transparent area enclosed within (similar to but not exactly as in Fig. 33); body length 2.4 mm [Australia: Tasmania] *Miropotes creon*
 - Areolet in fore wing larger, subtriangular or suboval in shape (as in Figs 2, 14, 20, 25, 26, 29, 39) 5
5. Antenna short and stout, not reaching past T2, flagellomeres relatively shorter (as in Figs 1, 5, 19, 20, 23) (areola reduced to

- multiple carinae diverging from posterior margin of propodeum; T1, T2 and anterior part of T3 longitudinally striate; body length 2.9 mm) [Australia: South Australia] *M. katois*
- Antenna reaching to at least T3 (as in Figs 13, 25, 38), flagellomeres relatively longer 6
- 6. Only posterior part of areola present and only indicated by indistinct carinae bounded by striations, rest of propodeum with variable amount of fine striations and intervening smooth areas (as in Figs 3, 5, 20, 23, 32, 36, 37) 7
 - Areola complete and strongly carinate; coarse carinae radiating from areola with rugosity in between; area enclosed by areola with several distinct transverse rugae (as in Figs 9, 11, 15, 17, 30, 31) 9
- 7. T1–T3 smooth; body length 3.0 mm [Australia: New South Wales, Queensland]
 - T1–T2, and usually part or all of T3, mostly sculptured (as in Figs 3, 5, 9, 15, 20, 23, 31); body length at most 2.6 mm, usually less 8
- 8. Antenna, propleuron, metacoxa, hypopygium and sternites dark brown (Figs 1–6); hypopygium pointed apically (Figs 1, 6); body length 2.6 mm; fore wing length 2.0 mm [Australia: New South Wales]
 - Antenna with most flagellomere white (at most with flagellomere 2–6 brown), propleuron, metacoxa and most of sternites yellow, hypopygium partially yellow (Figs 19–24); hypopygium apically truncated (Fig. 21); body length 2.1–2.3 mm; fore wing length 1.5–1.6 mm [Thailand; Vietnam] *M. orientalis* sp. n.
- 9. Antenna uniformly dark brown (as in Fig. 30) [Australia: Capital Territory, Queensland, New South Wales, Tasmania, Victoria; Papua New Guinea]
 - Antenna with apical or subapical flagellomeres white (as in Fig. 25), rest of antenna dark brown [Australia: Queensland] *M. burringbaris*
- 10. Areolet in fore wing reduced to a small spot with virtually no transparent area enclosed within (Figs 8, 33) 11
 - Areolet in fore wing larger, subtriangular in shape (as in Figs 14, 20, 25, 26, 29, 39) 12
- 11. Eyes not strongly convergent below (as in Fig. 11 of Austin, 1990); propleuron,

- pro- and mesocoxae dark brown to black, protibia brown on anterior 0.4; metafemur relatively stout, its length less than $3.0\times$ its maximum width; body length 2.0 mm [Australia: Northern Territory, Queensland, Western Australia] *M. goobitis*
- Eyes strongly convergent (Fig. 10); propleuron yellow-orange to light brown, pro- and mesocoxae yellow, protibia yellow; metafemur relatively less stout, its length more than $3.0\times$ its maximum width; body length 3.2 mm [Australia: New South Wales (Lord Howe Island)] *M. lordhowensis* sp. n.
12. Areola complete and strongly carinate (as in Figs 30, 31); coarse carinae radiating from areola with rugosity in between; area enclosed by areola with one to several distinct transverse carinae; T1 longitudinally rugose-striate; T2 longitudinally striate (as in Fig. 31) [widespread in Australia; New Caledonia; Papua New Guinea; Vanuatu] *M. thuraris*
- Anterior part of areola not completed by strongly developed carinae, this area finely striate or nearly smooth (Figs 36, 37); T2 usually smooth, at most with few short anterior striations (Figs 36, 37) 13
13. Posterior part of areola formed by obvious carinae, anterior part of areola delimited by fine oblique and transverse striations (as in Fig. 29 of Austin, 1990) [Australia: Northern Territory] *M. kilkulunis*
- Posterior part of areola formed by faint carinae which sometimes merge with surrounding striations, anterior part of propodeum generally smooth (Figs 36, 37), sometimes with indistinct oblique or -transverse striations [Australia: Capital Territory, New South Wales, Northern Territory, South Australia, Queensland, Western Australia] *M. petiolaris*

Taxonomic treatment of species, in alphabetical order

Miropotes austini Fernández-Triana & Whitfield sp. n.

Figs 1–6

Type locality. Australia. New South Wales, Kyogle.

Holotype. Female, CNC. Holotype labels: 1. Australia: NSW: Kyogle, 345 m, 2.iii.1980, Newton, Thayer. 2. DNA Voucher, CNCHYM 01890.

Description. Female. Body length: 2.5–2.6 mm. Antenna length: short and stout, not reaching past mediotergite 2. Flagellomere color: uniformly dark

brown to black. Face width below antennal sockets/head width in anterior view: $0.41\text{--}0.45\times$. Eyes: strongly convergent below. Gena: with light (white or yellow) spot next to base of mandible and lower margin of eye. Margin of dorsomedial pronotum: straight. Fore wing areolet: relatively large, subtriangular in shape. Propodeal areola: with only posterior part present and then only indicated by indistinct carinae bounded by striations, rest of propodeum with variable amount of fine striations and intervening smooth area. Metafemur: more than $3.0\times$ as long as its maximum width. Sculpture of mediotergites 1–2: mostly sculptured. Mediotergite 1 length/maximum width: $2.0\times$ or less. Mediotergite 2 width at posterior margin/length: $1.2\times$. Mediotergite 2 width at posterior margin/width at anterior margin: more than $2.2\times$. Shape of ovipositor tip: strongly bent at $50^\circ\text{--}80^\circ$.

Distribution. Australia, New South Wales.

Etymology. We dedicate this species to Andy Austin, in recognition of his valuable contribution to the knowledge of the Microgastrinae.

