

## Ants of the genus *Meranoplus* F. SMITH, 1853 (Hymenoptera: Formicidae): Three new species and others from northeastern Australian rainforests

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### Abstract

*Meranoplus beatonii* sp.n., *M. hoplites* sp.n., and *M. schoedli* sp.n. are described. *Meranoplus hirsutus* MAYR, 1876, *M. dimidiatus* F. SMITH, 1867, and *M. armatus* F. SMITH, 1862 are reviewed. All are illustrated.

**Key words:** Ants, *Meranoplus*, taxonomy, Australia, new species.

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### Introduction

The African, Oriental and Indo-Australian myrmicine ant genus *Meranoplus* is exceptionally species-rich in Australia. There are thirty-eight named continental species (including eighteen described as new by SCHÖDL in press), and many other taxa represented in collections remain undescribed. Perhaps surprisingly, apart from the common *M. hirsutus* MAYR, 1876, the genus is extremely sparsely represented, even rare, in rainforested habitats (TAYLOR 1990, ANDERSEN 2006, SCHÖDL in press).

This paper provides descriptions of three new *Meranoplus* species represented in the Australian National Insect Collection (ANIC) from Queensland rainforest sites. Several more are known in other collections, some of them possibly conspecific with undescribed New Guinean species. The new species described below seem likely to be related to *M. hirsutus*, since all conform to a similar "ground plan". *Meranoplus hirsutus* is illustrated and its distribution summarised, and the very distinctive, previously reviewed (TAYLOR 1990) species *M. dimidiatus* F. SMITH, 1867 and *M. armatus* F. SMITH, 1862 comprehensively illustrated.

### Materials and methods

**Abbreviations:** NP = National Park; SF = State Forest. Some distribution records are reported using 1-degree geographical mapping coordinates. 17 / 145, for example, indicates the mapping grid cell 17° S × 145° E.

**Illustrations:** The standard set of illustrations include (1) lateral view including head, mesosoma and waist nodes, (2) frontal view of head, (3) dorsal view of gaster, (4) dorsal view including head, mesosoma and waist nodes. They include both Scanning Electron Micrographs (SEMs) and Extended Focus (Z-stack) Images (EFIs).

SEM illustrations were prepared using a JEOL JSMU3 scanning electron microscope. EFI illustrations were prepared using an Olympus E330 digital SLR camera, a custom-built stepper stage to position and move subject specimens, and Combine-Z software (www.microscopy.uk.org.uk).

**Measurements and indices:** All measurements are in mm, and were prepared using an eyepiece ruler reading directly at 50× magnification to mm / 100 using a Zeiss stereomicroscope.