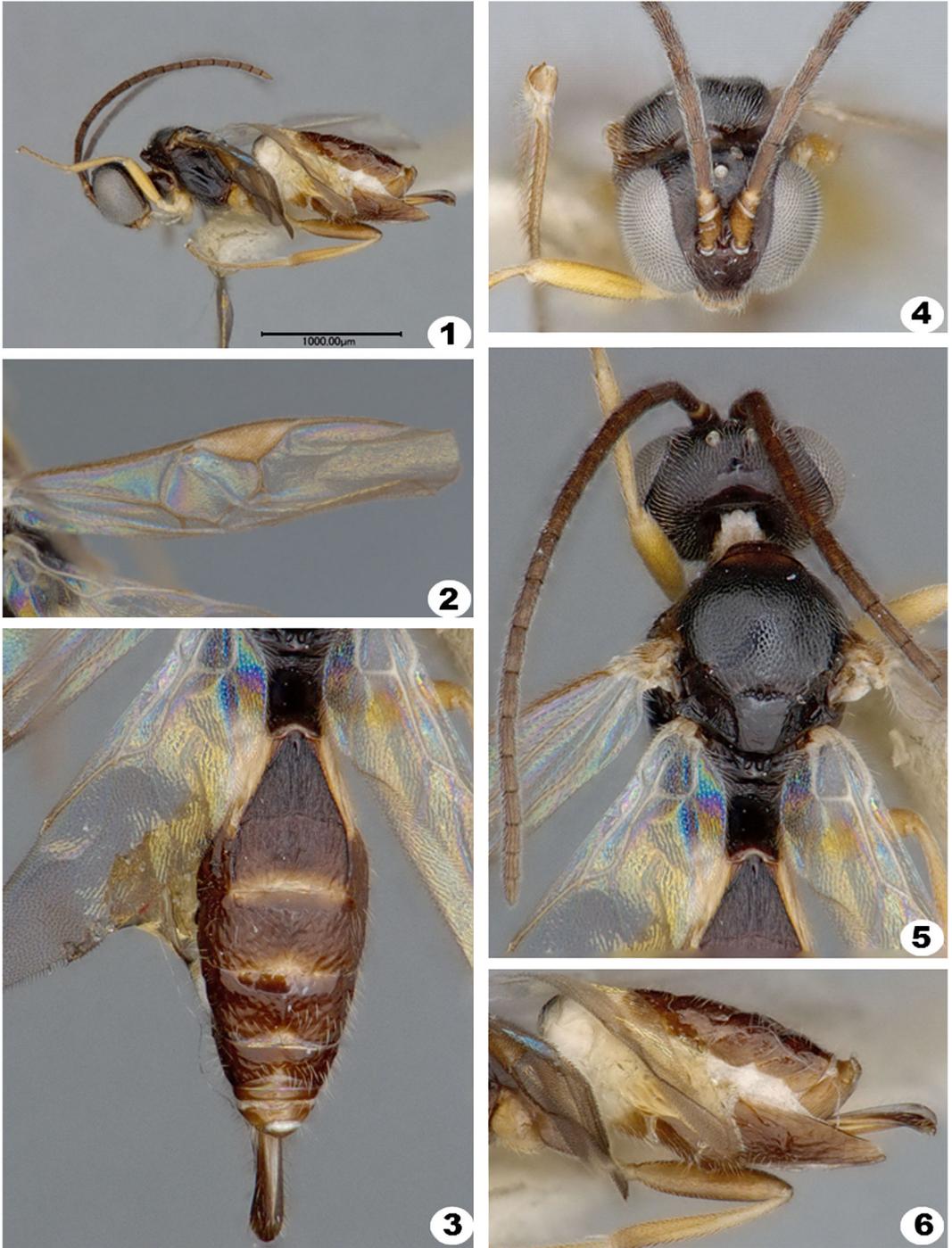
Comments. The holotype had an extra label, handwritten by Austin, mentioning the striation of T2 and T3, and the (morphological) proximity of this species to *M. cadgeis*. His observation is supported in our key, where the new species comes right after *cadgeis*.

Miropotes boothis Austin

Figs 25–28

Miropotes boothis Austin, 1990: 54. Holotype, Australia: “Queensland, Nambour, 26.iv.–1.v.1985”, ANIC (not examined).

Description. Female. Body length: 2.1–3.0 mm, rarely up to 3.2 mm. Antenna length: reaching to at least T3, basal flagellomeres long and thin. Flagellomere color: with apical or subapical 3–7 flagellomeres white, rest of antenna dark brown. Face width below antennal sockets/head width in anterior view: $0.41\text{--}0.45\times$ or $0.46\text{--}0.50\times$. Eyes: strongly convergent below. Gena: with light (white or yellow) spot next to base of mandible and lower margin of eye. Margin of dorsomedial pronotum: straight. Fore wing areolet: relatively large, subtriangular in shape. Propodeal areola: complete and strongly carinate, coarse carinae radiating from areola with rugosity in between, area enclosed by areola with several distinct transverse rugae. Metafemur: more than $3.0\times$ as long as its maximum width. Sculpture of mediotergites 1–2: mostly sculptured. Mediotergite 1 length/maximum width: $2.0\times$ or less. Mediotergite 2 width at posterior margin/length: $1.2\times$. Mediotergite 2 width at posterior



Figs 1–6. *Miropotes austini*. – 1, habitus; 2, fore wing; 3, dorsal view of metasoma; 4, head, frontal view; 5, dorsal view of head, mesosoma and mediotergite 1; 6, metasoma, lateral view.

margin/width at anterior margin: $1.8\times$. Shape of ovipositor tip: strongly bent at 50° – 80° .

Distribution. Australia, Queensland (Austin 1990).

Miropotes burringbaris Austin

Figs 29–31

Miropotes burringbaris Austin, 1990: 51. Holotype, Australia: “North Queensland, Rex Range Lookout, via Julatten, 9.xi-2.xii.1981” ANIC (not examined).

Description. Female. Body length: 2.1–3.0 mm, rarely up to 3.2 mm. Antenna length: reaching to at least T3, basal flagellomeres long and thin. Flagellomere color: uniformly dark brown to black. Face width below antennal sockets/head width in anterior view: 0.41 – $0.45\times$ or 0.46 – $0.50\times$. Eyes: strongly convergent below. Genae: with light (white or yellow) spot next to base of mandible and lower margin of eye. Margin of dorsomedial pronotum: straight. Fore wing areolet: relatively large, subtriangular in shape. Propodeal areola: complete and strongly carinate, coarse carinae radiating from areola with rugosity in between, area enclosed by areola with several distinct transverse rugae. Metafemur: more than $3.0\times$ as long as its maximum width. Sculpture of mediotergites 1–2: mostly sculptured. Mediotergite 1 length/maximum width: $2.0\times$ or less. Mediotergite 2 width at posterior margin/length: $1.2\times$. Mediotergite 2 width at posterior margin/width at anterior margin: $1.8\times$. Shape of ovipositor tip: strongly bent at 50° – 80° .

Distribution. Previously recorded from Australia, Capital Territory, New South Wales, Queensland, Tasmania, Victoria; and Papua New Guinea (Austin 1990). Here recorded for the first time from Indonesia (1 female from Sula Islands, Mangole, near Buya, 460 m, 12.x–2.xi.1993, Malaise trap, C. van Achterberg coll.; specimen deposited at the RMNH).

Comments. The new record from Indonesia is by far the westernmost known specimen (approximately 2000 km away from the closest record in Papua New Guinea). The Sula Islands are part of Wallacea, a group of Indonesian islands separated by deep water straits and constituting a transitional zone between Asia and Australia (e.g., http://www.conservation.org/where/priority_areas/hotspots/asia-pacific/Wallacea/Pages/default.aspx).

Miropotes cadgeis Austin

Miropotes cadgeis Austin, 1990: 59. Holotype, Australia: “N.S.W., Bethunga, 21.vii.1974, ex 28.x.1974” ANIC (not examined).

Description. Female. Body length: 2.9–3.0 mm. Antenna length: reaching to at least T3, basal flagel-

lomers long and thin. Flagellomere color: uniformly dark brown to black. Face width below antennal sockets/head width in anterior view: 0.41 – $0.45\times$. Eyes: strongly convergent below. Margin of dorsomedial pronotum: straight. Fore wing areolet: relatively small, suboval in shape. Propodeal areola: with only posterior part present and then only indicated by indistinct carinae bounded by striations, rest of propodeum with variable amount of fine striations and intervening smooth area. Metafemur: more than $3.0\times$ as long as its maximum width. Sculpture of mediotergites 1–2: mostly smooth. Mediotergite 1 length/maximum width: $2.0\times$ or less. Mediotergite 2 width at posterior margin/length: $1.0\times$. Mediotergite 2 width at posterior margin/width at anterior margin: $2.1\times$. Shape of ovipositor tip: straight or gently curved.

Distribution. Australia, New South Wales, and Queensland (Austin 1990).

Comments. Illustrations of this species are provided in Austin (1990).

Miropotes chookolis Austin

Miropotes chookolis Austin, 1990: 54. Holotype, Australia: “Queensland, Brisbane, Underwood, 13.v.1986, ex *Samea multiplicalis*” ANIC (not examined).

Description. Female. Body length: 2.7–3.4 mm. Antenna length: reaching to at least T3, basal flagellomeres long and thin. Flagellomere color: uniformly dark brown to black. Face width below antennal sockets/head width in anterior view: 0.51 – $0.55\times$. Eyes: strongly convergent below. Margin of dorsomedial pronotum: with deep notch. Fore wing areolet: relatively large, subtriangular in shape. Propodeal areola: complete and strongly carinate, coarse carinae radiating from areola with rugosity in between, area enclosed by areola with several distinct transverse rugae. Metafemur: more than $3.0\times$ as long as its maximum width. Sculpture of mediotergites 1–2: mostly sculptured. Mediotergite 1 length/maximum width: $2.0\times$ or less. Mediotergite 2 width at posterior margin/length: $1.7\times$. Mediotergite 2 width at posterior margin/width at anterior margin: $2.0\times$. Shape of ovipositor tip: straight or gently curved.

Distribution. Australia, Queensland (Austin 1990).

Comments. Illustrations of this species are provided in Austin (1990).

Miropotes creon Nixon

Miropotes creon Nixon, 1965: 200. Holotype, Australia: “Tasmania, Hobart, 3.iii.1935” BMNH (not examined).

Description. Female. Body length: 2.3–2.4 mm. Antenna length: reaching to at least T3, basal flagellomeres long and thin. Flagellomere color: uni-

formly dark brown to black. Face width below antennal sockets/head width in anterior view: 0.36–0.40 \times . Eyes: strongly convergent below. Margin of dorsomedial pronotum: straight. Fore wing areolet: reduced to a small spot with virtually no transparent area enclosed within. Propodeal areola: complete and strongly carinate, coarse carinae radiating from areola with rugosity in between, area enclosed by areola with several distinct transverse rugae. Metafemur: more than 3.0 \times as long as its maximum width. Sculpture of mediotergites 1–2: mostly sculptured. Mediotergite 1 length/maximum width: more than 2.2 \times . Mediotergite 2 width at posterior margin/length: 1.3 \times . Mediotergite 2 width at posterior margin/width at anterior margin: 1.8 \times . Shape of ovipositor tip: strongly bent at 50°–80°.

Distribution. Australia, Tasmania (Austin 1990).

Comments. Illustrations of this species are provided in Austin (1990). The fore wing areolet is unlike any other species illustrated here and thus the reader is encouraged to check the only image available (Fig. 6 in Austin, 1990).

Miropotes goobitis Austin

Figs 32–34

Miropotes goobitis Austin, 1990: 58. Holotype, Australia: "Northern Territory, 33 km, WNW, Alice Springs, 23°36'S, 133°34'E, 30.ix.1978, J.C. Cardale" ANIC (not examined).

Description. Female. Body length: 2.0 mm or less. Antenna length: reaching to at least T3, basal flagellomeres long and thin. Flagellomere color: uniformly dark brown to black. Face width below antennal sockets/head width in anterior view: 0.56–0.60 \times . Eyes: not strongly convergent below. Gena: dark brown to black, without light spot next to base of mandible and lower margin of eye. Margin of dorsomedial pronotum: straight. Fore wing areolet: reduced to a small spot with virtually no transparent area enclosed within. Propodeal areola: with only posterior part present and then only indicated by indistinct carinae bounded by striations, rest of propodeum with variable amount of fine striations and intervening smooth area (?). Metafemur: less than 3.0 \times as long as its maximum width. Sculpture of mediotergites 1–2: mostly smooth. Mediotergite 1 length/maximum width: 2.0 \times or less. Mediotergite 2 width at posterior margin/length: 1.3 \times . Mediotergite 2 width at posterior margin/width at anterior margin: 2.0 \times . Shape of ovipositor tip: straight or gently curved.