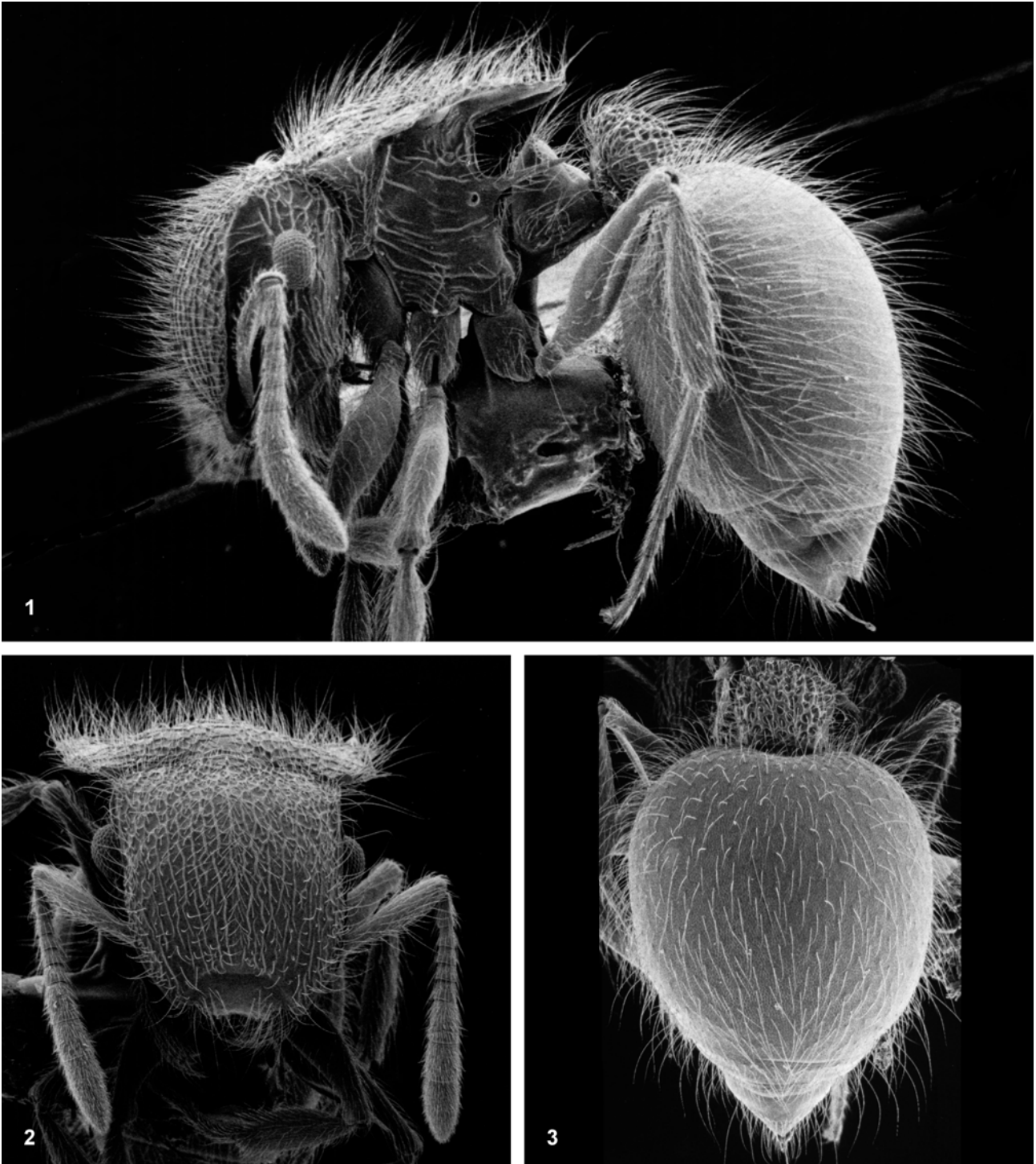
- HW Maximum width of head capsule, full face view, measured at its widest point (usually in *Meranoplus* behind the eyes).
  - HWE Maximum Head Width (across eyes), full face view, across and including the eyes.
  - HL Head Length, full-face view, measured along midline from mid-point of vertex to mid-point of anterior clypeal margin.
  - CI Cephalic Index:  $HW \times 100 / HL$ .
  - EL Maximum length across longest axis of eye, all structural ommatidia included.
  - OI Ocular Index:  $EL \times 100 / HW$ .
  - SL Chord length of scape excluding basal condyle (SL is not easily measured in species with deep antennal scrobes, and some estimation is required. In such cases the term "c." is cited or the measurement is omitted).
  - SI Scape Index:  $SL \times 100 / HW$ .
  - PSW Promesonotal Shield Width; overall maximum width of shield, dorsal view, measured along right-transverse axis spanning its lateral extremities (usually the apices of opposite bilateral spines, or spine-like or lamellar extensions).
  - PSL Promesonotal Shield Length; overall maximum length of shield, dorsal view, measured on axis of midline, between transverse level of anteriormost extremity to transverse level of posteriormost extremity, including spines and spine-like or lamellar extensions (measured to level of apex of pronotal collar when it is the anterior extremity).
  - PSI Promesonotal Shield Index:  $PSW \times 100 / PSL$ .
  - GW Maximum width of gaster (which is sufficiently incompressible in *Meranoplus* to facilitate this measurement).
- PSW and PSL in effect specify the dimensions of a rectangle framing the entire promesonotal shield.

### Discussion of individual species

*Meranoplus hirsutus* MAYR, 1876 (Figs. 1 - 4)

*Meranoplus hirsutus* MAYR, 1876: 112: worker. Type locality: Australia: Gayndah (25 / 151), Queensland.

**Material examined and distribution:** Known from sections of the Great Dividing Range and its eastern flanks



Figs. 1 - 3: *Meranoplus hirsutus*, worker, Lake Eacham NP, Queensland, standard views. HW 0.93; PSL 1.15; GW 1.23.

south from c.15° 45' S in NE Queensland to ca 28° 30' S in NE New South Wales. Typically in rainforest. Elevational range from near sea level to 950 m (Mt. Windsor Tableland) or "800 - 1000 m" (Black Mountain, ESE of Julatten). Workers are not uncommonly encountered foraging diurnally on vegetation, at least to several metres above ground. Nests in soil or rotting wood on the ground or under stones.

ANIC locality records are: Australia: N.E. **Queensland:** (Grid Cell 15 / 145): Moses Creek, N of Mt. Finnigan.

(16 / 145): Black Mt. Rd, Kuranda; Black Mountain, 17 km ESE of Julatten; 8 km SSW of Cape Tribulation; Gold Hill, McDowall Ra; Kuranda; Mossman Bluff Track; Mt. Windsor Tableland. (17 / 145): 6 km N of Atherton; Boar Pocket; Cathedral Fig, 13 km NW of Yungaburra; Koombooloomba; Lake Barrine NP; Lake Eacham NP; Palmers-ton NP; Tully Falls NP; Windin Falls via Butchers Creek; Wongabel SF, 5 km S of Atherton. (18 / 145): Mt. Graham, 8 km N of Abergowrie. (19 / 146): Alligator Creek NP; Crystal Creek, Paluma; Harvey Range Rd 50 km W



Fig. 4: *Meranoplus hirsutus*, worker, Lake Eacham NP, Queensland, dorsal view. PSW 1.41.