Distribution. Australia, Northern Territory, Queensland, and Western Australia (Austin 1990).

Comments. Morphologically, this species is the most unusual of all known *Miropotes*, and does not appear

to be closely related to any other (Austin 1990). Especially significant are the non-convergent eyes and the tiny, almost non-existent areolet in the fore wing (both characters recognized by Austin 1990). Also unique in this species is the lack of a white spot on the gena.

Miropotes katois Austin

Miropotes katois Austin, 1990: 58. Holotype, Australia: "South Australia, 45 km NE of Welbourn Hill, 27°03'S, 134°22'E, 20.ix.1978, J.C. Cardale" ANIC (not examined).

Description. Female. Body length: 2.9–3.0 mm. Antenna length: short and stout, not reaching past mediotergite 2. Flagellomere color: uniformly dark brown to black. Face width below antennal sockets/head width in anterior view: 0.41–0.45 \times . Eyes: strongly convergent below. Margin of dorsomedial pronotum: straight. Fore wing areolet: relatively small, suboval in shape. Propodeal areola: with only posterior part present and then only indicated by indistinct carinae bounded by striations, rest of propodeum with variable amount of fine striations and intervening smooth area. Metafemur: more than 3.0 \times as long as its maximum width. Sculpture of mediotergites 1–2: mostly sculptured. Mediotergite 1 length/maximum width: 2.0 \times or less. Mediotergite 2 width at posterior margin/length: 1.4 \times . Mediotergite 2 width at posterior margin/width at anterior margin: 2.0 \times . Shape of ovipositor tip: strongly bent at 50°–80°.

Distribution. Australia, South Australia (Austin 1990).

Comments. Illustrations of this species are provided in Austin (1990).

Miropotes kilkulunis Austin

Miropotes kilkulunis Austin, 1990: 61. Holotype, Australia: "Northern Territory, 30 km NW by W of Alice Springs, 23°32'S, 133°88'E, 7.x.1978, J.C. Cardale" ANIC (not examined).

Description. Female. Body length: 2.7–3.4 mm. Antenna length: reaching to at least T3, basal flagellomeres long and thin. Flagellomere color: uniformly dark brown to black. Face width below antennal sockets/head width in anterior view: 0.46–0.50 \times . Eyes: strongly convergent below. Margin of dorsomedial pronotum: straight. Fore wing areolet: relatively large, subtriangular in shape. Propodeal areola: with only posterior part present and then only indicated by indistinct carinae bounded by striations, rest of propodeum with variable amount of fine striations and intervening smooth area. Metafemur: more than 3.0 \times as long as its maximum width. Sculpture

of mediotergites 1–2: mostly smooth. Mediotergite 1 length/maximum width: $2.0\times$ or less. Mediotergite 2 width at posterior margin/length: $1.0\times$. Mediotergite 2 width at posterior margin/width at anterior margin: $1.9\times$. Shape of ovipositor tip: straight or gently curved.

Distribution. Australia, Northern Territory (Austin 1990).

Comments. Illustrations of this species are provided in Austin (1990).

Miropotes lordhowensis Fernández-Triana and Whitfield sp. n.

Figs 7–12

Type locality. Australia. New South Wales, Lord Howe Island.

Holotype. Female, CNC. Holotype labels: 1. Australia: NSW, Lord Howe Is., 18–30.ii.1980, S. & J. Peck. 2. DNA Voucher, CNCHYM 01891.

Paratypes. 1 ♀ (CNC), Australia, Tasmania, Hellyer River gorge, 11.i.1984, L. Masner.

Description. Female. Body length: 3.1–3.2 mm. Antenna length: reaching to at least T3, basal flagellomeres long and thin. Flagellomere color: uniformly dark brown to black. Face width below antennal sockets/head width in anterior view: $0.46\text{--}0.50\times$. Eyes: strongly convergent below. Gena: with light (white or yellow) spot next to base of mandible and lower margin of eye. Margin of dorsomedial pronotum: straight. Fore wing areolet: reduced to a small spot with virtually no transparent area enclosed within. Propodeal areola: complete and strongly carinate, coarse carinae radiating from areola with rugosity in between, area enclosed by areola with several distinct transverse rugae. Metafemur: more than $3.0\times$ as long as its maximum width. Sculpture of mediotergites 1–2: mostly sculptured. Mediotergite 1 length/maximum width: more than $2.2\times$. Mediotergite 2 width at posterior margin/length: $1.2\times$. Mediotergite 2 width at posterior margin/width at anterior margin: $2.0\times$. Shape of ovipositor tip: straight or gently curved.

Distribution. Australia, New South Wales (Lord Howe Island) and Tasmania.

Etymology. Named after the locality where the holotype was collected, Lord Howe Island, to honor a place that has become an icon of insect conservation.

Comments. The female paratype from Tasmania is slightly darker in colouration, but otherwise similar to the holotype.

Miropotes neglectus Fernández-Triana and Whitfield sp. n.

Figs 13–18

Type locality. Papua New Guinea. Western Highlands Province, Mount Hagen, Kuk, 1700 m.

Holotype. Female, CNC. Holotype labels: 1. Papua New Guinea. Kuk, W. Highl. Dist., '76, Mt. Hagen, 1700 m. 2. DNA Voucher, CNCHYM 01883.

Paratypes. 1 ♀ (CNC), same locality than holotype; 1 ♂ (CNC) from Vanuatu, Efate, Vila, 0–100 m, xii.1978, N.L.H. Krauss.

Description. Female. Body length: 3.5–3.6 mm. Antenna length: reaching to at least T3, basal flagellomeres long and thin. Flagellomere color: uniformly dark brown to black. Face width below antennal sockets/head width in anterior view: $0.46\text{--}0.50\times$. Eyes: strongly convergent below. Gena: with light (white or yellow) spot next to base of mandible and lower margin of eye. Margin of dorsomedial pronotum: with deep notch. Fore wing areolet: relatively large, subtriangular in shape. Propodeal areola: complete and strongly carinate, coarse carinae radiating from areola with rugosity in between, area enclosed by areola with several distinct transverse rugae. Metafemur: more than $3.0\times$ as long as its maximum width. Sculpture of mediotergites 1–2: mostly sculptured. Mediotergite 1 length/maximum width: more than $2.2\times$. Mediotergite 2 width at posterior margin/length: $1.5\times$. Mediotergite 2 width at posterior margin/width at anterior margin: more than $2.2\times$. Shape of ovipositor tip: straight or gently curved.