Townsville; Mt. Eliot NP. (20 / 148): Cannon Vale. (20 / 149): Cape Hillsborough NP; N Slope of Mt. Ossa. (21 / 148): Blackwood NP near Kuttatbul; Eungella NP. (21 / 149): 10 km N of Koumala, 30 km S of Sarina. (23 / 150): Rockhampton. (24 / 150): Cania Gorge NP. (26 / 152): Glasshouse Mountains; 30 km W of Kilkoy, foot of Blackall Range; Obi Obi Creek near Mapleton. (27 / 152): Mt. Coot-tha, near Brisbane. **New South Wales:** (28 / 153): Blue Knob Mountain, Night Cap Ranges; Mt. Nullum, near Murwillumbah.

Most northern labels specify rainforest, rainforest edges, gallery rainforest or "scrub". In the south, specimens from the Glasshouse Mountains are labeled "dry sclerophyll"; those from Mt. Coot-tha "med sclerophyll", and from Mt. Nullum "dry sclero, under rock in creek bed". The most southern series (Blue Knob Mt.) is labeled "RF" (= rainforest).

**Worker diagnosis:** General features as illustrated. Translucent fenestrae at middle and posterolateral sections of promesonotal shield (Fig. 4); shield not strongly arched in frontal view (Fig. 2). Colour as illustrated – generally medium reddish-brown, gaster brightly orange-brown. A distinctively coloured, spinose and hirsute species, relatively heavily sculptured. No other known *Meranoplus* species with similar general colouration or with HWE less than 1.10 mm is as sharply or brightly bicoloured, none have such well-developed promesonotal spination, and few are anything like as densely pilose. No species with equivalent known distribution is at all similar. *Meranoplus hirsutus* is thus readily recognisable using Figs. 1 - 4. There is no apparently significant discernable geographical variation.

**Measurements of worker:** The smallest and largest specimens (determined by surveying HWE) in a series of 32 workers from 30 km S of Sarina Qld. (ANIC) have the following dimensions: HW 0.83, 1.03; HWE 0.99, 1.23; HL 0.84, 0.98; CI 99, 105; EL 0.17, 0.22; OI 21, 21; PSW 1.24, 1.42; PSL 0.93, 1.12; PSI 125, 126; GW 1.12, 1.52.

**Remarks:** Nomenclature is based on ANIC lectotype-compared vouchers from Lake Eacham NP (17 / 145), Queensland (TAYLOR 1990: 39). Two specimens from this series are illustrated (Figs. 1 - 3 and Fig. 4 respectively).

***Meranoplus beatoni* sp.n.** (Figs. 5 - 8)

**Material examined and distribution:** Known only from the unique holotype, worker. Australia: N.E. Queensland: McDowell Range, 17 km N of Daintree, 16° 06' S, 145° 20' E,



Fig. 5: *Meranoplus beatoni* sp.n., holotype worker, lateral view, see description for dimensions.



Fig. 6: *Meranoplus beatoni* sp.n., holotype worker, head, frontal view, see description for dimensions.

27.XI.1985, leg. G. Monteith, ex Berlese funnel sample, sieved rainforest litter (ANIC: holotype – No. 32-029200).

**Description of worker:** HW 0.80; HWE 0.88; HL 0.73; CI 109; EL 0.19; OI 23; SL 0.53; SI 66; PSW 1.00; PSL 0.77; PSI 130; GW 0.94.

General features as illustrated. Essentially a smaller version of *M. hirsutus*, with a much less well-developed and peripherally elaborated promesonotal shield (cf. Figs. 1 - 4 and 5 - 8). General characteristics otherwise as in *M. hirsutus*, notably the structure and sculpturation of the petiole and postpetiole, which are relatively less massive in *M. beatoni* sp.n. Promesonotal shield differences as illustrated, with all major homologous structures, marginal extensions, fenestrae etc., readily identifiable. Sculpturing of head and promesonotal shield similar, but less reticulate in *M. beatoni* sp.n., with fewer transverse elements between the longitudinal ribs. Gastral dorsum in both species very superficially sculptured and shining; the hair-pits more distinct in *M. hirsutus*. Strongly hirsute, the hairs somewhat relatively short and slightly less abundant than in *M. hirsutus*. Bicoloured much as in *M. hirsutus*, but the ground colour darker and the gaster less brightly differentiated.





Fig. 7: *Meranoplus beatoni* sp.n., holotype worker, gaster, dorsal view, see description for dimensions.



Fig. 8: *Meranoplus beatoni* sp.n., holotype worker, dorsal view, see description for dimensions.

**Remarks:** Named for my long-time friend and colleague Colin D. Beaton. Together we published the first-ever SEMicrographs used for formal illustrations in insect taxonomy (TAYLOR & BEATON 1970), subsequently producing many more (those here probably the last, following the progress of digital photographic technology). We recently together developed the inexpensive EFI equipment used for the first time to illustrate this paper.

***Meranoplus schoedli* sp.n.** (Figs. 9 - 12)

**Material examined and distribution:** Known only from the type locality. Holotype and 18 paratypes, all workers. Australia: N.E. Queensland: Bruce Highway, N Slope of Mt. Ossa, 20° 58' S, 149° 49' E, 28.XI.1976, leg R.J. Kohout (ANIC: holotype – No. 32-029201 and 9 mounted paratypes). Other mounted paratypes in: Australian Museum, Sydney; Los Angeles County Museum, California, USA; Museum d'Histoire Naturelle, Geneva, Switzerland; Museum of Comparative Zoology, Harvard University,



Fig. 9: *Meranoplus schoedli* sp.n., holotype worker, dorsal view, see description for dimensions.

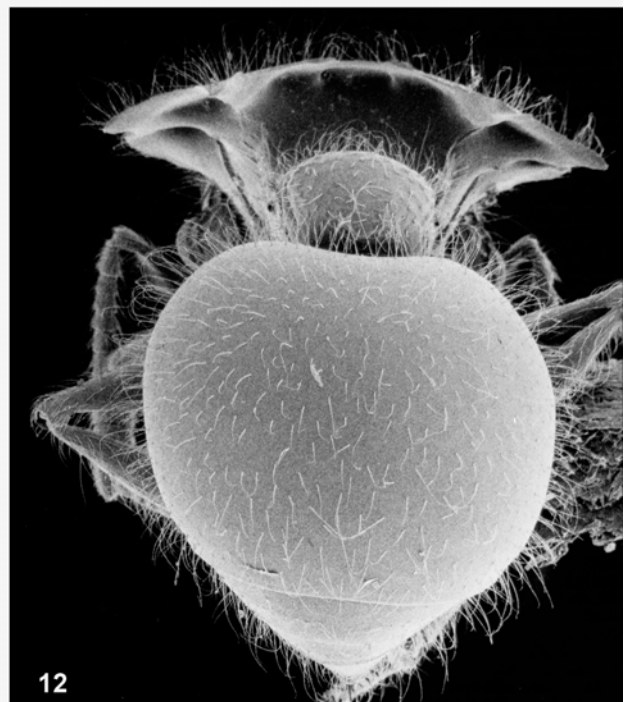
Cambridge, Massachusetts, USA; Natural History Museum, London, U.K.; Naturhistorisches Museum, Vienna, Austria; Queensland Museum, Brisbane; South Australian Museum, Adelaide.

**Description of worker:** The smallest mounted paratype (determined by HW) and the holotype (the largest specimen) have the following dimensions. HW 0.86, 0.90; HWE 1.00, 1.05; HL 0.78, 0.87; CI 110, 103; EL 0.17, 0.19; OI 20, 21; SL c. 0.64, 0.67; SI 74, 74; PSW 1.44, 1.56; PSL 1.19, 1.23; PSI 121, 127; GW 1.21, 1.26. The holotype (Fig. 9) and illustrated paratype (Figs. 10 - 12) both have HW 0.92.

General features as illustrated. Very distinctive from, but readily comparable with *M. hirsutus*. Promesonotal shield differences considerable, as illustrated, but with all major homologous structures, marginal extensions, fenestrae etc., readily identifiable (cf. Figs. 1 - 4 and 9 - 12). General features otherwise much as in *M. hirsutus*, notably the structure and sculpturation of the petiole and postpetiole, which are more massive in *M. schoedli* sp.n., with the postpetiolar sculpturing very superficial, essentially vestigial. Cephalic sculpturing less strongly-developed than in *M. hirsutus* and less reticulate, with fewer transverse elements between the longitudinal ribs. Promesonotal shield of basically similar configuration, differing from *M. hirsutus* as illustrated; generally smooth and strongly shining, with very superficial, vestigial reticulation; the posterolateral fenestrae closed by thin bars of thicker cuticle. Promesonotal dorsum strongly transversely arched in frontal view, quite different from that of *M. hirsutus* (cf. Figs. 2, 11). Gastral dorsum smooth and strongly shining, hair-pits less distinct than in *M. hirsutus*. Strongly hirsute, the hairs more flexuous, generally shorter, finer and slightly less abundant than in *M. hirsutus*. Uniformly dark reddish-brown as illustrated.

**Diagnosis:** No other known *Meranoplus* species except the bizarre and very different northwestern Australian *M. testudineus* MCAREAVEY, 1956 (and similar undescribed species), has such an extended and lightly sculptured promesonotal shield.

**Remarks:** *Meranoplus schoedli* sp.n. is sympatric at its type locality with *M. hirsutus*. The types are from a collection vial which included workers of both species (18 *M. schoedli* sp.n. and 60 *M. hirsutus*). They were presumably collected foraging on vegetation in rainforest.



Figs. 10 - 12: *Meranoplus schoedli* sp.n., workers: (10) lateral view; (11) head, frontal view; (12) gaster, dorsal view (holotype).

**Dedication:** This exceptional species is named for the late Stefan Schödl to honour his excellent contributions to the taxonomy of *Meranoplus*.