Distribution. Papua New Guinea, Vanuatu.

Etymology. From Latin “neglectus” = overlooked. It refers to a distinctive morphological character (margin of pronotum dorso-medially with deep notch) which was previously overlooked and prevented the recognition of this species as new until now.

Comments. The holotype specimen was considered by Austin (1990) as a paratype of *M. thuriaris*, and had a label indicating so. That label has been removed now, to avoid future confusions when examining the specimen.

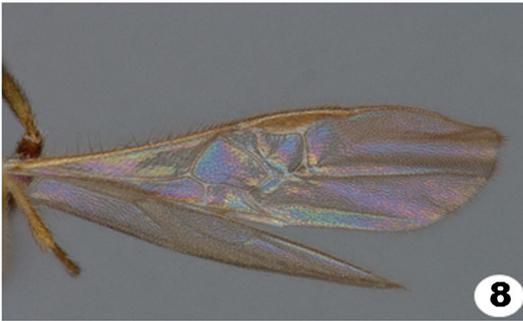
Miropotes orientalis Fernández-Triana and van Achterberg sp. n.

Figs 19–24

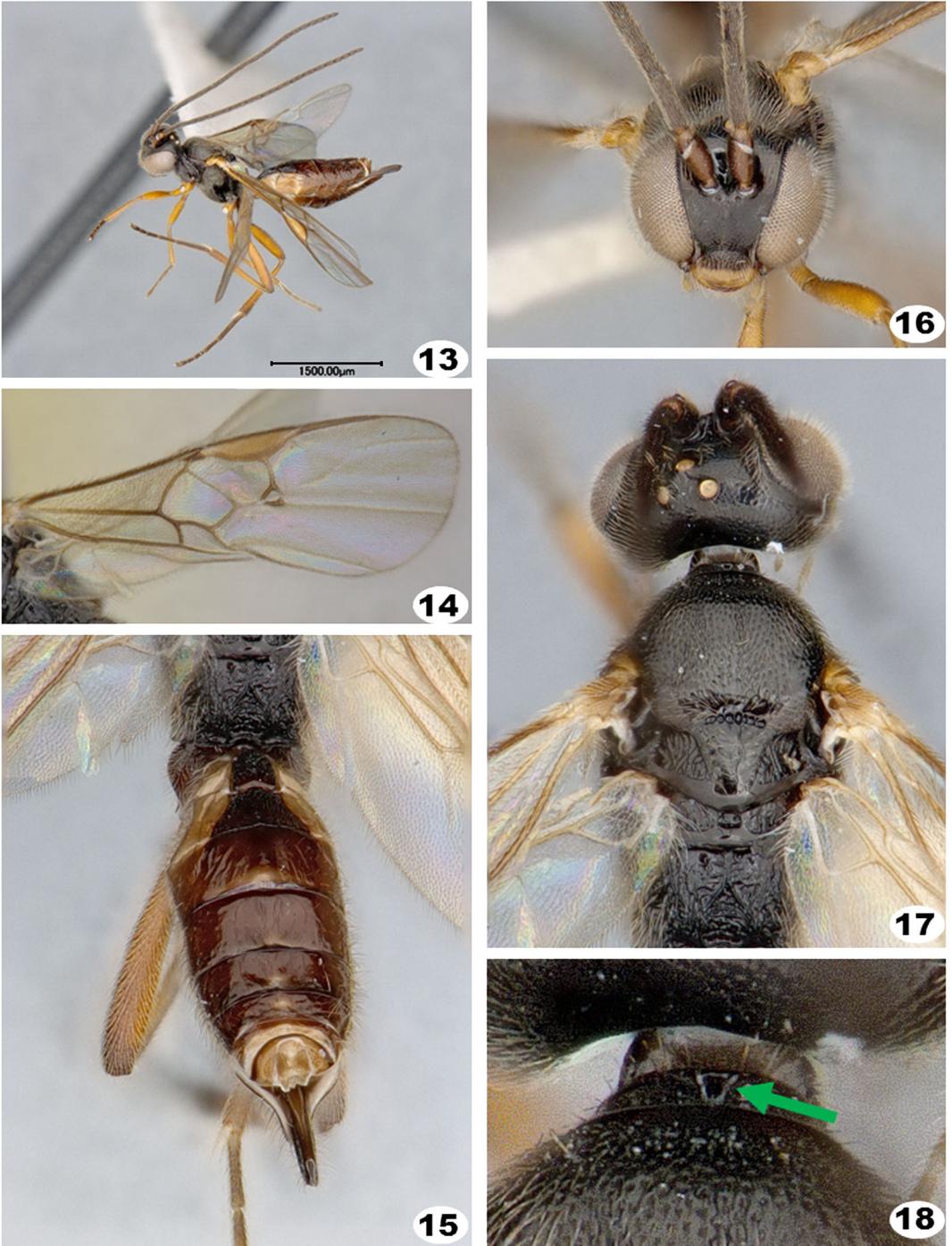
Type locality. Vietnam. Ninh Thuan, Núi Chúa National Park, 100–180 m.

Holotype. Female, RMNH. Holotype labels: 1. Vietnam: Ninh Thuan, Núi Chúa N. P., dry south part, Mal. traps, 100–180 m, 22–29.v.2007, C. van Achterberg & R. de Vries, RMNH'07.

Paratypes. 1 ♀ (CNC), Thailand, Sakhonakorn, Phu-Pan National Park; 3 ♂ (RMNH), same locality than holotype.