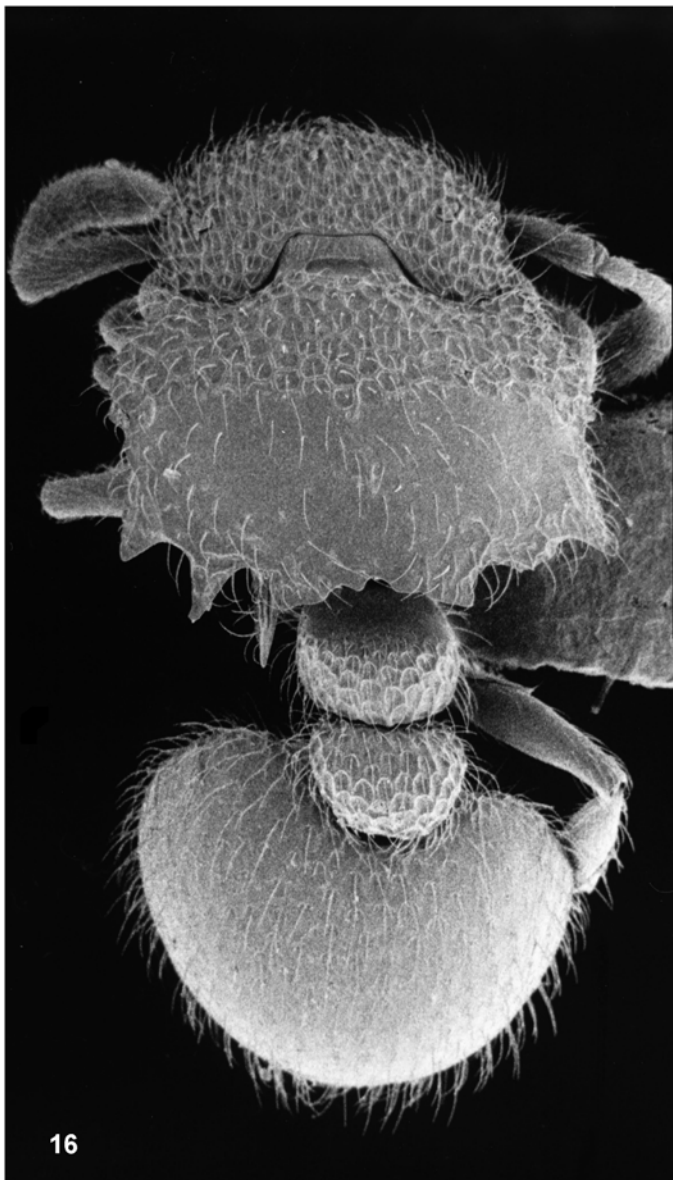
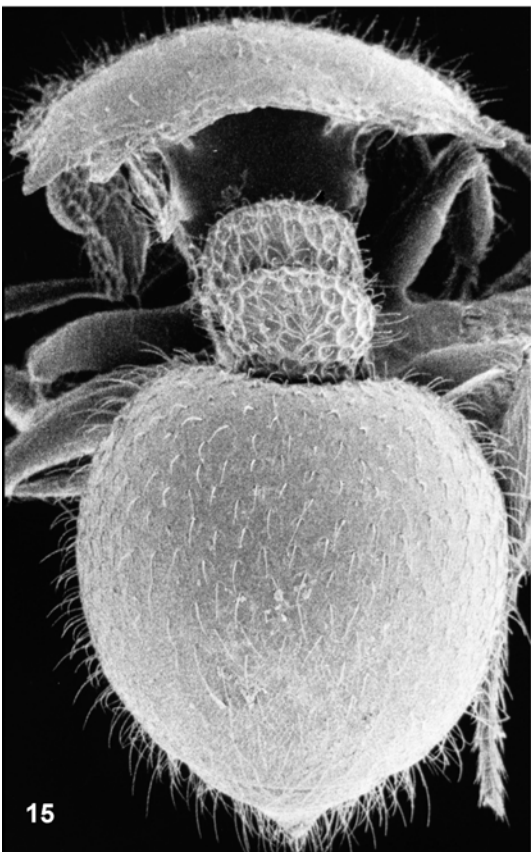
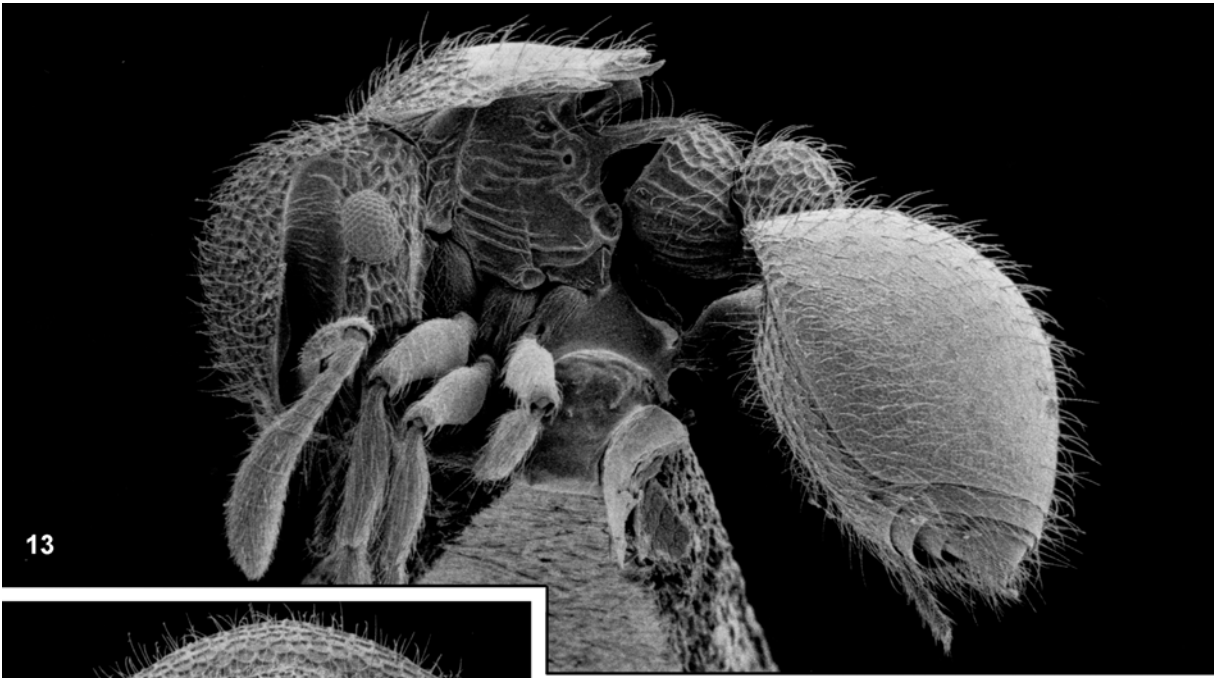
*Meranoplus hoplites* sp.n. (Figs. 13 - 16)

**Material examined and distribution:** Known only from the unique holotype worker. Australia: N.E. Queensland: 9 km ENE of Mt. Tozer, 12° 43' S, 143° 17' E, 5 -10.VII.

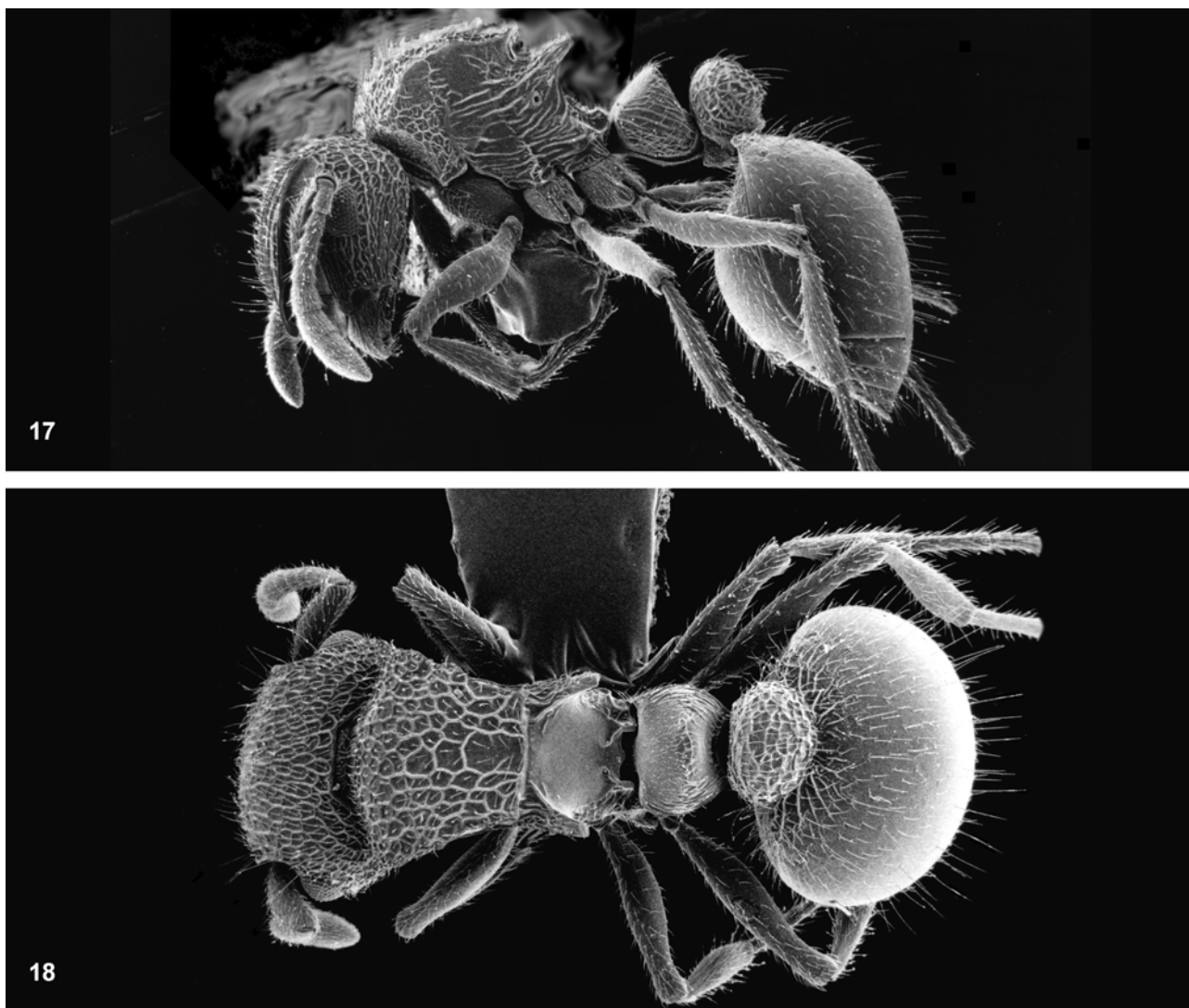
1986, leg. T. Weir, berlesate, forest litter (ANIC, holotype – No. 32-029 202).