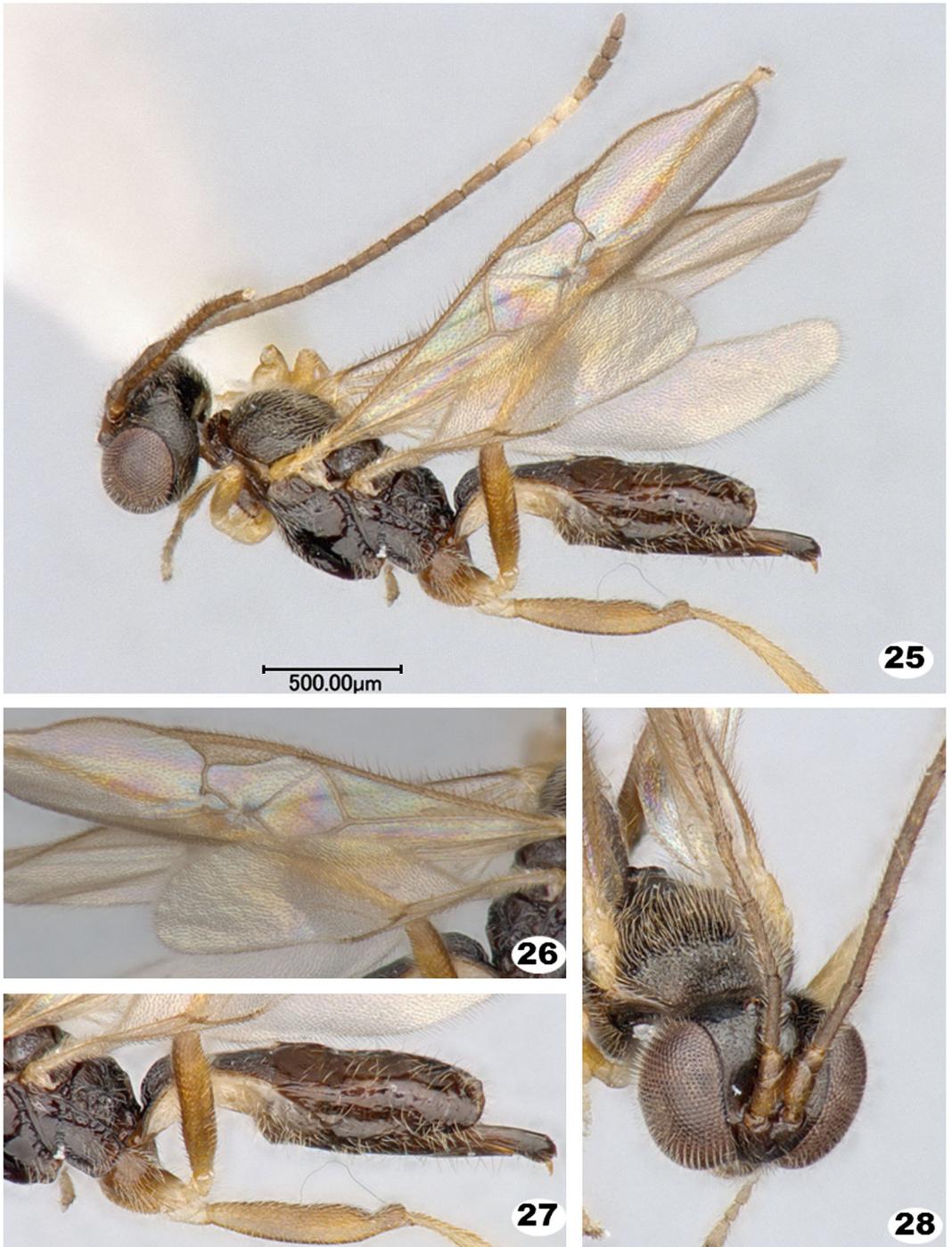
Figs 7–12. *Miropotes lordhowensis*. – 7, habitus; 8, fore wing; 9, dorsal view of metasoma; 10, head, frontal view; 11, dorsal view of head, mesosoma and mediotergite 1; 12, metasoma, lateral view.



Figs 13–18. *Miropotes neglectus*. – 13, habitus; 14, fore wing; 15, dorsal view of metasoma and propodeum; 16, head, frontal view; 17, dorsal view of head and mesosoma; 18, dorsal view of pronotum, with green arrow indicating a notch.



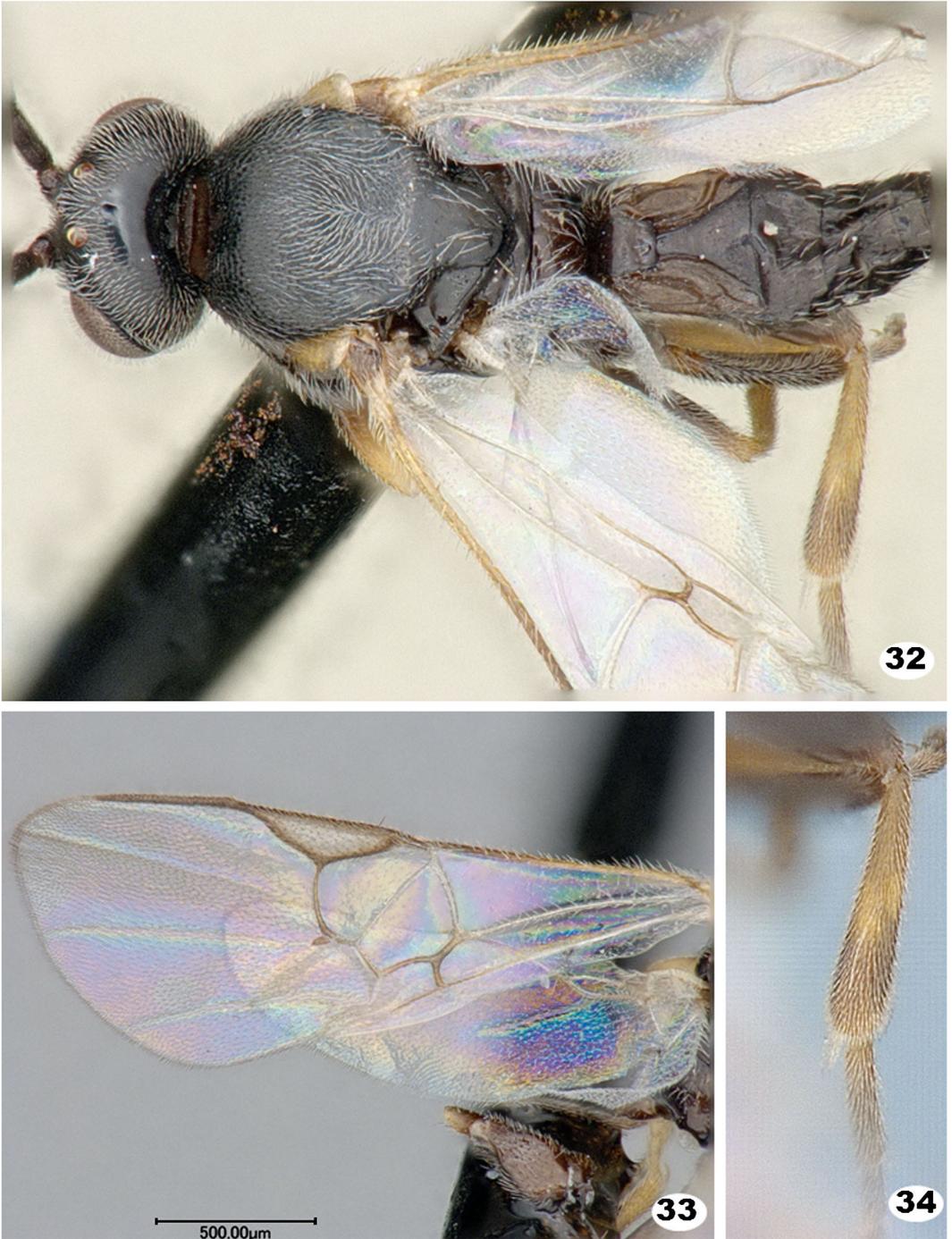
Figs 19–24. *Miropotes orientalis*. – 19, habitus of holotype; 20, fore wing; 21, habitus of paratype; 22, head, frontal view; 23, dorsal view of head, mesosoma and mediotergites 1–3; 24, hypopygium, ovipositor, and ovipositor sheaths, lateral view.