**Description of worker:** HW 0.76; HWE 0.84; HL 0.72; CI 105; EL 0.19; OI 12; SL 0.53; SI 69; PSW 1.03; PSL 0.75; PSI 137; GW 0.92.

General features as illustrated. Very distinctive, but readily comparable with *M. hirsutus*, and *M. schoedli* sp.n., described above (compare Figs. 1 - 4, 9 - 12, and 13 - 16);







Figs. 17 - 18: *Meranoplus dimidiatus*, worker, see text for details.

somewhat smaller than either. Promesonotal shield a further variant of the same apparent underlying theme (cf. Figs. 4, 9 and 16); strongly transversely arched (Figs. 11, 12), much as in *M. schoedli* sp.n. Petiolar node more massive and rounded than in the other species discussed here, but with vestiges of the transverse crest seen in the others. Cephalic sculpturing more intense than in *M. hirsutus*; more strongly reticulate and without underlying longitudinal elements. Promesonotal shield very distinctively sculptured; anterior section (approximately half the surface) sculptured similarly to head; posterior section spectacularly different – smooth and strongly shining, with extremely superficial traces of rugosity, which is more distinct in a narrow band following the periphery of the shield; fenestrae much as in *M. schoedli* sp.n. Petiole and postpetiole strongly sculptured, much like anterior surface of promesonotal shield. Gastral dorsum more-or-less shining, but with effaced traces of fine superficial rugosity. Pilosity as illus-

trated, the hairs less dense and much shorter than in the other species described here. Anterolateral margins of first gastral tergite somewhat longitudinally angular, unlike the other species discussed here. Colouration as in *M. beatonii* sp.n.

**Diagnosis:** The remarkable sculpturing of the promesonotal shield immediately distinguishes *M. hoplites* from all other known *Meranoplus* species.

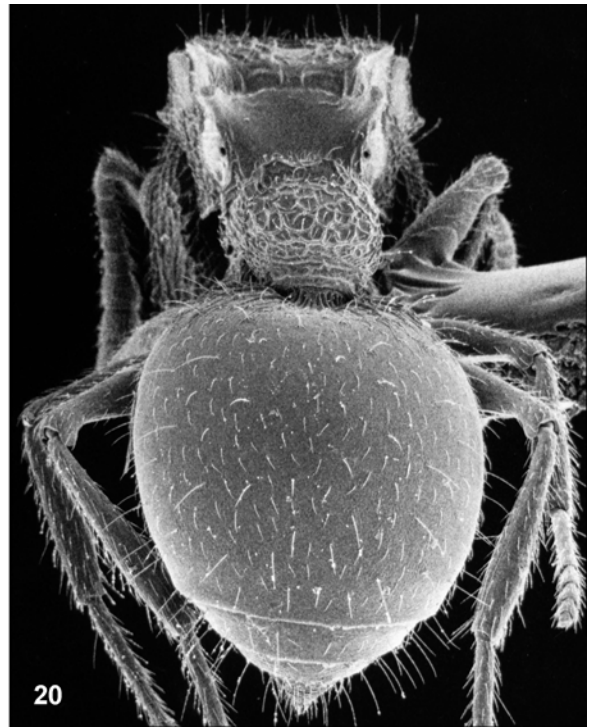
**Etymology:** The name is a noun in apposition (*hoplites* (Gr.) – an armoured soldier).

***Meranoplus dimidiatus* F. SMITH, 1867** (Figs. 17 - 20)

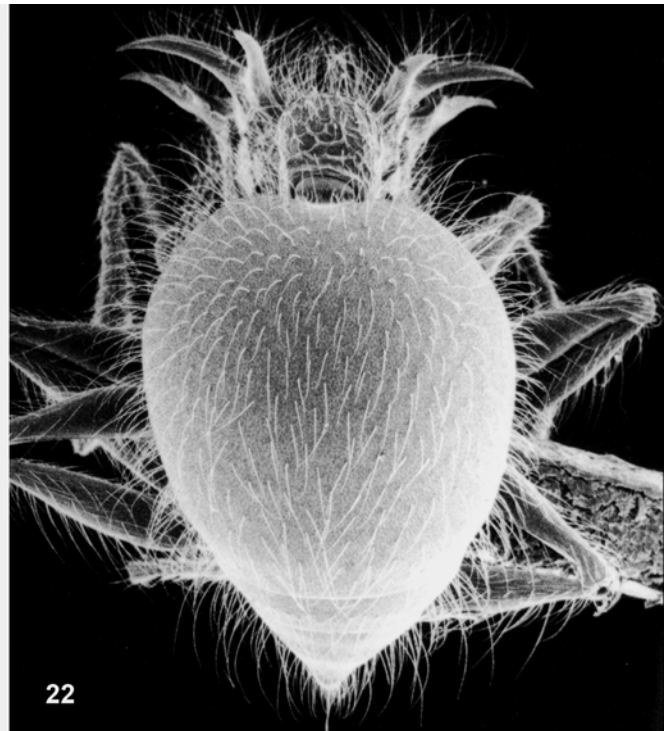
*Meranoplus dimidiatus* F. SMITH, 1867: 527: worker. Type locality: Champion Bay (= Geraldton) (28 / 114), Western Australia.

**Remarks:** The specimen illustrated here is one of those from Katherine, Northern Territory, discussed by TAYLOR (1990). Nomenclature is based on the ANIC holotype-compared vouchers from Barrow Island (20 / 115), Western Australia, established in that paper, which also cites dimensions and other distribution records.

Figs. 13 - 16: *Meranoplus hoplites* sp.n., holotype worker, standard views, see description for dimensions.



Figs. 19 - 20: *Meranoplus dimidiatus*, worker, see text for details.



Figs. 21 - 22: *Meranoplus armatus*, worker, see text for details.

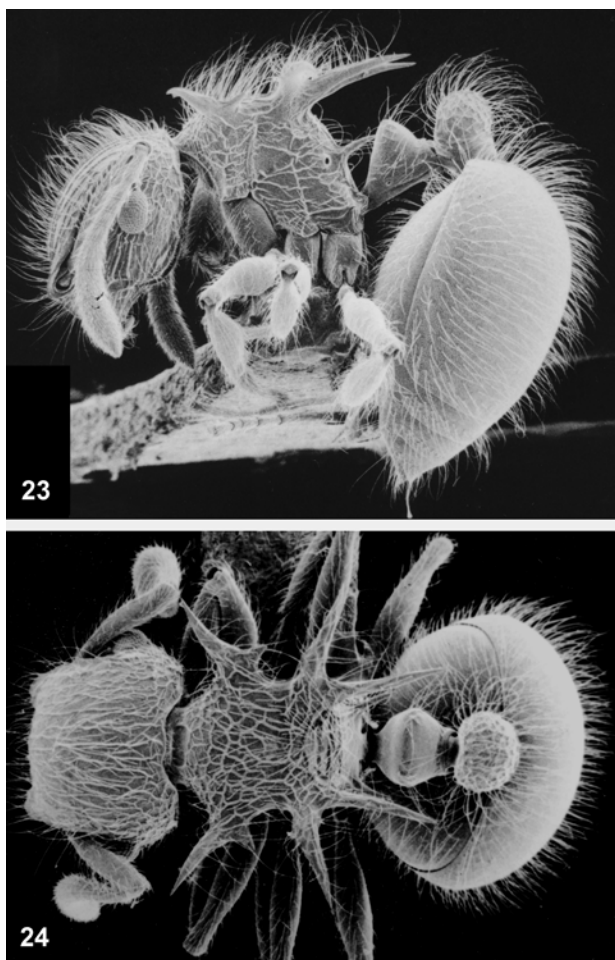
***Meranoplus armatus* F. SMITH, 1862** (Figs. 21 - 24)

*Meranoplus armatus* F. SMITH, 1862: 527, plate XII, fig. 7: worker. Type locality: either Sumatra or Celebes (= Sulawesi), Indonesia.

*Meranoplus rugifrons* EMERY, 1897: 569, plate 1, figs. 13-15: Worker; Type locality: New Guinea. Synonymy by TAYLOR (1990: 35).

**Distribution:** Widespread in Western Melanesia and the Moluccas. Probably indigenous to northern Australia. Reported from Saibai Island (09 / 142), Torres Strait and Iron Range (12 / 143), N. Queensland (TAYLOR 1990). Additional New Guinea records are from grid cells 06 / 143, 06 / 146, 07 / 146, 08 / 147, 08 / 148, 09 / 147, 09 / 148, 09 / 149 (loc.cit.). Sulawesi seems the more likely of the alternative original localities.





Figs. 23 - 24: *Meranoplus armatus*, worker, see text for details.

**Notes:** The illustrated worker is from 3 km E of Gain, Sarawaget Range, Papua New Guinea.

#### Acknowledgements

Colin Beaton developed and built electronic controls for the EFI stepper and associated lighting system, and collabo-

rated in production of the SEM illustrations. Alf Silvestro and Jim Neale provided or constructed EFI stepper components. All are gratefully acknowledged.

#### Zusammenfassung

*Meranoplus beatonii* sp.n., *M. hoplites* sp.n. und *M. schoedli* sp.n. werden erstmals beschrieben. *M. hirsutus* MAYR, 1876, *M. dimidiatus* F. SMITH, 1867 und *M. armatus* F. SMITH, 1862 werden charakterisiert. Alle Arten werden illustriert.

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