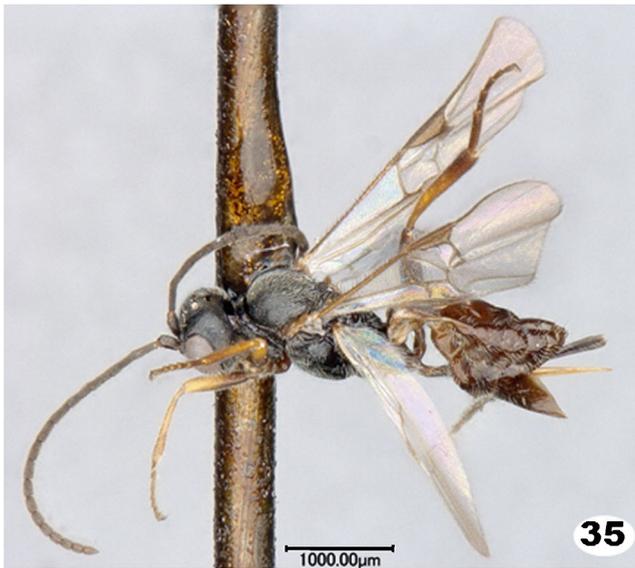
Figs 25–28. *Miropotes boothis*. – 25, habitus; 26, fore wing; 27, lateral view of mesosoma (partially) and metasoma; 28, head, frontal view.



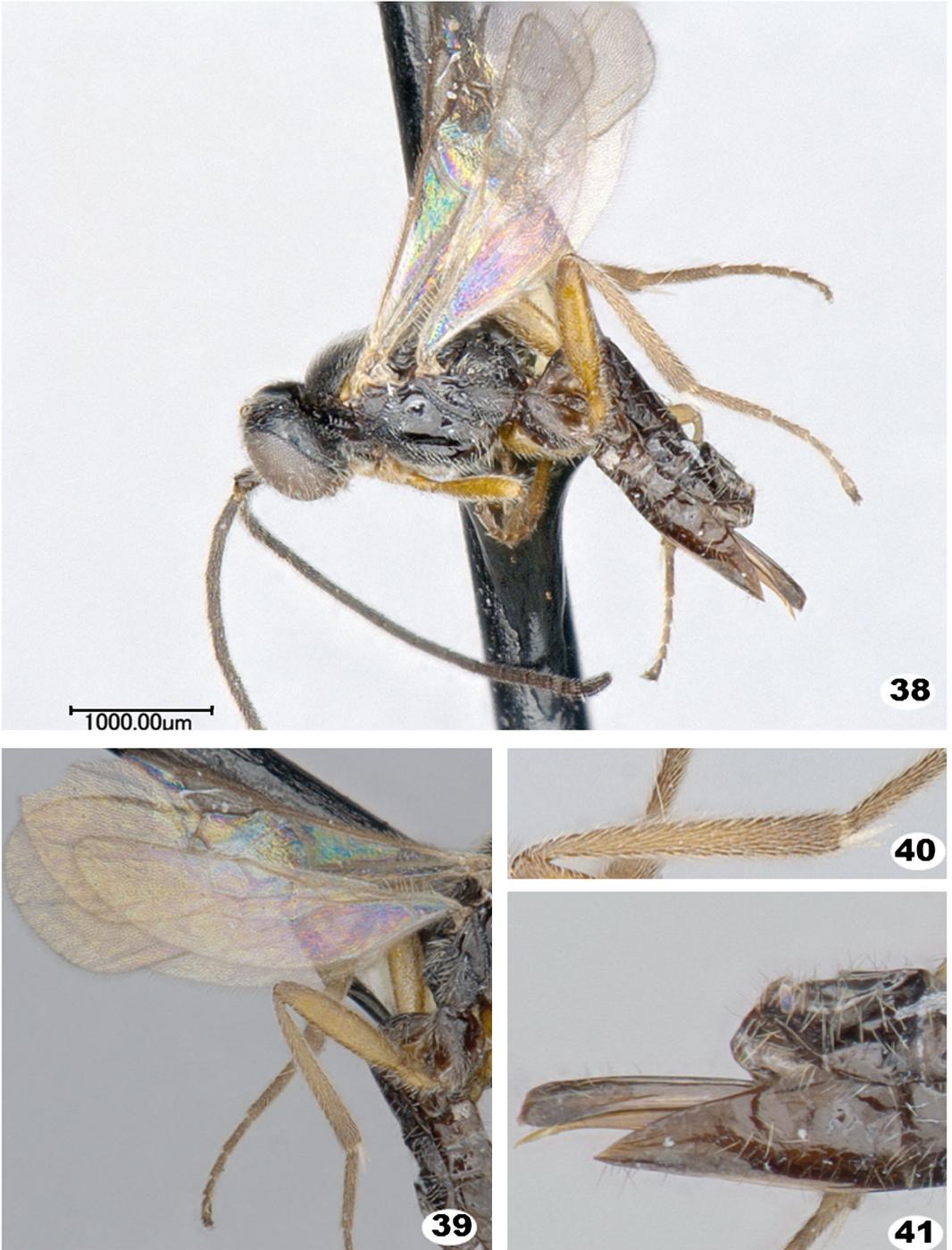
Figs 29–31. *Miropotes burringbaris*. – 29, fore wing; 30, dorsal view of head, mesosoma and mediotergite 1; 31, dorsal view of propodeum and metasoma.



Figs 32–34. *Miropotes goobitis*. – 32, habitus, dorsal view; 33, fore wing; 34, metatibia and metatarsus.



Figs 35–37. *Miropotes petiolaris*. – 35, habitus; 36, dorsal view of head, mesosoma and mediotergites 1–3; 37, dorsal view of propodeum and metasoma.



Figs 38–41. *Miropotes thuriaris*. – 38, habitus; 39, fore wing, and partial lateral view of mesosoma and metasoma; 40, metatibia and metatarsus; 41, hypopygium, ovipositor, and ovipositor sheaths, lateral view.

Description. Female. Body length: 2.0 mm or less or 2.1–2.2 mm. Antenna length: short and stout, not reaching past mediotergite 2. Flagellomere color: with most flagellomere white, at most with flagellomere 2–6 brown. Face width below antennal sockets/head width in anterior view: 0.36–0.40 \times . Eyes: strongly convergent below. Gena: with light (white or yellow) spot next to base of mandible and lower margin of eye. Margin of dorsomedial pronotum: straight. Fore wing areolet: relatively large, subtriangular in shape. Propodeal areola: with only posterior part present and then only indicated by indistinct carinae bounded by striations, rest of propodeum with variable amount of fine striations and intervening smooth area. Metafemur: more than 3.0 \times as long as its maximum width. Sculpture of mediotergites 1–2: mostly sculptured. Mediotergite 1 length/maximum width: more than 2.2 \times . Mediotergite 2 width at posterior margin/length: 1.0 \times . Mediotergite 2 width at posterior margin/width at anterior margin: more than 2.2 \times . Shape of ovipositor tip: strongly bent at 50–80°.

Distribution. Thailand and Vietnam.

Etymology. The name refers to the distribution of the species, the only *Miropotes* known from the Oriental region.

Comments. The two known females differ slightly in size and other morphological characters [Vietnam specimen (holotype): body length 2.1 mm, fore wing length 1.5 mm; T2 width/length 1.8 \times ; ocellar–ocellar line/posterior ocellus diameter 2.9 \times ; interocellar distance/posterior ocellus diameter 2.0 \times ; second flagellomere length/width 3.6 \times ; fourteen flagellomere length/width 1.3 \times . Thailand specimen (paratype): body length 2.3 mm, fore wing length 1.6 mm, T2 width/length 1.5 \times ; ocellar–ocellar line/posterior ocellus diameter 2.4 \times ; interocellar distance/posterior ocellus diameter 1.6 \times ; second flagellomere length/width 3.3 \times ; fourteen flagellomere length/width 1.2 \times]. The extent of the white coloration in the antenna also varies (compare Fig. 19, from the holotype, versus Figs 21 and 23 from the paratype). However, those differences are subtle and the number of specimens examined was very small. Thus, we prefer to keep them as one species for now, until more data and specimens become available.

Miropotes petiolaris (Szépligeti)

Figs 35–37

Microgaster petiolaris Szépligeti, 1905: 48. Lectotype, Australia: “NSW, Sydney, 1900, Biro” HNHM (not examined).

Description. Female. Body length: 2.5–3.6 mm, rarely up to 3.8 mm. Antenna length: reaching to at least T3, basal flagellomeres long and thin. Flag-

ellomere color: uniformly dark brown to black. Face width below antennal sockets/head width in anterior view: 0.46–0.50 \times . Eyes: strongly convergent below. Gena: with light (white or yellow) spot next to base of mandible and lower margin of eye. Margin of dorsomedial pronotum: straight. Fore wing areolet: relatively large, subtriangular in shape. Propodeal areola: with only posterior part present and then only indicated by indistinct carinae bounded by striations, rest of propodeum with variable amount of fine striations and intervening smooth area. Metafemur: more than 3.0 \times as long as its maximum width. Sculpture of mediotergites 1–2: mostly smooth. Mediotergite 1 length/maximum width: more than 2.2 \times . Shape of ovipositor tip: straight or gently curved.

Distribution. Australia, Capital Territory, New South Wales, Northern Territory, Queensland, South Australia, and Western Australia (Austin 1990).

Miropotes thuraris Austin

Figs 38–41

Miropotes thuraris Austin, 1990: 65. Holotype, Australia: “Northern Territory, 1 km E of Corroboree Rock, 23°38'S, 134°16'E, 28.v.1978, J.C. Cardale” ANIC (not examined).

Description. Female. Body length: 2.3–3.6 mm. Antenna length: reaching to at least T3, basal flagellomeres long and thin. Flagellomere color: uniformly dark brown to black. Face width below antennal sockets/head width in anterior view: 0.41–0.45 \times . Eyes: strongly convergent below. Margin of dorsomedial pronotum: straight. Fore wing areolet: relatively large, subtriangular in shape. Propodeal areola: complete and strongly carinate, coarse carinae radiating from areola with rugosity in between, area enclosed by areola with several distinct transverse rugae. Metafemur: more than 3.0 \times as long as its maximum width. Sculpture of mediotergites 1–2: mostly sculptured. Mediotergite 1 length/maximum width: more than 2.2 \times . Mediotergite 2 width at posterior margin/length: 1.1 \times . Mediotergite 2 width at posterior margin/width at anterior margin: more than 2.2 \times . Shape of ovipositor tip: straight or gently curved.

Distribution. Widespread in Australia (New South Wales, Northern Territory, Queensland, South Australia, Tasmania, Victoria, and Western Australia), New Caledonia, Papua New Guinea, and Vanuatu (Austin 1990).

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